

# practical data science with python

**practical data science with python** is an essential approach for professionals aiming to harness the power of data in today's technology-driven world. This discipline combines statistical analysis, machine learning, and data visualization to extract meaningful insights from complex datasets. Python, with its extensive libraries and ease of use, serves as a cornerstone for practical data science applications. This article explores the fundamental concepts, tools, and techniques necessary for effective data science projects using Python. Readers will gain insight into data preprocessing, exploratory data analysis, machine learning model development, and deployment strategies. Additionally, the article highlights best practices and real-world examples that illustrate how practical data science with Python can drive informed decision-making. The following sections provide a structured overview of the key components involved in executing data science workflows efficiently.

- Understanding Practical Data Science with Python
- Essential Python Libraries for Data Science
- Data Collection and Preprocessing Techniques
- Exploratory Data Analysis and Visualization
- Machine Learning with Python
- Model Evaluation and Optimization
- Deployment and Real-World Applications

## Understanding Practical Data Science with Python

Practical data science with Python encompasses the application of data science principles using Python programming language to solve real-world problems. This involves gathering data, cleaning and preparing it, conducting analysis, building predictive models, and interpreting results to support business or research decisions. Python's simplicity and comprehensive ecosystem make it ideal for both beginners and experienced practitioners. By focusing on practical implementations, data scientists can translate theoretical knowledge into actionable insights efficiently.

## Definition and Scope

Data science is an interdisciplinary field that leverages scientific methods, algorithms, and systems to extract knowledge from structured and unstructured data. Practical data science emphasizes usability and application, prioritizing tools and techniques that offer tangible results. Python plays a crucial role in this field due to its versatility and vast support for data manipulation, statistical analysis, and machine learning. The scope of practical data science extends across various domains such as finance, healthcare, marketing, and technology.

## Why Python for Data Science?

Python's popularity in data science is attributed to several factors:

- **Extensive Libraries:** Python offers libraries like NumPy, Pandas, and Scikit-learn that streamline data analysis and modeling.
- **Ease of Learning:** Its clear syntax and readability reduce the learning curve for new data scientists.
- **Community Support:** A large and active community continuously develops tools and shares knowledge.
- **Integration Capabilities:** Python integrates well with other technologies, enabling seamless deployment and automation.

## Essential Python Libraries for Data Science

Effective practical data science with Python relies heavily on key libraries that facilitate different stages of the data science workflow. These libraries provide pre-built functions and optimized data structures, reducing the need to develop algorithms from scratch and enhancing productivity.

### NumPy: Numerical Computing

NumPy is the foundational library for numerical computing in Python. It provides support for large, multi-dimensional arrays and matrices, along with a collection of mathematical functions to operate on these arrays efficiently. NumPy is essential for handling numerical data and performing mathematical operations required in data preprocessing and analysis.

## **Pandas: Data Manipulation and Analysis**

Pandas is designed for data manipulation and analysis, offering data structures like DataFrames and Series that simplify handling tabular data. It supports operations such as filtering, grouping, aggregation, and merging datasets. Pandas is indispensable for cleaning, transforming, and preparing data before modeling.

## **Matplotlib and Seaborn: Data Visualization**

Visualization is crucial in practical data science to understand data distributions and relationships. Matplotlib provides a flexible platform for creating static, animated, and interactive plots, while Seaborn builds on Matplotlib to offer a high-level interface for attractive statistical graphics. Together, they enable insightful visual representations of data.

## **Scikit-learn: Machine Learning**

Scikit-learn is a comprehensive library for implementing machine learning algorithms. It supports classification, regression, clustering, dimensionality reduction, and model evaluation methods. Scikit-learn's consistent API and extensive documentation make it a preferred choice for building and validating predictive models.

## **Data Collection and Preprocessing Techniques**

Data collection and preprocessing are critical first steps in the data science pipeline. Data gathered from various sources often contains inconsistencies, missing values, or noise, which can negatively impact model performance. Practical data science with Python involves systematic preprocessing to ensure data quality and reliability.

### **Data Collection Methods**

Data can be collected from multiple channels including databases, APIs, web scraping, and flat files like CSV or Excel. Python offers libraries such as Requests for API interaction, BeautifulSoup for web scraping, and built-in functions for file handling. Selecting appropriate data sources and methods depends on the project objectives and data availability.

### **Data Cleaning and Transformation**

Cleaning involves addressing missing or duplicate data, correcting inconsistencies, and handling outliers. Transformation may include

normalization, encoding categorical variables, and feature scaling to prepare data for modeling. Pandas provides powerful tools to perform these operations efficiently, facilitating smooth downstream analysis.

## **Feature Engineering**

Feature engineering is the process of creating new variables or modifying existing ones to improve model accuracy. This can involve creating interaction terms, aggregating data, or extracting date/time features. Effective feature engineering requires domain knowledge and exploratory analysis to identify relevant attributes.

## **Exploratory Data Analysis and Visualization**

Exploratory Data Analysis (EDA) is a fundamental step in practical data science with Python aimed at summarizing the main characteristics of a dataset. EDA helps uncover patterns, detect anomalies, and formulate hypotheses for further modeling. Visualization tools enhance the interpretation and communication of these insights.

## **Statistical Summaries**

Statistical summaries such as mean, median, mode, variance, and correlation coefficients provide a quantitative overview of the data. These metrics help identify trends and relationships between variables. Python's Pandas and NumPy libraries offer functions to compute these statistics easily.

## **Visualizing Data Distributions**

Understanding the distribution of variables is vital for selecting appropriate models and preprocessing techniques. Histograms, box plots, and density plots reveal the spread and skewness of data. Seaborn and Matplotlib facilitate the creation of these visualizations with customizable options.

## **Detecting Outliers and Patterns**

Outliers can distort model outcomes, so identifying them through scatter plots and clustering methods is crucial. Visualizing relationships between variables with heatmaps and pair plots helps detect correlations and multicollinearity, guiding feature selection and engineering.

# Machine Learning with Python

Machine learning represents the core of practical data science with Python, enabling predictive analytics and automation. Python's machine learning libraries simplify the development and deployment of models tailored to specific tasks such as classification, regression, and clustering.

## Supervised Learning Algorithms

Supervised learning involves training models on labeled datasets. Common algorithms include linear regression, decision trees, support vector machines, and neural networks. Scikit-learn provides implementations and tools to train, validate, and tune these models efficiently.

## Unsupervised Learning Algorithms

Unsupervised learning deals with unlabeled data to discover hidden structures or groupings. Techniques such as k-means clustering, hierarchical clustering, and principal component analysis are widely used. Python libraries support these methods, facilitating segmentation and dimensionality reduction.

