

# Digital Image Processing Projects With Matlab Code

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THREE DATA SCIENCE PROJECTS FOR RFM ANALYSIS, K-MEANS CLUSTERING, AND MACHINE LEARNING BASED PREDICTION WITH PYTHON GUI Vivian Siahaan 2022-05-11 PROJECT 1: RFM ANALYSIS AND K-MEANS CLUSTERING: A CASE STUDY ANALYSIS, CLUSTERING, AND PREDICTION ON RETAIL STORE TRANSACTIONS WITH PYTHON GUI The dataset used in this project is the detailed data on sales of consumer goods obtained by ‘scanning’ the bar codes for individual products at electronic points of sale in a retail store. The dataset provides detailed information about quantities, characteristics and values of goods sold as well as their prices. The anonymized dataset includes 64.682 transactions of 5.242 SKU's sold to 22.625 customers during one year. Dataset Attributes are as follows: Date of Sales Transaction, Customer ID, Transaction ID, SKU Category ID, SKU ID, Quantity Sold, and Sales Amount (Unit price times quantity. For unit price, please divide Sales Amount by Quantity). This dataset can be analyzed with RFM analysis and can be clustered using K-Means algorithm. The machine learning models used in this project to predict clusters as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM, Gradient Boosting, XGB, and MLP. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training

accuracy. PROJECT 2: DATA SCIENCE FOR GROCERIES MARKET ANALYSIS, CLUSTERING, AND PREDICTION WITH PYTHON GUI RFM analysis used in this project can be used as a marketing technique used to quantitatively rank and group customers based on the recency, frequency and monetary total of their recent transactions to identify the best customers and perform targeted marketing campaigns. The idea is to segment customers based on when their last purchase was, how often they've purchased in the past, and how much they've spent overall. Clustering, in this case K-Means algorithm, used in this project can be used to place similar customers into mutually exclusive groups; these groups are known as “segments” while the act of grouping is known as segmentation. Segmentation allows businesses to identify the different types and preferences of customers/markets they serve. This is crucial information to have to develop highly effective marketing, product, and business strategies. The dataset in this project has 38765 rows of the purchase orders of people from the grocery stores. These orders can be analyzed with RFM analysis and can be clustered using K-Means algorithm. The machine learning models used in this project to predict clusters as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM, Gradient Boosting, XGB, and MLP. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy. PROJECT 3: ONLINE RETAIL CLUSTERING AND PREDICTION USING MACHINE LEARNING WITH PYTHON GUI The dataset used in this project is a transnational dataset which contains all the transactions occurring between 01/12/2010 and 09/12/2011 for a UK-based and registered non-store online retail. The company mainly sells unique all-occasion gifts. Many customers of the company are wholesalers. You will be using the online retail transnational dataset to build a RFM clustering and choose the best set of customers which the company should target. In this project, you will perform Cohort analysis and RFM analysis. You will also perform clustering using K-Means to get 5 clusters. The machine learning models used in this project to predict clusters as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM, Gradient Boosting, XGB, and MLP. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

Book 1: Practical Data Science Programming for Medical Datasets Analysis and Prediction with Python GUI In this book, you will implement two data science projects using Scikit-Learn, Scipy, and other libraries with Python GUI. In Project 1, you will learn how to use Scikit-Learn, NumPy, Pandas, Seaborn, and other libraries to perform how to predict early stage diabetes using Early Stage Diabetes Risk Prediction Dataset provided by Kaggle. This dataset contains the sign and symptom data of newly diabetic or would be diabetic patient. This has been collected using direct questionnaires from the patients of Sylhet Diabetes Hospital in Sylhet, Bangladesh and approved by a doctor. You will develop a GUI using PyQt5 to plot distribution of features, feature importance, cross validation score, and prediced values versus true values. The machine learning models used in this project are Adaboost, Random Forest, Gradient Boosting, Logistic Regression, and Support Vector Machine. In Project 2, you will learn how to use Scikit-Learn, NumPy, Pandas, and other libraries to perform how to analyze and predict breast cancer using Breast Cancer Prediction Dataset provided by Kaggle. Worldwide, breast cancer is the most common type of cancer in women and the second highest in terms of mortality rates. Diagnosis of breast cancer is performed when an abnormal lump is found (from self-examination or x-ray) or a tiny speck of calcium is seen (on an x-ray). After a suspicious lump is found, the doctor will conduct a diagnosis to determine whether it is cancerous and, if so, whether it has spread to other parts of the body. This breast cancer dataset was obtained from the University of Wisconsin Hospitals, Madison from Dr. William H. Wolberg. You will develop a GUI using PyQt5 to plot distribution of features, pairwise relationship, test scores, prediced values versus true values, confusion matrix, and decision boundary. The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, and Support Vector Machine. Book 2: Step by Step Tutorials For Data Science With Python GUI: Traffic And Heart Attack Analysis And Prediction In this book, you will implement two data science projects using Scikit-Learn, Scipy, and other libraries with Python GUI. In Chapter 1, you will learn how to use Scikit-Learn, Scipy, and other libraries to perform how to predict traffic (number of vehicles) in four different junctions using Traffic Prediction Dataset provided by Kaggle. This dataset contains 48.1k (48120) observations of the number of vehicles each hour in four different junctions: 1) DateTime; 2) Junction; 3) Vehicles; and 4) ID. In Chapter 2, you will learn how to use Scikit-Learn, NumPy, Pandas, and other libraries to perform how to analyze and predict heart attack using Heart

Attack Analysis & Prediction Dataset provided by Kaggle. Book 3: BRAIN TUMOR: Analysis, Classification, and Detection Using Machine Learning and Deep Learning with Python GUI In this project, you will learn how to use Scikit-Learn, TensorFlow, Keras, NumPy, Pandas, Seaborn, and other libraries to implement brain tumor classification and detection with machine learning using Brain Tumor dataset provided by Kaggle. This dataset contains five first order features: Mean (the contribution of individual pixel intensity for the entire image), Variance (used to find how each pixel varies from the neighboring pixel 0, Standard Deviation (the deviation of measured Values or the data from its mean), Skewness (measures of symmetry), and Kurtosis (describes the peak of e.g. a frequency distribution). It also contains eight second order features: Contrast, Energy, ASM (Angular second moment), Entropy, Homogeneity, Dissimilarity, Correlation, and Coarseness. The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, and Support Vector Machine. The deep learning models used in this project are MobileNet and ResNet50. In this project, you will develop a GUI using PyQt5 to plot boundary decision, ROC, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, training loss, and training accuracy.

Digital Image Processing and Analysis Scott E Umbaugh 2017-11-30 Digital image processing and analysis is a field that continues to experience rapid growth, with applications in many facets of our lives. Areas such as medicine, agriculture, manufacturing, transportation, communication systems, and space exploration are just a few of the application areas. This book takes an engineering approach to image processing and analysis, including more examples and images throughout the text than the previous edition. It provides more material for illustrating the concepts, along with new PowerPoint slides. The application development has been expanded and updated, and the related chapter provides step-by-step tutorial examples for this type of development. The new edition also includes supplementary exercises, as well as MATLAB-based exercises, to aid both the reader and student in development of their skills.

**Digital Signal Processing** Lizhe Tan 2013-01-21 Digital Signal Processing, Second Edition enables electrical engineers and technicians in the fields of biomedical, computer, and electronics engineering to master the essential fundamentals of DSP principles and practice. Many instructive worked examples are

used to illustrate the material, and the use of mathematics is minimized for easier grasp of concepts. As such, this title is also useful to undergraduates in electrical engineering, and as a reference for science students and practicing engineers. The book goes beyond DSP theory, to show implementation of algorithms in hardware and software. Additional topics covered include adaptive filtering with noise reduction and echo cancellations, speech compression, signal sampling, digital filter realizations, filter design, multimedia applications, over-sampling, etc. More advanced topics are also covered, such as adaptive filters, speech compression such as PCM, u-law, ADPCM, and multi-rate DSP and over-sampling ADC. New to this edition: MATLAB projects dealing with practical applications added throughout the book New chapter (chapter 13) covering sub-band coding and wavelet transforms, methods that have become popular in the DSP field New applications included in many chapters, including applications of DFT to seismic signals, electrocardiography data, and vibration signals All real-time C programs revised for the TMS320C6713 DSK Covers DSP principles with emphasis on communications and control applications Chapter objectives, worked examples, and end-of-chapter exercises aid the reader in grasping key concepts and solving related problems Website with MATLAB programs for simulation and C programs for real-time DSP

*Digital Image Processing using SCILAB* Rohit M. Thanki 2018-05-07 This book provides basic theories and implementations using SCILAB open-source software for digital images. The book simplifies image processing theories and well as implementation of image processing algorithms, making it accessible to those with basic knowledge of image processing. This book includes many SCILAB programs at the end of each theory, which help in understanding concepts. The book includes more than sixty SCILAB programs of the image processing theory. In the appendix, readers will find a deeper glimpse into the research areas in the image processing.