## Model Training and Validation

Training involves feeding data to algorithms to learn patterns, while validation assesses model performance on unseen data. Cross-validation, train-test splits, and hyperparameter tuning are essential to avoid overfitting and enhance generalization. Python's Scikit-learn streamlines these processes through built-in functions.

## Model Evaluation and Optimization

Evaluating and optimizing machine learning models ensures accuracy and robustness in practical data science projects. Python offers diverse metrics and techniques to measure performance and refine models for better predictions.

## Performance Metrics

Depending on the task, different metrics apply. For classification, accuracy, precision, recall, F1-score, and ROC-AUC are standard metrics. Regression models use mean squared error, mean absolute error, and R-squared. Selecting appropriate metrics aligns evaluation with project goals.

## Hyperparameter Tuning

Model parameters that are not learned during training, called hyperparameters, significantly influence performance. Methods such as grid search and random search systematically explore combinations to identify optimal settings. Python's Scikit-learn provides tools to automate hyperparameter tuning.

## Handling Overfitting and Underfitting

Overfitting occurs when a model learns noise instead of the underlying pattern, while underfitting results from insufficient learning. Techniques like regularization, pruning, and early stopping help maintain a balance. Practical data science with Python incorporates these strategies to improve model generalization.

## Deployment and Real-World Applications

Deploying machine learning models into production environments marks the final phase of practical data science with Python. Effective deployment enables organizations to leverage insights continuously and at scale, ensuring real-world impact.

## Model Serialization and Serving

Once trained, models can be serialized using formats such as pickle or joblib for storage and later use. Serving models through APIs or cloud platforms allows integration with applications and systems. Python frameworks like Flask and FastAPI facilitate building lightweight model-serving endpoints.

## Automation and Monitoring

Automating data pipelines and model retraining ensures that predictions remain accurate as new data arrives. Monitoring model performance and data drift helps detect degradation, prompting timely updates. Python's ecosystem supports workflow automation and monitoring tools essential for maintenance.

## Industry Use Cases

Practical data science with Python is applied across various industries:

- **Healthcare:** Predictive analytics for patient outcomes and medical imaging analysis.

- **Finance:** Fraud detection, credit scoring, and algorithmic trading.
- **Retail:** Customer segmentation, demand forecasting, and recommendation systems.
- **Manufacturing:** Predictive maintenance and quality control analytics.

## Frequently Asked Questions

### What are the essential Python libraries for practical data science?

The essential Python libraries for practical data science include NumPy for numerical computations, pandas for data manipulation, Matplotlib and Seaborn for data visualization, Scikit-learn for machine learning, and Jupyter Notebook for interactive coding.

### How can Python be used for data cleaning in data science projects?

Python can be used for data cleaning by utilizing pandas to handle missing values, remove duplicates, convert data types, and normalize data. Techniques such as filtering, applying functions, and using regular expressions help in cleaning messy datasets effectively.

### What practical machine learning algorithms can be implemented using Python in data science?

Python allows implementation of practical machine learning algorithms such as linear regression, logistic regression, decision trees, random forests, support vector machines, k-nearest neighbors, and clustering algorithms like K-means using libraries like Scikit-learn.

### How does Jupyter Notebook facilitate practical data science with Python?

Jupyter Notebook facilitates practical data science by providing an interactive environment where data scientists can write and execute Python code in cells, visualize data inline, document their process with markdown, and share notebooks easily for reproducibility and collaboration.

### What role does data visualization play in practical

## **data science with Python?**

Data visualization helps in understanding data patterns, identifying outliers, and communicating insights effectively. Python libraries like Matplotlib, Seaborn, and Plotly enable creating various types of charts and interactive plots that support exploratory data analysis and decision-making.

## **How can Python be used to handle big data in practical data science scenarios?**

Python can handle big data by integrating with frameworks like PySpark for distributed computing, using Dask for parallel processing, and employing efficient data structures to process large datasets in chunks, enabling scalable data science workflows.

## **What are some best practices for writing practical data science code in Python?**

Best practices include writing clean and modular code, using version control like Git, documenting code and analysis, performing exploratory data analysis before modeling, validating models with proper metrics, and ensuring reproducibility with environments or containers.

## **How can Python help in deploying practical data science models?**

Python helps in deploying data science models by enabling serialization with libraries like pickle or joblib, creating APIs with Flask or FastAPI, integrating models into web applications, and using cloud platforms to host and scale models for production use.

## **Additional Resources**

### *1. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython*

This book by Wes McKinney is a foundational resource for practical data science using Python. It focuses on data manipulation and analysis with essential libraries like Pandas and NumPy. Readers learn how to clean, transform, and visualize data effectively, making it ideal for hands-on data projects.

### *2. Data Science from Scratch: First Principles with Python*

Written by Joel Grus, this book introduces data science concepts by building algorithms and tools from the ground up using Python. It covers important topics such as statistics, machine learning, and data visualization while emphasizing practical implementation. This approach helps readers understand the inner workings of data science techniques.



### 3. *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*

Aurélien Géron's book focuses on applying machine learning techniques in Python with popular libraries. It blends theory and practice, guiding readers through real-world projects involving classification, regression, and deep learning. This title is excellent for data scientists eager to build and deploy models efficiently.

### 4. *Practical Statistics for Data Scientists: 50 Essential Concepts*

Authors Peter Bruce and Andrew Bruce provide a concise guide to statistical methods most relevant for data science. The book covers foundational statistics, exploratory data analysis, and inference techniques using Python-friendly explanations. It's a valuable resource for practitioners needing to apply statistics accurately in their analyses.

### 5. *Effective Python for Data Science: 59 Specific Ways to Write Better Python Code*

This book offers practical tips and best practices tailored for data science projects in Python. It helps readers write more efficient, readable, and maintainable code while working with data pipelines, visualization, and machine learning. The actionable advice makes it useful for data scientists aiming to improve their coding skills.

### 6. *Python Data Science Handbook: Essential Tools for Working with Data*

Jake VanderPlas's comprehensive handbook covers the core Python libraries for data science, including NumPy, Pandas, Matplotlib, Scikit-Learn, and others. It provides detailed examples and explanations for data manipulation, visualization, and machine learning tasks. This book is a go-to reference for practical, everyday data science work.

### 7. *Data Wrangling with Python: Tips and Tools to Make Your Life Easier*

By Jacqueline Kazil and Katharine Jarmul, this book focuses on the critical step of data wrangling in the data science workflow. It teaches how to gather, clean, and prepare data from various sources using Python tools and libraries. The practical examples help data scientists handle real-world messy data effectively.

### 8. *Machine Learning Engineering with Python: Manage the Production Life Cycle of Machine Learning Models*

Andriy Burkov's book addresses the engineering aspects of deploying and maintaining machine learning models. It covers best practices for building scalable, reliable, and maintainable ML systems using Python. This is essential reading for data scientists looking to transition models from development to production.

### 9. *Applied Text Analysis with Python: Enabling Language-Aware Data Products with Machine Learning*

Benjamin Bengfort, Rebecca Bilbro, and Tony Ojeda provide a practical guide to text analysis and natural language processing using Python. The book covers techniques for cleaning, analyzing, and modeling text data to build language-aware applications. It's ideal for data scientists working with unstructured text data in real-world projects.

## **Practical Data Science With Python**

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**practical data science with python: Practical Data Science with Jupyter** Prateek Gupta, 2021-03-01 Solve business problems with data-driven techniques and easy-to-follow Python examples \_ KEY FEATURES \_ Essential coverage on statistics and data science techniques. \_ Exposure to Jupyter, PyCharm, and use of GitHub. \_ Real use-cases, best practices, and smart techniques on the use of data science for data applications. DESCRIPTION \_ This book begins with an introduction to Data Science followed by the Python concepts. The readers will understand how to interact with various database and Statistics concepts with their Python implementations. You will learn how to import various types of data in Python, which is the first step of the data analysis process. Once you become comfortable with data importing, you will \_ clean the dataset and after that will gain an understanding about various visualization charts. This book focuses on how to apply feature engineering techniques to make your data more valuable to an algorithm. The readers will get to know various Machine Learning Algorithms, concepts, Time Series data, and a few real-world case studies. This book also presents some best practices that will help you to be industry-ready. This book focuses on how to practice data science techniques while learning their concepts using Python and Jupyter. This book is a complete answer to the most common question that how can you get started with Data Science instead of explaining Mathematics and Statistics behind the Machine Learning Algorithms. WHAT YOU WILL LEARN \_ Rapid understanding of Python concepts for data science applications. \_ Understand and practice how to run data analysis with data science techniques and algorithms. \_ Learn feature engineering, dealing with different datasets, and most trending machine learning algorithms. \_ Become self-sufficient to perform data science tasks with the best tools and techniques. \_ WHO THIS BOOK IS FOR \_ This book is for a beginner or an experienced professional who is thinking about a career or a career switch to Data Science. Each chapter contains easy-to-follow Python examples. \_ TABLE OF CONTENTS 1. Data Science Fundamentals 2. Installing Software and System Setup 3. Lists and Dictionaries 4. Package, Function, and Loop 5. NumPy Foundation 6. Pandas and DataFrame 7. Interacting with Databases 8. Thinking Statistically in Data Science 9. How to Import Data in Python? 10. Cleaning of Imported Data 11. Data Visualization 12. Data Pre-processing 13. Supervised Machine Learning 14. Unsupervised Machine Learning 15. Handling Time-Series Data 16. Time-Series Methods 17. Case Study-1 18. Case Study-2 19. Case Study-3 20. Case Study-4 21. Python Virtual Environment 22. Introduction to An Advanced Algorithm - CatBoost 23. Revision of All Chapters \_ Learning

**practical data science with python: Practical Data Science with Python** Nathan George, 2021-09-30 Learn to effectively manage data and execute data science projects from start to finish using Python Key Features Understand and utilize data science tools in Python, such as specialized machine learning algorithms and statistical modeling Build a strong data science foundation with the best data science tools available in Python Add value to yourself, your organization, and society by extracting actionable insights from raw data Book Description Practical Data Science with Python teaches you core data science concepts, with real-world and realistic examples, and strengthens your grip on the basic as well as advanced principles of data preparation and storage, statistics, probability theory, machine learning, and Python programming, helping you build a solid foundation to gain proficiency in data science. The book starts with an overview of basic Python skills and then

introduces foundational data science techniques, followed by a thorough explanation of the Python code needed to execute the techniques. You'll understand the code by working through the examples. The code has been broken down into small chunks (a few lines or a function at a time) to enable thorough discussion. As you progress, you will learn how to perform data analysis while exploring the functionalities of key data science Python packages, including pandas, SciPy, and scikit-learn. Finally, the book covers ethics and privacy concerns in data science and suggests resources for improving data science skills, as well as ways to stay up to date on new data science developments. By the end of the book, you should be able to comfortably use Python for basic data science projects and should have the skills to execute the data science process on any data source. What you will learn

- Use Python data science packages effectively
- Clean and prepare data for data science work, including feature engineering and feature selection
- Data modeling, including classic statistical models (such as t-tests), and essential machine learning algorithms, such as random forests and boosted models
- Evaluate model performance
- Compare and understand different machine learning methods
- Interact with Excel spreadsheets through Python
- Create automated data science reports through Python
- Get to grips with text analytics techniques

Who this book is for The book is intended for beginners, including students starting or about to start a data science, analytics, or related program (e.g. Bachelor's, Master's, bootcamp, online courses), recent college graduates who want to learn new skills to set them apart in the job market, professionals who want to learn hands-on data science techniques in Python, and those who want to shift their career to data science. The book requires basic familiarity with Python. A getting started with Python section has been included to get complete novices up to speed.

**practical data science with python: Practical Data Science Cookbook** Prabhanjan Tattar, Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, 2017-06-29 Over 85 recipes to help you complete real-world data science projects in R and Python About This Book Tackle every step in the data science pipeline and use it to acquire, clean, analyze, and visualize your data Get beyond the theory and implement real-world projects in data science using R and Python Easy-to-follow recipes will help you understand and implement the numerical computing concepts Who This Book Is For If you are an aspiring data scientist who wants to learn data science and numerical programming concepts through hands-on, real-world project examples, this is the book for you. Whether you are brand new to data science or you are a seasoned expert, you will benefit from learning about the structure of real-world data science projects and the programming examples in R and Python. What You Will Learn Learn and understand the installation procedure and environment required for R and Python on various platforms Prepare data for analysis by implement various data science concepts such as acquisition, cleaning and munging through R and Python Build a predictive model and an exploratory model Analyze the results of your model and create reports on the acquired data Build various tree-based methods and Build random forest In Detail As increasing amounts of data are generated each year, the need to analyze and create value out of it is more important than ever. Companies that know what to do with their data and how to do it well will have a competitive advantage over companies that don't. Because of this, there will be an increasing demand for people that possess both the analytical and technical abilities to extract valuable insights from data and create valuable solutions that put those insights to use. Starting with the basics, this book covers how to set up your numerical programming environment, introduces you to the data science pipeline, and guides you through several data projects in a step-by-step format. By sequentially working through the steps in each chapter, you will quickly familiarize yourself with the process and learn how to apply it to a variety of situations with examples using the two most popular programming languages for data analysis—R and Python. Style and approach This step-by-step guide to data science is full of hands-on examples of real-world data science tasks. Each recipe focuses on a particular task involved in the data science pipeline, ranging from readying the dataset to analytics and visualization