*A Course on Digital Image Processing with MATLAB* P. K. Thiruvikraman 2019 Concentrating on the principles and techniques of image processing, this book provides an in-depth presentation of key topics, including many techniques not included in introductory texts. Practical implementation of the various image processing algorithms is an important step in learning the subject, and computer packages such as MATLAB facilitate this without the need to learn more complex programming languages. Whilst two

chapters are devoted to the MATLAB programming environment and the image processing toolbox, the use of image processing algorithms using MATLAB is emphasised throughout the book, and every chapter is accompanied by a collection of exercises and programming assignments. Including coverage of colour and video image processing as well as object recognition, the book is augmented with supplementary MATLAB code and hints and solutions to problems are also provided.

**Practical MATLAB** Irfan Turk 2019-10-29 Apply MATLAB programming to the mathematical modeling of real-life problems from a wide range of topics. This pragmatic book shows you how to solve your programming problems, starting with a brief primer on MATLAB and the fundamentals of the MATLAB programming language. Then, you'll build fully working examples and computational models found in the financial, engineering, and scientific sectors. As part of this section, you'll cover signal and image processing, as well as GUIs. After reading and using Practical MATLAB and its accompanying source code, you'll have the practical know-how and code to apply to your own MATLAB programming projects.

**What You Will Learn** Discover the fundamentals of MATLAB and how to get started with it for problem solving  
Apply MATLAB to a variety of problems and case studies  
Carry out economic and financial modeling with MATLAB, including option pricing and compound interest  
Use MATLAB for simulation problems such as coin flips, dice rolling, random walks, and traffic flows  
Solve computational biology problems with MATLAB  
Implement signal processing with MATLAB, including currents, Fast Fourier Transforms (FFTs), and harmonic analysis  
Process images with filters and edge detection  
Build applications with GUIs  
**Who This Book Is For** People with some prior experience with programming and MATLAB.

## **5 FIVE DATA SCIENCE PROJECTS FOR ANALYSIS, CLASSIFICATION, PREDICTION, AND SENTIMENT**

### **ANALYSIS WITH PYTHON GUI** Vivian Siahaan 2022-04-29 **PROJECT 1: SUPERMARKET SALES**

**ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON GUI** The dataset used in this project consists of the growth of supermarkets with high market competitions in most populated cities. The dataset is one of the historical sales of supermarket company which has recorded in 3 different branches for 3 months data. Predictive data analytics methods are easy to apply with this dataset. Attribute information in the dataset are as follows: Invoice id: Computer generated sales slip invoice identification number; Branch: Branch of supercenter (3 branches are available identified by A, B and C);

City: Location of supercenters; Customer type: Type of customers, recorded by Members for customers using member card and Normal for without member card; Gender: Gender type of customer; Product line: General item categorization groups - Electronic accessories, Fashion accessories, Food and beverages, Health and beauty, Home and lifestyle, Sports and travel; Unit price: Price of each product in \$; Quantity: Number of products purchased by customer; Tax: 5% tax fee for customer buying; Total: Total price including tax; Date: Date of purchase (Record available from January 2019 to March 2019); Time: Purchase time (10am to 9pm); Payment: Payment used by customer for purchase (3 methods are available – Cash, Credit card and Ewallet); COGS: Cost of goods sold; Gross margin percentage: Gross margin percentage; Gross income: Gross income; and Rating: Customer stratification rating on their overall shopping experience (On a scale of 1 to 10). In this project, you will perform predicting rating using machine learning. The machine learning models used in this project to predict clusters as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM, Gradient Boosting, XGB, and MLP. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

### PROJECT 2: DETECTING CYBERBULLYING TWEETS USING MACHINE LEARNING AND DEEP LEARNING WITH PYTHON GUI

As social media usage becomes increasingly prevalent in every age group, a vast majority of citizens rely on this essential medium for day-to-day communication. Social media's ubiquity means that cyberbullying can effectively impact anyone at any time or anywhere, and the relative anonymity of the internet makes such personal attacks more difficult to stop than traditional bullying. On April 15th, 2020, UNICEF issued a warning in response to the increased risk of cyberbullying during the COVID-19 pandemic due to widespread school closures, increased screen time, and decreased face-to-face social interaction. The statistics of cyberbullying are outright alarming: 36.5% of middle and high school students have felt cyberbullied and 87% have observed cyberbullying, with effects ranging from decreased academic performance to depression to suicidal thoughts. In light of all of this, this dataset contains more than 47000 tweets labelled according to the class of cyberbullying: Age; Ethnicity; Gender; Religion; Other type of cyberbullying; and Not cyberbullying. The data has been balanced in order to contain ~8000 of each class. The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine,

Adaboost, LGBM classifier, Gradient Boosting, XGB classifier, LSTM, and CNN. Three feature scaling used in machine learning are raw, minmax scaler, and standard scaler. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, decision boundaries, performance of the model, scalability of the model, training loss, and training accuracy.

### PROJECT 3: HIGHER EDUCATION STUDENT ACADEMIC PERFORMANCE ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON GUI

The dataset used in this project was collected from the Faculty of Engineering and Faculty of Educational Sciences students in 2019. The purpose is to predict students' end-of-term performances using ML techniques. Attribute information in the dataset are as follows: Student ID; Student Age (1: 18-21, 2: 22-25, 3: above 26); Sex (1: female, 2: male); Graduated high-school type: (1: private, 2: state, 3: other); Scholarship type: (1: None, 2: 25%, 3: 50%, 4: 75%, 5: Full); Additional work: (1: Yes, 2: No); Regular artistic or sports activity: (1: Yes, 2: No); Do you have a partner: (1: Yes, 2: No); Total salary if available (1: USD 135-200, 2: USD 201-270, 3: USD 271-340, 4: USD 341-410, 5: above 410); Transportation to the university: (1: Bus, 2: Private car/taxi, 3: bicycle, 4: Other); Accommodation type in Cyprus: (1: rental, 2: dormitory, 3: with family, 4: Other); Mother's education: (1: primary school, 2: secondary school, 3: high school, 4: university, 5: MSc., 6: Ph.D.); Father's education: (1: primary school, 2: secondary school, 3: high school, 4: university, 5: MSc., 6: Ph.D.); Number of sisters/brothers (if available): (1: 1, 2: 2, 3: 3, 4: 4, 5: 5 or above); Parental status: (1: married, 2: divorced, 3: died - one of them or both); Mother's occupation: (1: retired, 2: housewife, 3: government officer, 4: private sector employee, 5: self-employment, 6: other); Father's occupation: (1: retired, 2: government officer, 3: private sector employee, 4: self-employment, 5: other); Weekly study hours: (1: None, 2: <5 hours, 3: 6-10 hours, 4: 11-20 hours, 5: more than 20 hours); Reading frequency (non-scientific books/journals): (1: None, 2: Sometimes, 3: Often); Reading frequency (scientific books/journals): (1: None, 2: Sometimes, 3: Often); Attendance to the seminars/conferences related to the department: (1: Yes, 2: No); Impact of your projects/activities on your success: (1: positive, 2: negative, 3: neutral); Attendance to classes (1: always, 2: sometimes, 3: never); Preparation to midterm exams 1: (1: alone, 2: with friends, 3: not applicable); Preparation to midterm exams 2: (1: closest date to the exam, 2: regularly during the semester, 3: never); Taking notes in classes: (1: never, 2: sometimes, 3: always); Listening in classes: (1: never, 2: sometimes, 3: always); Discussion improves my interest and success in the course: (1: never, 2: sometimes, 3: always); Flip-classroom: (1: not useful, 2: useful, 3: not

applicable); Cumulative grade point average in the last semester (/4.00): (1: <2.00, 2: 2.00-2.49, 3: 2.50-2.99, 4: 3.00-3.49, 5: above 3.49); Expected Cumulative grade point average in the graduation (/4.00): (1: <2.00, 2: 2.00-2.49, 3: 2.50-2.99, 4: 3.00-3.49, 5: above 3.49); Course ID; and OUTPUT: Grade (0: Fail, 1: DD, 2: DC, 3: CC, 4: CB, 5: BB, 6: BA, 7: AA). The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier. Three feature scaling used in machine learning are raw, minmax scaler, and standard scaler. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, decision boundaries, performance of the model, scalability of the model, training loss, and training accuracy.

**PROJECT 4: COMPANY BANKRUPTCY ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON GUI**

The dataset was collected from the Taiwan Economic Journal for the years 1999 to 2009. Company bankruptcy was defined based on the business regulations of the Taiwan Stock Exchange. Attribute information in the dataset are as follows: Y - Bankrupt?: Class label; X1 - ROA(C) before interest and depreciation before interest: Return On Total Assets(C); X2 - ROA(A) before interest and % after tax: Return On Total Assets(A); X3 - ROA(B) before interest and depreciation after tax: Return On Total Assets(B); X4 - Operating Gross Margin: Gross Profit/Net Sales; X5 - Realized Sales Gross Margin: Realized Gross Profit/Net Sales; X6 - Operating Profit Rate: Operating Income/Net Sales; X7 - Pre-tax net Interest Rate: Pre-Tax Income/Net Sales; X8 - After-tax net Interest Rate: Net Income/Net Sales; X9 - Non-industry income and expenditure/revenue: Net Non-operating Income Ratio; X10 - Continuous interest rate (after tax): Net Income-Exclude Disposal Gain or Loss/Net Sales; X11 - Operating Expense Rate: Operating Expenses/Net Sales; X12 - Research and development expense rate: (Research and Development Expenses)/Net Sales X13 - Cash flow rate: Cash Flow from Operating/Current Liabilities; X14 - Interest-bearing debt interest rate: Interest-bearing Debt/Equity; X15 - Tax rate (A): Effective Tax Rate; X16 - Net Value Per Share (B): Book Value Per Share(B); X17 - Net Value Per Share (A): Book Value Per Share(A); X18 - Net Value Per Share (C): Book Value Per Share(C); X19 - Persistent EPS in the Last Four Seasons: EPS-Net Income; X20 - Cash Flow Per Share; X21 - Revenue Per Share (Yuan ¥): Sales Per Share; X22 - Operating Profit Per Share (Yuan ¥): Operating Income Per Share; X23 - Per Share Net profit before tax (Yuan ¥): Pretax Income Per Share; X24 - Realized Sales Gross Profit Growth Rate; X25 - Operating Profit Growth Rate: Operating Income Growth; X26 - After-tax Net Profit

Growth Rate: Net Income Growth; X27 - Regular Net Profit Growth Rate: Continuing Operating Income after Tax Growth; X28 - Continuous Net Profit Growth Rate: Net Income-Excluding Disposal Gain or Loss Growth; X29 - Total Asset Growth Rate: Total Asset Growth; X30 - Net Value Growth Rate: Total Equity Growth; X31 - Total Asset Return Growth Rate Ratio: Return on Total Asset Growth; X32 - Cash Reinvestment %: Cash Reinvestment Ratio X33 - Current Ratio; X34 - Quick Ratio: Acid Test; X35 - Interest Expense Ratio: Interest Expenses/Total Revenue; X36 - Total debt/Total net worth: Total Liability/Equity Ratio; X37 - Debt ratio %: Liability/Total Assets; X38 - Net worth/Assets: Equity/Total Assets; X39 - Long-term fund suitability ratio (A): (Long-term Liability+Equity)/Fixed Assets; X40 - Borrowing dependency: Cost of Interest-bearing Debt; X41 - Contingent liabilities/Net worth: Contingent Liability/Equity; X42 - Operating profit/Paid-in capital: Operating Income/Capital; X43 - Net profit before tax/Paid-in capital: Pretax Income/Capital; X44 - Inventory and accounts receivable/Net value: (Inventory+Accounts Receivables)/Equity; X45 - Total Asset Turnover; X46 - Accounts Receivable Turnover; X47 - Average Collection Days: Days Receivable Outstanding; X48 - Inventory Turnover Rate (times); X49 - Fixed Assets Turnover Frequency; X50 - Net Worth Turnover Rate (times): Equity Turnover; X51 - Revenue per person: Sales Per Employee; X52 - Operating profit per person: Operation Income Per Employee; X53 - Allocation rate per person: Fixed Assets Per Employee; X54 - Working Capital to Total Assets; X55 - Quick Assets/Total Assets; X56 - Current Assets/Total Assets; X57 - Cash/Total Assets; X58 - Quick Assets/Current Liability; X59 - Cash/Current Liability; X60 - Current Liability to Assets; X61 - Operating Funds to Liability; X62 - Inventory/Working Capital; X63 - Inventory/Current Liability X64 - Current Liabilities/Liability; X65 - Working Capital/Equity; X66 - Current Liabilities/Equity; X67 - Long-term Liability to Current Assets; X68 - Retained Earnings to Total Assets; X69 - Total income/Total expense; X70 - Total expense/Assets; X71 - Current Asset Turnover Rate: Current Assets to Sales; X72 - Quick Asset Turnover Rate: Quick Assets to Sales; X73 - Working capital Turnover Rate: Working Capital to Sales; X74 - Cash Turnover Rate: Cash to Sales; X75 - Cash Flow to Sales; X76 - Fixed Assets to Assets; X77 - Current Liability to Liability; X78 - Current Liability to Equity; X79 - Equity to Long-term Liability; X80 - Cash Flow to Total Assets; X81 - Cash Flow to Liability; X82 - CFO to Assets; X83 - Cash Flow to Equity; X84 - Current Liability to Current Assets; X85 - Liability-Assets Flag: 1 if Total Liability exceeds Total Assets, 0 otherwise; X86 - Net Income to Total Assets; X87 - Total assets to GNP price; X88 - No-credit Interval; X89 - Gross Profit to Sales; X90 - Net Income to Stockholder's Equity; X91 -

Liability to Equity; X92 - Degree of Financial Leverage (DFL); X93 - Interest Coverage Ratio (Interest expense to EBIT); X94 - Net Income Flag: 1 if Net Income is Negative for the last two years, 0 otherwise; and X95 - Equity to Liabilities. The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier. Three feature scaling used in machine learning are raw, minmax scaler, and standard scaler. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, decision boundaries, performance of the model, scalability of the model, training loss, and training accuracy.

**PROJECT 5: DATA SCIENCE FOR RAIN CLASSIFICATION AND PREDICTION WITH PYTHON GUI**

This dataset contains about 10 years of daily weather observations from many locations across Australia. RainTomorrow is the target variable to predict. You will determine rain or not in the next day. This column is Yes if the rain for that day was 1mm or more. Observations were drawn from numerous weather stations. The daily observations are available from <http://www.bom.gov.au/climate/data>. The dataset contains 23 attributes. Some of them are as follows: About some of them are: DATE - The date of observation; LOCATION - The common name of the location of the weather station; MINTEMP - The minimum temperature in degrees celsius; MAXTEMP - The maximum temperature in degrees celsius; RAINFALL - The amount of rainfall recorded for the day in mm; EVAPORATION - The so-called Class A pan evaporation (mm) in the 24 hours to 9am; SUNSHINE - The number of hours of bright sunshine in the day; WINDGUESTDIR - The direction of the strongest wind gust in the 24 hours to midnight; WINDGUESTSPEED- The speed (km/h) of the strongest wind gust in the 24 hours to midnight; WINDDIR9AM - Direction of the wind at 9am. The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier. Three feature scaling used in machine learning are raw, minmax scaler, and standard scaler. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, decision boundaries, performance of the model, scalability of the model, training loss, and training accuracy.

## **ANALYSIS AND PREDICTION PROJECTS USING MACHINE LEARNING AND DEEP LEARNING WITH PYTHON**

Vivian Siahaan 2022-02-17 PROJECT 1: DEFAULT LOAN PREDICTION BASED ON CUSTOMER

BEHAVIOR Using Machine Learning and Deep Learning with Python In finance, default is failure to meet the legal obligations (or conditions) of a loan, for example when a home buyer fails to make a mortgage payment, or when a corporation or government fails to pay a bond which has reached maturity. A national or sovereign default is the failure or refusal of a government to repay its national debt. The dataset used in this project belongs to a Hackathon organized by "Univ.AI". All values were provided at the time of the loan application. Following are the features in the dataset: Income, Age, Experience, Married/Single, House\_Ownership, Car\_Ownership, Profession, CITY, STATE, CURRENT\_JOB\_YRS, CURRENT\_HOUSE\_YRS, and Risk\_Flag. The Risk\_Flag indicates whether there has been a default in the past or not. The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, XGB classifier, MLP classifier, and CNN 1D. Finally, you will plot boundary decision, ROC, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