**practical data science with python: Practical Data Science with Python 3** Ervin Varga, 2019-09-07 Gain insight into essential data science skills in a holistic manner using data engineering

and associated scalable computational methods. This book covers the most popular Python 3 frameworks for both local and distributed (in premise and cloud based) processing. Along the way, you will be introduced to many popular open-source frameworks, like, SciPy, scikitlearn, Numba, Apache Spark, etc. The book is structured around examples, so you will grasp core concepts via case studies and Python 3 code. As data science projects gets continuously larger and more complex, software engineering knowledge and experience is crucial to produce evolvable solutions. You'll see how to create maintainable software for data science and how to document data engineering practices. This book is a good starting point for people who want to gain practical skills to perform data science. All the code will be available in the form of IPython notebooks and Python 3 programs, which allow you to reproduce all analyses from the book and customize them for your own purpose. You'll also benefit from advanced topics like Machine Learning, Recommender Systems, and Security in Data Science. Practical Data Science with Python will empower you analyze data, formulate proper questions, and produce actionable insights, three core stages in most data science endeavors. What You'll Learn Play the role of a data scientist when completing increasingly challenging exercises using Python 3 Work with proven data science techniques/technologies Review scalable software engineering practices to ramp up data analysis abilities in the realm of Big Data Apply theory of probability, statistical inference, and algebra to understand the data science practices Who This Book Is For Anyone who would like to embark into the realm of data science using Python 3.

**practical data science with python: FULL SOURCE CODE: PRACTICAL DATA SCIENCE WITH MYSQL AND PYTHON GUI** Vivian Siahaan, Rismon Hasiholan Sianipar, 2022-08-06 In this project, we provide you with the MySQL version of SQLite sample database named chinook. The chinook sample database is a good database for practicing with SQL, especially SQLite. The detailed description of the database can be found on: <https://www.sqlitetutorial.net/sqlite-sample-database/>. There are 11 tables in the chinook sample database: The employee table stores employees data such as employee id, last name, first name, etc. It also has a field named ReportsTo to specify who reports to whom; customers table stores customers data; invoices & invoice\_items tables: these two tables store invoice data. The invoice table stores invoice header data and the invoice\_items table stores the invoice line items data; The artist table stores artists data. It is a simple table that contains only the artist id and name; The album table stores data about a list of tracks. Each album belongs to one artist. However, one artist may have multiple albums; The media\_type table stores media types such as MPEG audio and AAC audio files; genre table stores music types such as rock, jazz, metal, etc; The track table stores the data of songs. Each track belongs to one album; playlist & playlist\_track tables: The playlist table store data about playlists. Each playlist contains a list of tracks. Each track may belong to multiple playlists. The relationship between the playlist table and track table is many-to-many. The playlist\_track table is used to reflect this relationship. In this project, you will write Python script to create every table and insert rows of data into each of them. You will develop GUI with PyQt5 to each table in the database. You will also create GUI to plot: case distribution of order date by year, quarter, month, week, and day; the distribution of amount by year, quarter, month, week, day, and hour; the bottom/top 10 sales by employee, the bottom/top 10 sales by customer, the bottom/top 10 sales by customer, the bottom/top 10 sales by artist, the bottom/top 10 sales by genre, the bottom/top 10 sales by play list, the bottom/top 10 sales by customer city, the bottom/top 10 sales by customer city, the bottom/top 10 sales by customer city, the payment amount by month with mean and EWM, the average payment amount by every month, and amount payment in all years.

**practical data science with python: Practical Data Science Programming for Medical Datasets Analysis and Prediction with Python GUI** Vivian Siahaan, Rismon Hasiholan Sianipar, 2023-06-23 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, SVM, NumPy, Pandas, and other libraries to perform how to predict early stage diabetes using Early Stage Diabetes Risk Prediction Dataset

(<https://viviansiahaan.blogspot.com/2023/06/practical-data-science-programming-for.html>). 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. The dataset consist of total 15 features and one target variable named class. Age: Age in years ranging from (20years to 65 years); Gender: Male / Female; Polyuria: Yes / No; Polydipsia: Yes/ No; Sudden weight loss: Yes/ No; Weakness: Yes/ No; Polyphagia: Yes/ No; Genital Thrush: Yes/ No; Visual blurring: Yes/ No; Itching: Yes/ No; Irritability: Yes/No; Delayed healing: Yes/ No; Partial Paresis: Yes/ No; Muscle stiffness: yes/ No; Alopecia: Yes/ No; Obesity: Yes/ No; 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 chapter 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

(<https://viviansiahaan.blogspot.com/2023/06/practical-data-science-programming-for.html>).

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.

**practical data science with python: Practical Data Science** Andreas François Vermeulen, 2018-02-21 Learn how to build a data science technology stack and perform good data science with repeatable methods. You will learn how to turn data lakes into business assets. The data science technology stack demonstrated in Practical Data Science is built from components in general use in the industry. Data scientist Andreas Vermeulen demonstrates in detail how to build and provision a technology stack to yield repeatable results. He shows you how to apply practical methods to extract actionable business knowledge from data lakes consisting of data from a polyglot of data types and dimensions. What You'll Learn Become fluent in the essential concepts and terminology of data science and data engineering Build and use a technology stack that meets industry criteria Master the methods for retrieving actionable business knowledge Coordinate the handling of polyglot data types in a data lake for repeatable results Who This Book Is For Data scientists and data engineers who are required to convert data from a data lake into actionable knowledge for their business, and students who aspire to be data scientists and data engineers

**practical data science with python: Practical Data Analysis** Hector Cuesta, 2013-10-22 Each chapter of the book quickly introduces a key 'theme' of Data Analysis, before immersing you in the practical aspects of each theme. You'll learn quickly how to perform all aspects of Data Analysis. Practical Data Analysis is a book ideal for home and small business users who want to slice & dice the data they have on hand with minimum hassle.

**practical data science with python: Python for Data Science** Erick Thompson, 2020-11-29 Are you looking for a crash course that will help you learn Python? Do you want to master data science using Python? If yes, then keep reading! Python is one of the most popular programming languages in the word in 2020 and specially for data science. Every day people use it to do cool things like Automation, they use it in Artificial Intelligence, Machine Learning, as well as Building Applications and Websites like Instagram and Dropbox. YouTube, Pinterest, and SurveyMonkey are

all built on Python. So if you are looking for a trendy job, like data scientist, Python is for you. This is a Python guide with 2 Books in 1: Python crash course Python for data analysis Python has seen an explosion in popularity in recent years, driven by several aspects that make it an incredibly versatile and intuitive language. Moreover, data analysis plays a significant job in numerous parts of your regular day to day existence today. Organizations use information to Understand Their Customer Needs and produce the Best Possible Product or Service. Python Programming Language is one of the best framework with regards to information examination. Data Scientist is the most requested job of the 21st century and Python is the most popular programming language of the 21st century. So it's pretty obvious that anyone have skills in both Data Science and Python will be in great demand in industry. You needn't bother with an exhausting and costly reading material. This guide is the best one for every readers. This guide covers: The world of data science technologies Application of machine learning Data scientist: the sexiest job in the 21st century Learning Python from scratch Data analysis with Python NumPy for numerical data processing Data visualization with Python Projects on Python And much more! Despite its simplicity, Python is also sturdy and robust enough to carry out complex scientific and mathematical tasks. Python has been designed with features that drastically simplify the visualization and analysis of data, and Python is also the go-to choice for the creation of machine learning models and artificial intelligence. Be it machine learning, data analytics, data processing, web development, enterprise software development or taking the photo of Blackhole: Python is everywhere. Beloved by the data scientists and new generation developers, Python will eat the word! Ready to get started? Click the BUY NOW button!

**practical data science with python:** Data Science Fundamentals and Practical Approaches  
Nandi Dr. Rupam Dr. Gypsy, Kumar Sharma, 2020-09-03 Learn how to process and analysis data using Python Key Features a- The book has theories explained elaborately along with Python code and corresponding output to support the theoretical explanations. The Python codes are provided with step-by-step comments to explain each instruction of the code. a- The book is quite well balanced with programs and illustrative real-case problems. a- The book not only deals with the background mathematics alone or only the programs but also beautifully correlates the background mathematics to the theory and then finally translating it into the programs. a- A rich set of chapter-end exercises are provided, consisting of both short-answer questions and long-answer questions. Description This book introduces the fundamental concepts of Data Science, which has proved to be a major game-changer in business solving problems. Topics covered in the book include fundamentals of Data Science, data preprocessing, data plotting and visualization, statistical data analysis, machine learning for data analysis, time-series analysis, deep learning for Data Science, social media analytics, business analytics, and Big Data analytics. The content of the book describes the fundamentals of each of the Data Science related topics together with illustrative examples as to how various data analysis techniques can be implemented using different tools and libraries of Python programming language. Each chapter contains numerous examples and illustrative output to explain the important basic concepts. An appropriate number of questions is presented at the end of each chapter for self-assessing the conceptual understanding. The references presented at the end of every chapter will help the readers to explore more on a given topic. What will you learn a- Understand what machine learning is and how learning can be incorporated into a program. a- Perform data processing to make it ready for visual plot to understand the pattern in data over time. a- Know how tools can be used to perform analysis on big data using python a- Perform social media analytics, business analytics, and data analytics on any data of a company or organization. Who this book is for The book is for readers with basic programming and mathematical skills. The book is for any engineering graduates that wish to apply data science in their projects or wish to build a career in this direction. The book can be read by anyone who has an interest in data analysis and would like to explore more out of interest or to apply it to certain real-life problems. Table of Contents 1. Fundamentals of Data Science1 2. Data Preprocessing 3. Data Plotting and Visualization 4. Statistical Data Analysis 5. Machine Learning for Data Science 6. Time-Series Analysis 7. Deep Learning for Data Science 8. Social Media Analytics 9. Business Analytics 10. Big Data Analytics

About the Authors Dr. Gypsy Nandi is an Assistant Professor (Sr) in the Department of Computer Applications, Assam Don Bosco University, India. Her areas of interest include Data Science, Social Network Mining, and Machine Learning. She has completed her Ph.D. in the field of 'Social Network Analysis and Mining'. Her research scholars are currently working mainly in the field of Data Science. She has several research publications in reputed journals and book series. Dr. Rupam Kumar Sharma is an Assistant Professor in the Department of Computer Applications, Assam Don Bosco University, India. His area of interest includes Machine Learning, Data Analytics, Network, and Cyber Security. He has several research publications in reputed SCI and Scopus journals. He has also delivered lectures and trained hundreds of trainees and students across different institutes in the field of security and android app development.

**practical data science with python: Hands-On Python and Pandas** SARFUL. HASSAN, 2025-01-21 Unlock the power of Python and Pandas for data science! Hands-On Python and Pandas: Practical Data Science with Python is the ultimate guide for learning to manipulate, analyze, and visualize data with Python. Whether you're a beginner or already familiar with programming, this book provides clear, step-by-step instructions for mastering the Pandas library and applying it to real-world data science projects. You will learn how to: Master Data Manipulation: Handle missing data, perform sorting, filtering, and aggregating with ease. Transform and Clean Data: Use powerful tools to clean, reshape, and combine data sets efficiently. Visualize Your Data: Create compelling charts and graphs using Matplotlib and Seaborn to communicate insights clearly. Work with Real-World Projects: Apply your skills to practical data science tasks like sales analysis, customer segmentation, time-series forecasting, and more. Optimize Performance: Learn tips and techniques to work with large datasets, speed up processing, and improve overall performance. This comprehensive guide covers essential concepts such as data cleaning, transformation, and analysis with Pandas. You will also explore advanced topics like data visualization, performance optimization, and real-world applications, equipping you with the skills necessary for tackling any data science challenge. Perfect for: Beginners to intermediate Python users Data scientists and analysts looking to expand their skills Anyone interested in working with data for analysis or visualization Start your journey into Python and Pandas today and unlock the full potential of your data!