PROJECT 2: AIRLINE PASSENGER SATISFACTION Analysis and Prediction Using Machine Learning and Deep Learning with Python The dataset used in this project contains an airline passenger satisfaction survey. In this case, you will determine what factors are highly correlated to a satisfied (or dissatisfied) passenger and predict passenger satisfaction. Below are the features in the dataset: Gender: Gender of the passengers (Female, Male); Customer Type: The customer type (Loyal customer, disloyal customer); Age: The actual age of the passengers; Type of Travel: Purpose of the flight of the passengers (Personal Travel, Business Travel); Class: Travel class in the plane of the passengers (Business, Eco, Eco Plus); Flight distance: The flight distance of this journey; Inflight wifi service: Satisfaction level of the inflight wifi service (0:Not Applicable;1-5); Departure/Arrival time convenient: Satisfaction level of Departure/Arrival time convenient; Ease of Online booking: Satisfaction level of online booking; Gate location: Satisfaction level of Gate location; Food and drink: Satisfaction level of Food and drink; Online boarding: Satisfaction level of online boarding; Seat comfort: Satisfaction level of Seat comfort; Inflight entertainment: Satisfaction level of inflight entertainment; On-board service: Satisfaction level of On-board service; Leg room service: Satisfaction level of Leg room service; Baggage handling: Satisfaction level of baggage handling; Check-in service: Satisfaction level of Check-in service; Inflight service: Satisfaction level of inflight service; Cleanliness: Satisfaction level of Cleanliness;

Departure Delay in Minutes: Minutes delayed when departure; Arrival Delay in Minutes: Minutes delayed when Arrival; and Satisfaction: Airline satisfaction level (Satisfaction, neutral or dissatisfaction) The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM classifier, Gradient Boosting, XGB classifier, MLP classifier, and CNN 1D. Finally, you will plot boundary decision, ROC, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

**PROJECT 3: CREDIT CARD CHURNING CUSTOMER ANALYSIS AND PREDICTION USING MACHINE LEARNING AND DEEP LEARNING WITH PYTHON** The dataset used in this project consists of more than 10,000 customers mentioning their age, salary, marital\_status, credit card limit, credit card category, etc. There are 20 features in the dataset. In the dataset, there are only 16.07% of customers who have churned. Thus, it's a bit difficult to train our model to predict churning customers. Following are the features in the dataset: 'Attrition\_Flag', 'Customer\_Age', 'Gender', 'Dependent\_count', 'Education\_Level', 'Marital\_Status', 'Income\_Category', 'Card\_Category', 'Months\_on\_book', 'Total\_Relationship\_Count', 'Months\_Inactive\_12\_mon', 'Contacts\_Count\_12\_mon', 'Credit\_Limit', 'Total\_Revolving\_Bal', 'Avg\_Open\_To\_Buy', 'Total\_Amt\_Chng\_Q4\_Q1', 'Total\_Trans\_Amt', 'Total\_Trans\_Ct', 'Total\_Ct\_Chng\_Q4\_Q1', and 'Avg\_Utilization\_Ratio',. The target variable is 'Attrition\_Flag'. The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM classifier, Gradient Boosting, XGB classifier, MLP classifier, and CNN 1D. Finally, you will plot boundary decision, ROC, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

**PROJECT 4: MARKETING ANALYSIS AND PREDICTION USING MACHINE LEARNING AND DEEP LEARNING WITH PYTHON** This data set was provided to students for their final project in order to test their statistical analysis skills as part of a MSc. in Business Analytics. It can be utilized for EDA, Statistical Analysis, and Visualizations. Following are the features in the dataset: ID = Customer's unique identifier; Year\_Birth = Customer's birth year; Education = Customer's education level; Marital\_Status = Customer's marital status; Income = Customer's yearly household income; Kidhome = Number of children in customer's household; Teenhome = Number of teenagers in customer's household;

Dt\_Customer = Date of customer's enrollment with the company; Recency = Number of days since customer's last purchase; MntWines = Amount spent on wine in the last 2 years; MntFruits = Amount spent on fruits in the last 2 years; MntMeatProducts = Amount spent on meat in the last 2 years; MntFishProducts = Amount spent on fish in the last 2 years; MntSweetProducts = Amount spent on sweets in the last 2 years; MntGoldProds = Amount spent on gold in the last 2 years; NumDealsPurchases = Number of purchases made with a discount; NumWebPurchases = Number of purchases made through the company's web site; NumCatalogPurchases = Number of purchases made using a catalogue; NumStorePurchases = Number of purchases made directly in stores; NumWebVisitsMonth = Number of visits to company's web site in the last month; AcceptedCmp3 = 1 if customer accepted the offer in the 3rd campaign, 0 otherwise; AcceptedCmp4 = 1 if customer accepted the offer in the 4th campaign, 0 otherwise; AcceptedCmp5 = 1 if customer accepted the offer in the 5th campaign, 0 otherwise; AcceptedCmp1 = 1 if customer accepted the offer in the 1st campaign, 0 otherwise; AcceptedCmp2 = 1 if customer accepted the offer in the 2nd campaign, 0 otherwise; Response = 1 if customer accepted the offer in the last campaign, 0 otherwise; Complain = 1 if customer complained in the last 2 years, 0 otherwise; and Country = Customer's location. The machine and deep learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM classifier, Gradient Boosting, XGB classifier, MLP classifier, and CNN 1D. Finally, you will plot boundary decision, ROC, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

### PROJECT 5: METEOROLOGICAL DATA ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON

Meteorological phenomena are described and quantified by the variables of Earth's atmosphere: temperature, air pressure, water vapour, mass flow, and the variations and interactions of these variables, and how they change over time. Different spatial scales are used to describe and predict weather on local, regional, and global levels. The dataset used in this project consists of meteorological data with 96453 total number of data points and with 11 attributes/columns. Following are the columns in the dataset: Formatted Date; Summary; Precip Type; Temperature (C); Apparent Temperature (C); Humidity; Wind Speed (km/h); Wind Bearing (degrees); Visibility (km); Pressure (millibars); and Daily Summary. The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes,

Logistic Regression, Decision Tree, Support Vector Machine, LGBM classifier, Gradient Boosting, XGB classifier, and MLP classifier. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

**MATLAB® Recipes for Earth Sciences** Martin H. Trauth 2007 Introduces methods of data analysis in geosciences using MATLAB such as basic statistics for univariate, bivariate and multivariate datasets, jackknife and bootstrap resampling schemes, processing of digital elevation models, gridding and contouring, geostatistics and kriging, processing and georeferencing of satellite images, digitizing from the screen, linear and nonlinear time-series analysis and the application of linear time-invariant and adaptive filters. Includes a brief description of each method and numerous examples demonstrating how MATLAB can be used on data sets from earth sciences.

**Fundamentals of Digital Image Processing** Chris Solomon 2011-07-05 This is an introductory to intermediate level text on the science of image processing, which employs the Matlab programming language to illustrate some of the elementary, key concepts in modern image processing and pattern recognition. The approach taken is essentially practical and the book offers a framework within which the concepts can be understood by a series of well chosen examples, exercises and computer experiments, drawing on specific examples from within science, medicine and engineering. Clearly divided into eleven distinct chapters, the book begins with a fast-start introduction to image processing to enhance the accessibility of later topics. Subsequent chapters offer increasingly advanced discussion of topics involving more challenging concepts, with the final chapter looking at the application of automated image classification (with Matlab examples) . Matlab is frequently used in the book as a tool for demonstrations, conducting experiments and for solving problems, as it is both ideally suited to this role and is widely available. Prior experience of Matlab is not required and those without access to Matlab can still benefit from the independent presentation of topics and numerous examples. Features a companion website [www.wiley.com/go/solomon/fundamentals](http://www.wiley.com/go/solomon/fundamentals) containing a Matlab fast-start primer, further exercises, examples, instructor resources and accessibility to all files corresponding to the examples and exercises within the book itself. Includes numerous examples, graded exercises and computer experiments to

support both students and instructors alike.

**Digital Signal and Image Processing using MATLAB, Volume 1** Gérard Blanchet 2014-07-22 This fully revised and updated second edition presents the most important theoretical aspects of Image and Signal Processing (ISP) for both deterministic and random signals. The theory is supported by exercises and computer simulations relating to real applications. More than 200 programs and functions are provided in the MATLAB language, with useful comments and guidance, to enable numerical experiments to be carried out, thus allowing readers to develop a deeper understanding of both the theoretical and practical aspects of this subject. This fully revised new edition updates : - the introduction to MATLAB programs and functions as well as the Graphically displaying results for 2D displays - Calibration fundamentals for Discrete Time Signals and Sampling in Deterministic signals - image processing by modifying the contrast - also added are examples and exercises.

**Digital Image Processing and Analysis** Scott E Umbaugh 2017-11-30 Digital image processing and analysis is a field that continues to experience rapid growth, with applications in many facets of our lives. Areas such as medicine, agriculture, manufacturing, transportation, communication systems, and space exploration are just a few of the application areas. This book takes an engineering approach to image processing and analysis, including more examples and images throughout the text than the previous edition. It provides more material for illustrating the concepts, along with new PowerPoint slides. The application development has been expanded and updated, and the related chapter provides step-by-step tutorial examples for this type of development. The new edition also includes supplementary exercises, as well as MATLAB-based exercises, to aid both the reader and student in development of their skills.