**practical data science with python: Practical Data Science with SAP** Greg Foss, Paul Modderman, 2019-09-18 Learn how to fuse today's data science tools and techniques with your SAP enterprise resource planning (ERP) system. With this practical guide, SAP veterans Greg Foss and Paul Modderman demonstrate how to use several data analysis tools to solve interesting problems with your SAP data. Data engineers and scientists will explore ways to add SAP data to their analysis processes, while SAP business analysts will learn practical methods for answering questions about the business. By focusing on grounded explanations of both SAP processes and data science tools, this book gives data scientists and business analysts powerful methods for discovering deep data truths. You'll explore: Examples of how data analysis can help you solve several SAP challenges Natural language processing for unlocking the secrets in text Data science techniques for data clustering and segmentation Methods for detecting anomalies in your SAP data Data visualization techniques for making your data come to life

**practical data science with python: TKINTER, DATA SCIENCE, AND MACHINE LEARNING** Vivian Siahaan, Rismon Hasiholan Sianipar, 2023-09-02 In this project, we embarked on a comprehensive journey through the world of machine learning and model evaluation. Our primary goal was to develop a Tkinter GUI and assess various machine learning models on a given dataset to identify the best-performing one. This process is essential in solving real-world problems, as it helps us select the most suitable algorithm for a specific task. By crafting this Tkinter-powered GUI, we provided an accessible and user-friendly interface for users engaging with machine learning models. It simplified intricate processes, allowing users to load data, select models, initiate training, and visualize results without necessitating code expertise or command-line operations. This GUI introduced a higher degree of usability and accessibility to the machine learning workflow, accommodating users with diverse levels of technical proficiency. We began by loading and

preprocessing the dataset, a fundamental step in any machine learning project. Proper data preprocessing involves tasks such as handling missing values, encoding categorical features, and scaling numerical attributes. These operations ensure that the data is in a format suitable for training and testing machine learning models. Once our data was ready, we moved on to the model selection phase. We evaluated multiple machine learning algorithms, each with its strengths and weaknesses. The models we explored included Logistic Regression, Random Forest, K-Nearest Neighbors (KNN), Decision Trees, Gradient Boosting, Extreme Gradient Boosting (XGBoost), Multi-Layer Perceptron (MLP), and Support Vector Classifier (SVC). For each model, we employed a systematic approach to find the best hyperparameters using grid search with cross-validation. This technique allowed us to explore different combinations of hyperparameters and select the configuration that yielded the highest accuracy on the training data. These hyperparameters included settings like the number of estimators, learning rate, and kernel function, depending on the specific model. After obtaining the best hyperparameters for each model, we trained them on our preprocessed dataset. This training process involved using the training data to teach the model to make predictions on new, unseen examples. Once trained, the models were ready for evaluation. We assessed the performance of each model using a set of well-established evaluation metrics. These metrics included accuracy, precision, recall, and F1-score. Accuracy measured the overall correctness of predictions, while precision quantified the proportion of true positive predictions out of all positive predictions. Recall, on the other hand, represented the proportion of true positive predictions out of all actual positives, highlighting a model's ability to identify positive cases. The F1-score combined precision and recall into a single metric, helping us gauge the overall balance between these two aspects. To visualize the model's performance, we created key graphical representations. These included confusion matrices, which showed the number of true positive, true negative, false positive, and false negative predictions, aiding in understanding the model's classification results. Additionally, we generated Receiver Operating Characteristic (ROC) curves and area under the curve (AUC) scores, which depicted a model's ability to distinguish between classes. High AUC values indicated excellent model performance. Furthermore, we constructed true values versus predicted values diagrams to provide insights into how well our models aligned with the actual data distribution. Learning curves were also generated to observe a model's performance as a function of training data size, helping us assess whether the model was overfitting or underfitting. Lastly, we presented the results in a clear and organized manner, saving them to Excel files for easy reference. This allowed us to compare the performance of different models and make an informed choice about which one to select for our specific task. In summary, this project was a comprehensive exploration of the machine learning model development and evaluation process. We prepared the data, selected and fine-tuned various models, assessed their performance using multiple metrics and visualizations, and ultimately arrived at a well-informed decision about the most suitable model for our dataset. This approach serves as a valuable blueprint for tackling real-world machine learning challenges effectively.

**practical data science with python:** Practical Data Analysis Using Jupyter Notebook Marc Wintjen, 2020-06-19 Understand data analysis concepts to make accurate decisions based on data using Python programming and Jupyter Notebook Key FeaturesFind out how to use Python code to extract insights from data using real-world examplesWork with structured data and free text sources to answer questions and add value using dataPerform data analysis from scratch with the help of clear explanations for cleaning, transforming, and visualizing dataBook Description Data literacy is the ability to read, analyze, work with, and argue using data. Data analysis is the process of cleaning and modeling your data to discover useful information. This book combines these two concepts by sharing proven techniques and hands-on examples so that you can learn how to communicate effectively using data. After introducing you to the basics of data analysis using Jupyter Notebook and Python, the book will take you through the fundamentals of data. Packed with practical examples, this guide will teach you how to clean, wrangle, analyze, and visualize data to gain useful insights, and you'll discover how to answer questions using data with easy-to-follow steps. Later



chapters teach you about storytelling with data using charts, such as histograms and scatter plots. As you advance, you'll understand how to work with unstructured data using natural language processing (NLP) techniques to perform sentiment analysis. All the knowledge you gain will help you discover key patterns and trends in data using real-world examples. In addition to this, you will learn how to handle data of varying complexity to perform efficient data analysis using modern Python libraries. By the end of this book, you'll have gained the practical skills you need to analyze data with confidence. What you will learn

- Understand the importance of data literacy and how to communicate effectively using data
- Find out how to use Python packages such as NumPy, pandas, Matplotlib, and the Natural Language Toolkit (NLTK) for data analysis
- Wrangle data and create DataFrames using pandas
- Produce charts and data visualizations using time-series datasets
- Discover relationships and how to join data together using SQL
- Use NLP techniques to work with unstructured data to create sentiment analysis models
- Discover patterns in real-world datasets that provide accurate insights

Who this book is for This book is for aspiring data analysts and data scientists looking for hands-on tutorials and real-world examples to understand data analysis concepts using SQL, Python, and Jupyter Notebook. Anyone looking to evolve their skills to become data-driven personally and professionally will also find this book useful. No prior knowledge of data analysis or programming is required to get started with this book.

**practical data science with python:** *Fundamentals of Data Science* Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, 2021-09-26 Fundamentals of Data Science is designed for students, academicians and practitioners with a complete walkthrough right from the foundational groundwork required to outlining all the concepts, techniques and tools required to understand Data Science. Data Science is an umbrella term for the non-traditional techniques and technologies that are required to collect, aggregate, process, and gain insights from massive datasets. This book offers all the processes, methodologies, various steps like data acquisition, pre-process, mining, prediction, and visualization tools for extracting insights from vast amounts of data by the use of various scientific methods, algorithms, and processes Readers will learn the steps necessary to create the application with SQL, NoSQL, Python, R, Matlab, Octave and Tableau. This book provides a stepwise approach to building solutions to data science applications right from understanding the fundamentals, performing data analytics to writing source code. All the concepts are discussed in simple English to help the community to become Data Scientist without much pre-requisite knowledge. Features : Simple strategies for developing statistical models that analyze data and detect patterns, trends, and relationships in data sets. Complete roadmap to Data Science approach with dedicated sections which includes Fundamentals, Methodology and Tools. Focussed approach for learning and practice various Data Science Tools with Sample code and examples for practice. Information is presented in an accessible way for students, researchers and academicians and professionals.

**practical data science with python:** *Data Science Fundamentals and Practical Approaches* Dr. Gypsy Nandi, Dr. Rupam Kumar Sharma, 2020-06-02 Learn how to process and analysis data using Python

KEY FEATURES

- The book has theories explained elaborately along with Python code and corresponding output to support the theoretical explanations. The Python codes are provided with step-by-step comments to explain each instruction of the code.
- The book is not just dealing with the background mathematics alone or only the programs but beautifully correlates the background mathematics to the theory and then finally translating it into the programs.
- A rich set of chapter-end exercises are provided, consisting of both short-answer questions and long-answer questions.

DESCRIPTION This book introduces the fundamental concepts of Data Science, which has proved to be a major game-changer in business solving problems.

Topics covered in the book include fundamentals of Data Science, data preprocessing, data plotting and visualization, statistical data analysis, machine learning for data analysis, time-series analysis, deep learning for Data Science, social media analytics, business analytics, and Big Data analytics. The content of the book describes the fundamentals of each of the Data Science related topics together with illustrative examples as to how various data analysis techniques can be implemented using different tools and

libraries of Python programming language. Each chapter contains numerous examples and illustrative output to explain the important basic concepts. An appropriate number of questions is presented at the end of each chapter for self-assessing the conceptual understanding. The references presented at the end of every chapter will help the readers to explore more on a given topic. WHAT WILL YOU LEARN? Perform processing on data for making it ready for visual plot and understand the pattern in data over time. Understand what machine learning is and how learning can be incorporated into a program. Know how tools can be used to perform analysis on big data using python and other standard tools. Perform social media analytics, business analytics, and data analytics on any data of a company or organization. WHO THIS BOOK IS FOR The book is for readers with basic programming and mathematical skills. The book is for any engineering graduates that wish to apply data science in their projects or wish to build a career in this direction. The book can be read by anyone who has an interest in data analysis and would like to explore more out of interest or to apply it to certain real-life problems. TABLE OF CONTENTS 1. Fundamentals of Data Science 2. Data Preprocessing 3. Data Plotting and Visualization 4. Statistical Data Analysis 5. Machine Learning for Data Science 6. Time-Series Analysis 7. Deep Learning for Data Science 8. Social Media Analytics 9. Business Analytics 10. Big Data Analytics

**practical data science with python: Data Science and Deep Learning Workshop For Scientists and Engineers** Vivian Siahaan, Rismon Hasiholan Sianipar, 2021-11-04 WORKSHOP 1: In this workshop, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to implement deep learning on recognizing traffic signs using GTSRB dataset, detecting brain tumor using Brain Image MRI dataset, classifying gender, and recognizing facial expression using FER2013 dataset In Chapter 1, you will learn to create GUI applications to display line graph using PyQt. You will also learn how to display image and its histogram. In Chapter 2, you will learn how to use TensorFlow, Keras, Scikit-Learn, Pandas, NumPy and other libraries to perform prediction on handwritten digits using MNIST dataset with PyQt. You will build a GUI application for this purpose. In Chapter 3, you will learn how to perform recognizing traffic signs using GTSRB dataset from Kaggle. There are several different types of traffic signs like speed limits, no entry, traffic signals, turn left or right, children crossing, no passing of heavy vehicles, etc. Traffic signs classification is the process of identifying which class a traffic sign belongs to. In this Python project, you will build a deep neural network model that can classify traffic signs in image into different categories. With this model, you will be able to read and understand traffic signs which are a very important task for all autonomous vehicles. You will build a GUI application for this purpose. In Chapter 4, you will learn how to perform detecting brain tumor using Brain Image MRI dataset provided by Kaggle (<https://www.kaggle.com/navoneel/brain-mri-images-for-brain-tumor-detection>) using CNN model. You will build a GUI application for this purpose. In Chapter 5, you will learn how to perform classifying gender using dataset provided by Kaggle (<https://www.kaggle.com/cashutosh/gender-classification-dataset>) using MobileNetV2 and CNN models. You will build a GUI application for this purpose. In Chapter 6, you will learn how to perform recognizing facial expression using FER2013 dataset provided by Kaggle (<https://www.kaggle.com/nicolejyt/facialexpressionrecognition>) using CNN model. You will also build a GUI application for this purpose. WORKSHOP 2: In this workshop, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to implement deep learning on classifying fruits, classifying cats/dogs, detecting furnitures, and classifying fashion. In Chapter 1, you will learn to create GUI applications to display line graph using PyQt. You will also learn how to display image and its histogram. Then, you will learn how to use OpenCV, NumPy, and other libraries to perform feature extraction with Python GUI (PyQt). The feature detection techniques used in this chapter are Harris Corner Detection, Shi-Tomasi Corner Detector, and Scale-Invariant Feature Transform (SIFT). In Chapter 2, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform classifying fruits using Fruits 360 dataset provided by Kaggle (<https://www.kaggle.com/moltean/fruits/code>) using Transfer Learning and CNN models. You will build a GUI application for this purpose. In Chapter 3, you will

learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform classifying cats/dogs using dataset provided by Kaggle (<https://www.kaggle.com/chetankv/dogs-cats-images>) using Using CNN with Data Generator. You will build a GUI application for this purpose. In Chapter 4, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform detecting furnitures using Furniture Detector dataset provided by Kaggle (<https://www.kaggle.com/akkithetechie/furniture-detector>) using VGG16 model. You will build a GUI application for this purpose. In Chapter 5, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform classifying fashion using Fashion MNIST dataset provided by Kaggle (<https://www.kaggle.com/zalando-research/fashionmnist/code>) using CNN model. You will build a GUI application for this purpose.

**WORKSHOP 3:** In this workshop, you will implement deep learning on detecting vehicle license plates, recognizing sign language, and detecting surface crack using TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries. In Chapter 1, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform detecting vehicle license plates using Car License Plate Detection dataset provided by Kaggle (<https://www.kaggle.com/andrewmvd/car-plate-detection/download>). In Chapter 2, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform sign language recognition using Sign Language Digits Dataset provided by Kaggle (<https://www.kaggle.com/ardamavi/sign-language-digits-dataset/download>). In Chapter 3, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform detecting surface crack using Surface Crack Detection provided by Kaggle (<https://www.kaggle.com/arunrk7/surface-crack-detection/download>).