*Digital Image Processing* Rafael C. Gonzalez 2002 Digital Image Processing has been the leading textbook in its field for more than 20 years. As was the case with the 1977 and 1987 editions by Gonzalez and Wintz, and the 1992 edition by Gonzalez and Woods, the present edition was prepared with students and instructors in mind. The material is timely, highly readable, and illustrated with numerous examples of practical significance. All mainstream areas of image processing are covered, including a totally revised introduction and discussion of image fundamentals, image enhancement in the spatial and frequency

domains, restoration, color image processing, wavelets, image compression, morphology, segmentation, and image description. Coverage concludes with a discussion of the fundamentals of object recognition. Although the book is completely self-contained, a Companion Website (see inside front cover) provides additional support in the form of review material, answers to selected problems, laboratory project suggestions, and a score of other features. A supplementary instructor's manual is available to instructors who have adopted the book for classroom use. New Features \*New chapters on wavelets, image morphology, and color image

Image Processing with ImageJ Jurjen Broeke 2015-11-30 Extract and analyze data from complex images with ImageJ, the world's leading image processing tool About This Book Design automated image-processing solutions and speed up image-processing tasks with ImageJ Create quality and intuitive interfaces for image processing by developing a basic framework for ImageJ plugins. Tackle even the most sophisticated datasets and complex images Who This Book Is For The book has been created for engineers, scientists, and developers eager to tackle image processing with one of the leading tools available. No prior knowledge of ImageJ is needed. Familiarity with Java programming will be required for readers to code their own routines using ImageJ. What You Will Learn Install and set up ImageJ for image processing. Process images using ImageJ's built-in tools Create macros to perform repetitive processing tasks Set up and use an integrated development environment for ImageJ plugins Create plugins with a user-friendly interface for processing Use established ImageJ plugins for processing and quantification Generate a simple interface based on a real world example and create other interfaces for other projects Speed up interface development by setting multiple parameters interactively In Detail Advances in image processing have been vital for the scientific and technological communities, making it possible to analyze images in greater detail than ever before. But as images become larger and more complex, advanced processing techniques are required. ImageJ is built for the modern challenges of image processing – it's one of the key tools in its development, letting you automate basic tasks so you can focus on sophisticated, in depth analysis. This book demonstrates how to put ImageJ into practice. It outlines its key features and demonstrates how to create your own image processing applications using macros and ImageJ plugins. Once you've got to grips with the basics of ImageJ, you'll then discover how to build a number of different image processing solutions. From simple tasks to advanced and automated

image processing, you'll gain confidence with this innovative and powerful tool – however and whatever you are using it for. Style and approach A step-by-step guide to image processing and developing macros and plugins in ImageJ. The book will progress from using the built-in tools to macros and finally plugins for image processing.

**Fuzzy Image Processing and Applications with MATLAB** Tamalika Chaira 2017-12-19 In contrast to classical image analysis methods that employ "crisp" mathematics, fuzzy set techniques provide an elegant foundation and a set of rich methodologies for diverse image-processing tasks. However, a solid understanding of fuzzy processing requires a firm grasp of essential principles and background knowledge. *Fuzzy Image Processing and Applications with MATLAB®* presents the integral science and essential mathematics behind this exciting and dynamic branch of image processing, which is becoming increasingly important to applications in areas such as remote sensing, medical imaging, and video surveillance, to name a few. Many texts cover the use of crisp sets, but this book stands apart by exploring the explosion of interest and significant growth in fuzzy set image processing. The distinguished authors clearly lay out theoretical concepts and applications of fuzzy set theory and their impact on areas such as enhancement, segmentation, filtering, edge detection, content-based image retrieval, pattern recognition, and clustering. They describe all components of fuzzy, detailing preprocessing, threshold detection, and match-based segmentation. *Minimize Processing Errors Using Dynamic Fuzzy Set Theory* This book serves as a primer on MATLAB and demonstrates how to implement it in fuzzy image processing methods. It illustrates how the code can be used to improve calculations that help prevent or deal with imprecision—whether it is in the grey level of the image, geometry of an object, definition of an object's edges or boundaries, or in knowledge representation, object recognition, or image interpretation. The text addresses these considerations by applying fuzzy set theory to image thresholding, segmentation, edge detection, enhancement, clustering, color retrieval, clustering in pattern recognition, and other image processing operations. Highlighting key ideas, the authors present the experimental results of their own new fuzzy approaches and those suggested by different authors, offering data and insights that will be useful to teachers, scientists, and engineers, among others.

*Digital Signal Processing Using MATLAB & Wavelets* Michael Weeks 2011 Although Digital Signal

Processing (DSP) has long been considered an electrical engineering topic, recent developments have also generated significant interest from the computer science community. DSP applications in the consumer market, such as bioinformatics, the MP3 audio format, and MPEG-based cable/satellite television have fueled a desire to understand this technology outside of hardware circles. Designed for upper division engineering and computer science students as well as practicing engineers and scientists, *Digital Signal Processing Using MATLAB & Wavelets, Second Edition* emphasizes the practical applications of signal processing. Over 100 MATLAB examples and wavelet techniques provide the latest applications of DSP, including image processing, games, filters, transforms, networking, parallel processing, and sound. This Second Edition also provides the mathematical processes and techniques needed to ensure an understanding of DSP theory. Designed to be incremental in difficulty, the book will benefit readers who are unfamiliar with complex mathematical topics or those limited in programming experience. Beginning with an introduction to MATLAB programming, it moves through filters, sinusoids, sampling, the Fourier transform, the z-transform and other key topics. Two chapters are dedicated to the discussion of wavelets and their applications. A CD-ROM (platform independent) accompanies the book and contains source code, projects for each chapter, and the figures from the book.

*Physical Modeling in MATLAB* Allen Downey 2008-01-01 An introductory textbook for people who have not programmed before. Covers basic MATLAB programming with emphasis on modeling and simulation of physical systems.

**Principles of Digital Image Processing** Wilhelm Burger 2013-11-18 This textbook is the third of three volumes which provide a modern, algorithmic introduction to digital image processing, designed to be used both by learners desiring a firm foundation on which to build, and practitioners in search of critical analysis and concrete implementations of the most important techniques. This volume builds upon the introductory material presented in the first two volumes with additional key concepts and methods in image processing. Features: practical examples and carefully constructed chapter-ending exercises; real implementations, concise mathematical notation, and precise algorithmic descriptions designed for programmers and practitioners; easily adaptable Java code and completely worked-out examples for easy inclusion in existing applications; uses ImageJ; provides a supplementary website with the complete Java

source code, test images, and corrections; additional presentation tools for instructors including a complete set of figures, tables, and mathematical elements.

**Hyperspectral Image Analysis** Saurabh Prasad 2020-04-27 This book reviews the state of the art in algorithmic approaches addressing the practical challenges that arise with hyperspectral image analysis tasks, with a focus on emerging trends in machine learning and image processing/understanding. It presents advances in deep learning, multiple instance learning, sparse representation based learning, low-dimensional manifold models, anomalous change detection, target recognition, sensor fusion and super-resolution for robust multispectral and hyperspectral image understanding. It presents research from leading international experts who have made foundational contributions in these areas. The book covers a diverse array of applications of multispectral/hyperspectral imagery in the context of these algorithms, including remote sensing, face recognition and biomedicine. This book would be particularly beneficial to graduate students and researchers who are taking advanced courses in (or are working in) the areas of image analysis, machine learning and remote sensing with multi-channel optical imagery. Researchers and professionals in academia and industry working in areas such as electrical engineering, civil and environmental engineering, geosciences and biomedical image processing, who work with multi-channel optical data will find this book useful.

**Computational Fourier Optics** Jim Bernard Breckinridge 2011 Computational Fourier Optics is a text that shows the reader in a tutorial form how to implement Fourier optical theory and analytic methods on the computer. A primary objective is to give students of Fourier optics the capability of programming their own basic wave optic beam propagations and imaging simulations. The book will also be of interest to professional engineers and physicists learning Fourier optics simulation techniques-either as a self-study text or a text for a short course. For more advanced study, the latter chapters and appendices provide methods and examples for modeling beams and pupil functions with more complicated structure, aberrations, and partial coherence. For a student in a course on Fourier optics, this book is a concise, accessible, and practical companion to any of several excellent textbooks on Fourier optical theory.

*Embedded Image Processing on the TMS320C6000™ DSP* Shehrzad Qureshi 2006-07-20 This is an

application-oriented book includes debugged & efficient C implementations of real-world algorithms, in a variety of languages/environments, offering unique coverage of embedded image processing. covers TI technologies and applies them to an important market (important: features the C6416 DSK) Also covers the EVM should not be lost, especially the C6416 DSK, a much more recent DSP. Algorithms treated here are frequently missing from other image processing texts, in particular Chapter 6 (Wavelets), moreover, efficient fixed-point implementations of wavelet-based algorithms also treated. Provide numerous Visual Studio .NET 2003 C/C++ code, that show how to use MFC, GDI+, and the Intel IPP library to prototype image processing applications

Digital Signal Processing Using MATLAB for Students and Researchers John W. Leis 2011-10-14 Quickly Engages in Applying Algorithmic Techniques to Solve Practical Signal Processing Problems With its active, hands-on learning approach, this text enables readers to master the underlying principles of digital signal processing and its many applications in industries such as digital television, mobile and broadband communications, and medical/scientific devices. Carefully developed MATLAB® examples throughout the text illustrate the mathematical concepts and use of digital signal processing algorithms. Readers will develop a deeper understanding of how to apply the algorithms by manipulating the codes in the examples to see their effect. Moreover, plenty of exercises help to put knowledge into practice solving real-world signal processing challenges. Following an introductory chapter, the text explores: Sampled signals and digital processing Random signals Representing signals and systems Temporal and spatial signal processing Frequency analysis of signals Discrete-time filters and recursive filters Each chapter begins with chapter objectives and an introduction. A summary at the end of each chapter ensures that one has mastered all the key concepts and techniques before progressing in the text. Lastly, appendices listing selected web resources, research papers, and related textbooks enable the investigation of individual topics in greater depth. Upon completion of this text, readers will understand how to apply key algorithmic techniques to address practical signal processing problems as well as develop their own signal processing algorithms. Moreover, the text provides a solid foundation for evaluating and applying new digital processing signal techniques as they are developed.

THREE PROJECTS: Sentiment Analysis and Prediction Using Machine Learning and Deep Learning with

Python GUI Vivian Siahaan 2022-03-21 PROJECT 1: TEXT PROCESSING AND SENTIMENT ANALYSIS USING MACHINE LEARNING AND DEEP LEARNING WITH PYTHON GUI Twitter data used in this project was scraped from February of 2015 and contributors were asked to first classify positive, negative, and neutral tweets, followed by categorizing negative reasons (such as "late flight" or "rude service"). This data was originally posted by Crowdfunder last February and includes tweets about 6 major US airlines. Additionally, Crowdfunder had their workers extract the sentiment from the tweet as well as what the passenger was dissatisfied about if the tweet was negative. The information of main attributes for this project are as follows: `airline_sentiment` : Sentiment classification.(positive, neutral, and negative); `negativereason` : Reason selected for the negative opinion; `airline` : Name of 6 US Airlines('Delta', 'United', 'Southwest', 'US Airways', 'Virgin America', 'American'); and `text` : Customer's opinion. The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier, and LSTM. Three vectorizers used in machine learning are Hashing Vectorizer, Count Vectorizer, and TFIDF Vectorizer. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

PROJECT 2: HOTEL REVIEW: SENTIMENT ANALYSIS USING MACHINE LEARNING AND DEEP LEARNING WITH PYTHON GUI The data used in this project is the data published by Anurag Sharma about hotel reviews that were given by customers. The data is given in two files, a train and test. The train.csv is the training data, containing unique User\_ID for each entry with the review entered by a customer and the browser and device used. The target variable is `Is_Response`, a variable that states whether the customer was happy or not happy while staying in the hotel. This type of variable makes the project to a classification problem. The test.csv is the testing data, contains similar headings as the train data, without the target variable. The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier, and LSTM. Three vectorizers used in machine learning are Hashing Vectorizer, Count Vectorizer, and TFIDF Vectorizer. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

PROJECT 3: STUDENT ACADEMIC PERFORMANCE ANALYSIS AND PREDICTION USING MACHINE

LEARNING WITH PYTHON GUI The dataset used in this project consists of student achievement in secondary education of two Portuguese schools. The data attributes include student grades, demographic, social and school-related features) and it was collected by using school reports and questionnaires. Two datasets are provided regarding the performance in two distinct subjects: Mathematics (mat) and Portuguese language (por). In the two datasets were modeled under binary/five-level classification and regression tasks. Important note: the target attribute G3 has a strong correlation with attributes G2 and G1. This occurs because G3 is the final year grade (issued at the 3rd period), while G1 and G2 correspond to the 1st and 2nd period grades. It is more difficult to predict G3 without G2 and G1, but such prediction is much more useful. Attributes in the dataset are as follows: school - student's school (binary: 'GP' - Gabriel Pereira or 'MS' - Mousinho da Silveira); sex - student's sex (binary: 'F' - female or 'M' - male); age - student's age (numeric: from 15 to 22); address - student's home address type (binary: 'U' - urban or 'R' - rural); famsize - family size (binary: 'LE3' - less or equal to 3 or 'GT3' - greater than 3); Pstatus - parent's cohabitation status (binary: 'T' - living together or 'A' - apart); Medu - mother's education (numeric: 0 - none, 1 - primary education (4th grade), 2 - 5th to 9th grade, 3 - secondary education or 4 - higher education); Fedu - father's education (numeric: 0 - none, 1 - primary education (4th grade), 2 - 5th to 9th grade, 3 - secondary education or 4 - higher education); Mjob - mother's job (nominal: 'teacher', 'health' care related, civil 'services' (e.g. administrative or police), 'at\_home' or 'other'); Fjob - father's job (nominal: 'teacher', 'health' care related, civil 'services' (e.g. administrative or police), 'at\_home' or 'other'); reason - reason to choose this school (nominal: close to 'home', school 'reputation', 'course' preference or 'other'); guardian - student's guardian (nominal: 'mother', 'father' or 'other'); traveltime - home to school travel time (numeric: 1 - <15 min., 2 - 15 to 30 min., 3 - 30 min. to 1 hour, or 4 - >1 hour); studytime - weekly study time (numeric: 1 - <2 hours, 2 - 2 to 5 hours, 3 - 5 to 10 hours, or 4 - >10 hours); failures - number of past class failures (numeric: n if  $1 \leq n < 3$ , else 4); schoolsup - extra educational support (binary: yes or no); famsup - family educational support (binary: yes or no); paid - extra paid classes within the course subject (Math or Portuguese) (binary: yes or no); activities - extra-curricular activities (binary: yes or no); nursery - attended nursery school (binary: yes or no); higher - wants to take higher education (binary: yes or no); internet - Internet access at home (binary: yes or no); romantic - with a romantic relationship (binary: yes or no); famrel - quality of family relationships (numeric: from 1 - very bad to 5 - excellent); freetime - free time after school (numeric: from 1 - very low to 5 - very high); goout - going out

with friends (numeric: from 1 - very low to 5 - very high); Dalc - workday alcohol consumption (numeric: from 1 - very low to 5 - very high); Walc - weekend alcohol consumption (numeric: from 1 - very low to 5 - very high); health - current health status (numeric: from 1 - very bad to 5 - very good); absences - number of school absences (numeric: from 0 to 93); G1 - first period grade (numeric: from 0 to 20); G2 - second period grade (numeric: from 0 to 20); and G3 - final grade (numeric: from 0 to 20, output target). The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier. Three feature scaling used in machine learning are raw, minmax scaler, and standard scaler. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, decision boundaries, performance of the model, scalability of the model, training loss, and training accuracy.

*Digital Signal and Image Processing* Tamal Bose 2004 Introducing the first text to integrate the topics of digital signal processing (DSP), digital image processing (DIP), and adaptive signal processing (ASP)! *Digital Signal and Image Processing* helps students develop a well-rounded understanding of these key areas by focusing on fundamental concepts, mathematical foundations, and advanced algorithms. The presentation is mathematically thorough with clear explanations, numerous examples, illustrations, and applications. In addition to problems, MATLAB-based computer projects are assigned at the end of each chapter, making this book ideal for laboratory-based courses.

Digital Signal Processing Lizhe Tan 2018-10-02 *Digital Signal Processing: Fundamentals and Applications*, Third Edition, not only introduces students to the fundamental principles of DSP, it also provides a working knowledge that they take with them into their engineering careers. Many instructive, worked examples are used to illustrate the material, and the use of mathematics is minimized for an easier grasp of concepts. As such, this title is also useful as a reference for non-engineering students and practicing engineers. The book goes beyond DSP theory, showing the implementation of algorithms in hardware and software. Additional topics covered include adaptive filtering with noise reduction and echo cancellations, speech compression, signal sampling, digital filter realizations, filter design, multimedia applications, over-sampling, etc. More advanced topics are also covered, such as adaptive filters, speech compression such

as PCM,  $\mu$ -law, ADPCM, and multi-rate DSP, over-sampling ADC subband coding, and wavelet transform. Covers DSP principles with an emphasis on communications and control applications Includes chapter objectives, worked examples, and end-of-chapter exercises that aid the reader in grasping key concepts and solving related problems Provides an accompanying website with MATLAB programs for simulation and C programs for real-time DSP Presents new problems of varying types and difficulties

Information and Software Technologies Audrius Lopata 2020-10-08 This book constitutes the refereed proceedings of the 26th International Conference on Information and Software Technologies, ICIST 2020, held in Kaunas, Lithuania, in October 2020. The 23 full papers and 7 short papers presented were carefully reviewed and selected from 78 submissions. The papers are organized in topical sections on business intelligence for information and software system; software engineering; information technology applications.