**WORKSHOP 4:** In this workshop, implement deep learning-based image classification on detecting face mask, classifying weather, and recognizing flower using TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries. In Chapter 1, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform detecting face mask using Face Mask Detection Dataset provided by Kaggle (<https://www.kaggle.com/omkargurav/face-mask-dataset/download>). In Chapter 2, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform how to classify weather using Multi-class Weather Dataset provided by Kaggle (<https://www.kaggle.com/pratik2901/multiclass-weather-dataset/download>).

**WORKSHOP 5:** In this workshop, implement deep learning-based image classification on classifying monkey species, recognizing rock, paper, and scissor, and classify airplane, car, and ship using TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries. In Chapter 1, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform how to classify monkey species using 10 Monkey Species dataset provided by Kaggle (<https://www.kaggle.com/slothkong/10-monkey-species/download>). In Chapter 2, you will learn how to use TensorFlow, Keras, Scikit-Learn, OpenCV, Pandas, NumPy and other libraries to perform how to recognize rock, paper, and scissor using 10 Monkey Species dataset provided by Kaggle (<https://www.kaggle.com/sanikamal/rock-paper-scissors-dataset/download>).

**WORKSHOP 6:** In this workshop, 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 (<https://www.kaggle.com/fedesoriano/traffic-prediction-dataset/download>). 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 (<https://www.kaggle.com/rashikrahmanpritom/heart-attack-analysis-prediction-dataset/download>).

**WORKSHOP 7:** In this workshop, 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 (<https://www.kaggle.com/ishandutta/early-stage-diabetes-risk-prediction-dataset/download>). 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 predicted 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 (<https://www.kaggle.com/merishnasuwal/breast-cancer-prediction-dataset/download>). 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, predicted 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.

**WORKSHOP 8:** In this workshop, 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.

**WORKSHOP 9:** In this workshop, you will learn how to use Scikit-Learn, Keras, TensorFlow, NumPy, Pandas, Seaborn, and other libraries to perform COVID-19 Epitope Prediction using COVID-19/SARS B-cell Epitope Prediction dataset provided in Kaggle. All of three datasets consists of information of protein and peptide: parent\_protein\_id : parent protein ID; protein\_seq : parent protein sequence; start\_position : start position of peptide; end\_position : end position of peptide; peptide\_seq : peptide sequence; chou\_fasman : peptide feature; emini : peptide feature, relative surface accessibility; kolaskar\_tongaonkar : peptide feature, antigenicity; parker : peptide feature, hydrophobicity; isoelectric\_point : protein feature; aromaticity : protein feature; hydrophobicity : protein feature; stability : protein feature; and target : antibody valence (target value). The machine learning models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, Gradient Boosting, XGB classifier, and MLP classifier. Then, you will learn how to use sequential CNN and VGG16 models to detect and predict Covid-19 X-RAY using COVID-19 Xray Dataset (Train & Test Sets) provided in Kaggle. The folder itself consists of two subfolders: test and train. Finally, 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.

**WORKSHOP 10:** In this workshop, you will learn how to use Scikit-Learn, Keras, TensorFlow, NumPy, Pandas, Seaborn, and other libraries to perform analyzing and predicting stroke using dataset provided in Kaggle. The dataset consists of attribute information: id: unique identifier; gender: Male, Female or Other; age: age of the patient; hypertension: 0 if the patient doesn't have hypertension, 1 if the patient has hypertension; heart\_disease: 0 if the patient doesn't have any heart diseases, 1 if the patient has a heart disease; ever\_married: No or Yes; work\_type: children, Govt\_jov, Never\_worked, Private or Self-employed; Residence\_type: Rural or Urban; avg\_glucose\_level: average glucose level in blood; bmi: body mass index; smoking\_status: formerly smoked, never smoked, smokes or Unknown; and stroke: 1 if the patient had a stroke or 0 if not. 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, MLP classifier, and CNN 1D. Finally, 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, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

**WORKSHOP 11:** In this workshop, you will learn how to use Scikit-Learn, Keras, TensorFlow, NumPy, Pandas, Seaborn, and other libraries to perform classifying and predicting Hepatitis C using dataset provided by UCI Machine Learning Repository. All attributes in dataset except Category and Sex are numerical. Attributes 1 to 4 refer to the data of the patient: X (Patient ID/No.), Category (diagnosis) (values: '0=Blood Donor', '0s=suspect Blood Donor', '1=Hepatitis', '2=Fibrosis', '3=Cirrhosis'), Age (in years), Sex (f,m), ALB, ALP, ALT, AST, BIL, CHE, CHOL, CREA, GGT, and PROT. The target attribute for classification is Category (2): blood donors vs. Hepatitis C patients (including its progress ('just' Hepatitis C, Fibrosis, Cirrhosis). 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, MLP classifier, and ANN 1D. Finally, 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, learning curve, performance of the model, scalability of the model, training loss, and training accuracy.

**practical data science with python: Embedding Artificial Intelligence into ERP Software**

Siar Sarferaz, 2024-05-30 This book explains how to embed artificial intelligence in digitized business processes of ERP software by solving the two related substantial challenges: how can artificial intelligence be systematically integrated into ERP business processes for ease of consumption, and how can artificial intelligence be made enterprise-ready by covering ERP qualities like compliance, lifecycle management, extensibility, or scalability? As a general introduction, the first part of this book takes the reader through a historical journey towards intelligent ERP systems. In addition, reference processes and a reference architecture for ERP systems are proposed which build the foundation for the suggested subsequent solution concept, including a method for operationalizing intelligence for ERP business processes. Subsequently, in the second part detailed concepts of embedding artificial intelligence into ERP software are proposed. In this context the suggested solution architecture is depicted, and specific topics are resolved like data integration, model validation, explainability, data protection and privacy, model degradation and performance. In the last part an implementation framework is suggested which enables the previously introduced concepts and harmonizes the development and operations of artificial intelligent ERP applications. This part concludes with case studies considering artificial intelligence scenarios of SAP S/4HANA in the areas of logistics, finance and sales which apply the defined solution approach and shows its real-world feasibility. This book is written for professionals who want to implement (as developers) or exploit (as business analysts or consultants) or consider/plan the implementation/exploitation (as managers) of artificial intelligence in business information systems.

**practical data science with python: Mastering Elasticsearch - Second Edition** Rafał Kuć,

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