Digital Image Interpolation in Matlab Chi-Wah Kok 2019-03-19 This book provides a comprehensive study in digital image interpolation with theoretical, analytical and Matlab® implementation. It includes all historically and practically important interpolation algorithms, accompanied with Matlab® source code on a website, which will assist readers to learn and understand the implementation details of each presented interpolation algorithm. Furthermore, sections in fundamental signal processing theories and image quality models are also included. The authors intend for the book to help readers develop a thorough consideration of the design of image interpolation algorithms and applications for their future research in the field of digital image processing. Introduces a wide range of traditional and advanced image interpolation methods concisely and provides thorough treatment of theoretical foundations Discusses in detail the assumptions and limitations of presented algorithms Investigates a variety of interpolation and implementation methods including transform domain, edge-directed, wavelet and scale-space, and fractal based methods Features simulation results for comparative analysis, summaries and computational and analytical exercises at the end of each chapter Digital Image Interpolation in Matlab® is an excellent guide for researchers and engineers working in digital imaging and digital video technologies. Graduate students studying digital image processing will also benefit from this practical reference text.

Digital Image Processing D. Sundararajan 2017-10-12 This book offers readers an essential introduction to the fundamentals of digital image processing. Pursuing a signal processing and algorithmic approach, it makes the fundamentals of digital image processing accessible and easy to learn. It is written in a clear and concise manner with a large number of 4 x 4 and 8 x 8 examples, figures and detailed explanations. Each concept is developed from the basic principles and described in detail with equal emphasis on theory and practice. The book is accompanied by a companion website that provides several MATLAB programs for the implementation of image processing algorithms. The book also offers comprehensive coverage of the following topics: Enhancement, Transform processing, Restoration, Registration, Reconstruction from projections, Morphological image processing, Edge detection, Object representation and classification, Compression, and Color processing.

Introduction to Digital Image Processing Alasdair McAndrew 2004 Is an introduction to digital image processing from an elementary perspective. The book covers topics that can be introduced with simple mathematics so students can learn the concepts without getting overwhelmed by mathematical detail.

Digital Image Processing Rafael C. Gonzalez 2018 Introduce your students to image processing with the industry's most prized text For 40 years, Image Processing has been the foundational text for the study of digital image processing. The book is suited for students at the college senior and first-year graduate level with prior background in mathematical analysis, vectors, matrices, probability, statistics, linear systems, and computer programming. As in all earlier editions, the focus of this edition of the book is on fundamentals. The 4th Edition, which celebrates the book's 40th anniversary, is based on an extensive survey of faculty, students, and independent readers in 150 institutions from 30 countries. Their feedback led to expanded or new coverage of topics such as deep learning and deep neural networks, including convolutional neural nets, the scale-invariant feature transform (SIFT), maximally-stable extremal regions (MSERs), graph cuts, k-means clustering and superpixels, active contours (snakes and level sets), and exact histogram matching. Major improvements were made in reorganizing the material on image transforms into a more cohesive presentation, and in the discussion of spatial kernels and spatial filtering. Major revisions and additions were made to examples and homework exercises throughout the book. For the first time, we added MATLAB projects at the end of every chapter, and compiled support packages for

you and your teacher containing, solutions, image databases, and sample code. The support materials for this title can be found at [www.ImageProcessingPlace.com](http://www.ImageProcessingPlace.com)

**Digital Signal Processing** Lawrence R. Rabiner 1972

**Computational Intelligence, Cyber Security and Computational Models. Models and Techniques for Intelligent Systems and Automation** Geetha Ganapathi 2018-09-10 This book constitutes the proceedings of the Third International Conference on Computational Intelligence, Cyber Security, and Computational Models, ICC3 2017, which was held in Coimbatore, India, in December 2017. The 15 papers presented in this volume were carefully reviewed and selected from 63 submissions. They were organized in topical sections named: computational intelligence; cyber security; and computational models.

Computer Vision for Visual Effects Richard J. Radke 2013 This book explores the fundamental computer vision principles and state-of-the-art algorithms used to create cutting-edge visual effects for movies and television. It describes classical computer vision algorithms and recent developments, features more than 200 original images, and contains in-depth interviews with Hollywood visual effects artists that tie the mathematical concepts to real-world filmmaking.

REGRESSION, SEGMENTATION, CLUSTERING, AND PREDICTION PROJECTS WITH PYTHON Vivian Siahaan 2022-02-25 PROJECT 1: TIME-SERIES WEATHER: FORECASTING AND PREDICTION WITH PYTHON Weather data are described and quantified by the variables of Earth's atmosphere: temperature, air pressure, humidity, and the variations and interactions of these variables, and how they change over time. Different spatial scales are used to describe and predict weather on local, regional, and global levels. The dataset used in this project contains weather data for New Delhi, India. This data was taken out from wunderground. It contains various features such as temperature, pressure, humidity, rain, precipitation, etc. The main target is to develop a prediction model accurate enough for forecasting temperature and predicting target variable (condition). Time-series weather forecasting will be done using ARIMA models. The machine learning models used in this project to predict target variable (condition) are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector

Machine, LGBM classifier, Gradient Boosting, XGB classifier, and MLP classifier. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

### PROJECT 2: HOUSE PRICE: ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON

The dataset used in this project is taken from the second chapter of Aurélien Géron's recent book 'Hands-On Machine learning with Scikit-Learn and TensorFlow'. It serves as an excellent introduction to implementing machine learning algorithms because it requires rudimentary data cleaning, has an easily understandable list of variables and sits at an optimal size between being too toyish and too cumbersome. The data contains information from the 1990 California census. Although it may not help you with predicting current housing prices like the Zillow Zestimate dataset, it does provide an accessible introductory dataset for teaching people about the basics of machine learning. The data pertains to the houses found in a given California district and some summary stats about them based on the 1990 census data. Be warned the data aren't cleaned so there are some preprocessing steps required! The columns are as follows: longitude, latitude, housing\_median\_age, total\_rooms, total\_bedrooms, population, households, median\_income, median\_house\_value, and ocean\_proximity. The machine learning models used in this project used to perform regression on median\_house\_value and to predict it as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM classifier, Gradient Boosting, XGB classifier, and MLP classifier. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

### PROJECT 3: CUSTOMER PERSONALITY ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON

Customer Personality Analysis is a detailed analysis of a company's ideal customers. It helps a business to better understand its customers and makes it easier for them to modify products according to the specific needs, behaviors and concerns of different types of customers. Customer personality analysis helps a business to modify its product based on its target customers from different types of customer segments. For example, instead of spending money to market a new product to every customer in the company's database, a company can analyze which customer segment is most likely to buy the product and then market the product only on that particular segment. Following are the features in the dataset: ID

= Customer's unique identifier; Year\_Birth = Customer's birth year; Education = Customer's education level; Marital\_Status = Customer's marital status; Income = Customer's yearly household income; Kidhome = Number of children in customer's household; Teenhome = Number of teenagers in customer's household; Dt\_Customer = Date of customer's enrollment with the company; Recency = Number of days since customer's last purchase; MntWines = Amount spent on wine in the last 2 years; MntFruits = Amount spent on fruits in the last 2 years; MntMeatProducts = Amount spent on meat in the last 2 years; MntFishProducts = Amount spent on fish in the last 2 years; MntSweetProducts = Amount spent on sweets in the last 2 years; MntGoldProds = Amount spent on gold in the last 2 years; NumDealsPurchases = Number of purchases made with a discount; NumWebPurchases = Number of purchases made through the company's web site; NumCatalogPurchases = Number of purchases made using a catalogue; NumStorePurchases = Number of purchases made directly in stores; NumWebVisitsMonth = Number of visits to company's web site in the last month; AcceptedCmp3 = 1 if customer accepted the offer in the 3rd campaign, 0 otherwise; AcceptedCmp4 = 1 if customer accepted the offer in the 4th campaign, 0 otherwise; AcceptedCmp5 = 1 if customer accepted the offer in the 5th campaign, 0 otherwise; AcceptedCmp1 = 1 if customer accepted the offer in the 1st campaign, 0 otherwise; AcceptedCmp2 = 1 if customer accepted the offer in the 2nd campaign, 0 otherwise; Response = 1 if customer accepted the offer in the last campaign, 0 otherwise; and Complain = 1 if customer complained in the last 2 years, 0 otherwise. The target in this project is to perform clustering and predicting to summarize customer segments. In this project, you will perform clustering using KMeans to get 4 clusters. The machine learning models used in this project to perform regression on total number of purchase and to predict clusters as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM, Gradient Boosting, XGB, and MLP. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy. PROJECT 4: CUSTOMER SEGMENTATION, CLUSTERING, AND PREDICTION WITH PYTHON In this project, you will develop a customer segmentation, clustering, and prediction to define marketing strategy. The sample dataset summarizes the usage behavior of about 9000 active credit card holders during the last 6 months. The file is at a customer level with 18 behavioral variables. Following is the Data Dictionary for Credit Card dataset: CUSTID:

Identification of Credit Card holder (Categorical); BALANCE: Balance amount left in their account to make purchases; BALANCEFREQUENCY: How frequently the Balance is updated, score between 0 and 1 (1 = frequently updated, 0 = not frequently updated); PURCHASES: Amount of purchases made from account; ONEOFFPURCHASES: Maximum purchase amount done in one-go; INSTALLMENTSPURCHASES: Amount of purchase done in installment; CASHADVANCE: Cash in advance given by the user; PURCHASESFREQUENCY: How frequently the Purchases are being made, score between 0 and 1 (1 = frequently purchased, 0 = not frequently purchased); ONEOFFPURCHASESFREQUENCY: How frequently Purchases are happening in one-go (1 = frequently purchased, 0 = not frequently purchased); PURCHASESINSTALLMENTSFREQUENCY: How frequently purchases in installments are being done (1 = frequently done, 0 = not frequently done); CASHADVANCEFREQUENCY: How frequently the cash in advance being paid; CASHADVANCETRX: Number of Transactions made with "Cash in Advanced"; PURCHASESTRX: Number of purchase transactions made; CREDITLIMIT: Limit of Credit Card for user; PAYMENTS: Amount of Payment done by user; MINIMUM\_PAYMENTS: Minimum amount of payments made by user; PRCFULLPAYMENT: Percent of full payment paid by user; and TENURE: Tenure of credit card service for user. In this project, you will perform clustering using KMeans to get 5 clusters. The machine learning models used in this project to perform regression on total number of purchase and to predict clusters as target variable are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, LGBM, Gradient Boosting, XGB, and MLP. Finally, you will plot boundary decision, distribution of features, feature importance, cross validation score, and predicted values versus true values, confusion matrix, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

**LAB PRIMER THROUGH MATLAB®** NAVAS, K. A. 2014-02-19 This systematically designed laboratory manual elucidates a number of techniques which help the students carry out various experiments in the field of digital signal processing, digital image processing, digital signal processor and digital communication through MATLAB® in a single volume. A step-wise discussion of the programming procedure using MATLAB® has been carried out in this book. The numerous programming examples for each digital signal processing lab, image processing lab, signal processor lab and digital communication lab have also been included. The book begins with an introductory chapter on MATLAB®, which will be

very useful for a beginner. The concepts are explained with the aid of screenshots. Then it moves on to discuss the fundamental aspects in digital signal processing through MATLAB®, with a special emphasis given to the design of digital filters (FIR and IIR). Finally digital communication and image processing sections in the book help readers to understand the commonly used MATLAB® functions. At the end of this book, some basic experiments using DSP trainer kit have also been included. Audience This book is intended for the undergraduate students of electronics and communication engineering, electronics and instrumentation engineering, and instrumentation and control engineering for their laboratory courses in digital signal processing, image processing and digital communication. Key Features • Includes about 115 different experiments. • Contains several figures to reinforce the understanding of the techniques discussed. • Gives systematic way of doing experiments such as Aim, Theory, Programs, Sample inputs and outputs, Viva voce questions and Examination questions.

Safety, Security, and Reliability of Robotic Systems Brij B. Gupta 2020-12-30 With the increasing demand of robots for industrial and domestic use, it becomes indispensable to ensure their safety, security, and reliability. Safety, Security and Reliability of Robotic Systems: Algorithms, Applications, and Technologies provides a broad and comprehensive coverage of the evolution of robotic systems, as well as industrial statistics and future forecasts. First, it analyzes the safety-related parameters of these systems. Then, it covers security attacks and related countermeasures, and how to establish reliability in these systems. The later sections of the book then discuss various applications of these systems in modern industrial and domestic settings. By the end of this book, you will be familiarized with the theoretical frameworks, algorithms, applications, technologies, and empirical research findings on the safety, security, and reliability of robotic systems, while the book's modular structure and comprehensive material will keep you interested and involved throughout. This book is an essential resource for students, professionals, and entrepreneurs who wish to understand the safe, secure, and reliable use of robotics in real-world applications. It is edited by two specialists in the field, with chapter contributions from an array of experts on robotics systems and applications.

**Practical Image and Video Processing Using MATLAB** Oge Marques 2011-08-04 UP-TO-DATE,  
TECHNICALLY ACCURATE COVERAGE OF ESSENTIAL TOPICS IN IMAGE AND VIDEO

**PROCESSING** This is the first book to combine image and video processing with a practical MATLAB®-oriented approach in order to demonstrate the most important image and video techniques and algorithms. Utilizing minimal math, the contents are presented in a clear, objective manner, emphasizing and encouraging experimentation. The book has been organized into two parts. Part I: Image Processing begins with an overview of the field, then introduces the fundamental concepts, notation, and terminology associated with image representation and basic image processing operations. Next, it discusses MATLAB® and its Image Processing Toolbox with the start of a series of chapters with hands-on activities and step-by-step tutorials. These chapters cover image acquisition and digitization; arithmetic, logic, and geometric operations; point-based, histogram-based, and neighborhood-based image enhancement techniques; the Fourier Transform and relevant frequency-domain image filtering techniques; image restoration; mathematical morphology; edge detection techniques; image segmentation; image compression and coding; and feature extraction and representation. Part II: Video Processing presents the main concepts and terminology associated with analog video signals and systems, as well as digital video formats and standards. It then describes the technically involved problem of standards conversion, discusses motion estimation and compensation techniques, shows how video sequences can be filtered, and concludes with an example of a solution to object detection and tracking in video sequences using MATLAB®. Extra features of this book include: More than 30 MATLAB® tutorials, which consist of step-by-step guides to exploring image and video processing techniques using MATLAB® Chapters supported by figures, examples, illustrative problems, and exercises Useful websites and an extensive list of bibliographical references This accessible text is ideal for upper-level undergraduate and graduate students in digital image and video processing courses, as well as for engineers, researchers, software developers, practitioners, and anyone who wishes to learn about these increasingly popular topics on their own.

Applied Signal Processing Thierry Dutoit 2010-06-10 Applied Signal Processing: A MATLAB-Based Proof of Concept benefits readers by including the teaching background of experts in various applied signal processing fields and presenting them in a project-oriented framework. Unlike many other MATLAB-based textbooks which only use MATLAB to illustrate theoretical aspects, this book provides fully commented MATLAB code for working proofs-of-concept. The MATLAB code provided on the accompanying online

files is the very heart of the material. In addition each chapter offers a functional introduction to the theory required to understand the code as well as a formatted presentation of the contents and outputs of the MATLAB code. Each chapter exposes how digital signal processing is applied for solving a real engineering problem used in a consumer product. The chapters are organized with a description of the problem in its applicative context and a functional review of the theory related to its solution appearing first. Equations are only used for a precise description of the problem and its final solutions. Then a step-by-step MATLAB-based proof of concept, with full code, graphs, and comments follows. The solutions are simple enough for readers with general signal processing background to understand and they use state-of-the-art signal processing principles. *Applied Signal Processing: A MATLAB-Based Proof of Concept* is an ideal companion for most signal processing course books. It can be used for preparing student labs and projects.

Digital Signal Processing Using MATLAB Vinay K. Ingle 2007 This supplement to any standard DSP text is one of the first books to successfully integrate the use of MATLAB® in the study of DSP concepts. In this book, MATLAB® is used as a computing tool to explore traditional DSP topics, and solve problems to gain insight. This greatly expands the range and complexity of problems that students can effectively study in the course. Since DSP applications are primarily algorithms implemented on a DSP processor or software, a fair amount of programming is required. Using interactive software such as MATLAB® makes it possible to place more emphasis on learning new and difficult concepts than on programming algorithms. Interesting practical examples are discussed and useful problems are explored. This updated second edition includes new homework problems and revises the scripts in the book, available functions, and m-files to MATLAB® V7.