

Data Science with Python Programming

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Introduction to Data Science

Learning outcomes:

- **Introduction to Data Science**
- **Python in Data Science**
- **Why is Data Science so Important?**
- **Application of Data Science**
- **What will you learn in this course?**

Introduction to Data Science

Data science is an inter-disciplinary field that uses **scientific** methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured **data**. **Data science** is related to **data** mining, machine learning and big **data**.

Data science can be defined as a blend of mathematics, business acumen, tools, algorithms and machine learning techniques, all of which help us in finding out the hidden insights or patterns from raw **data** which can be of major use in the formation of big business decisions.

Introduction to Data Science

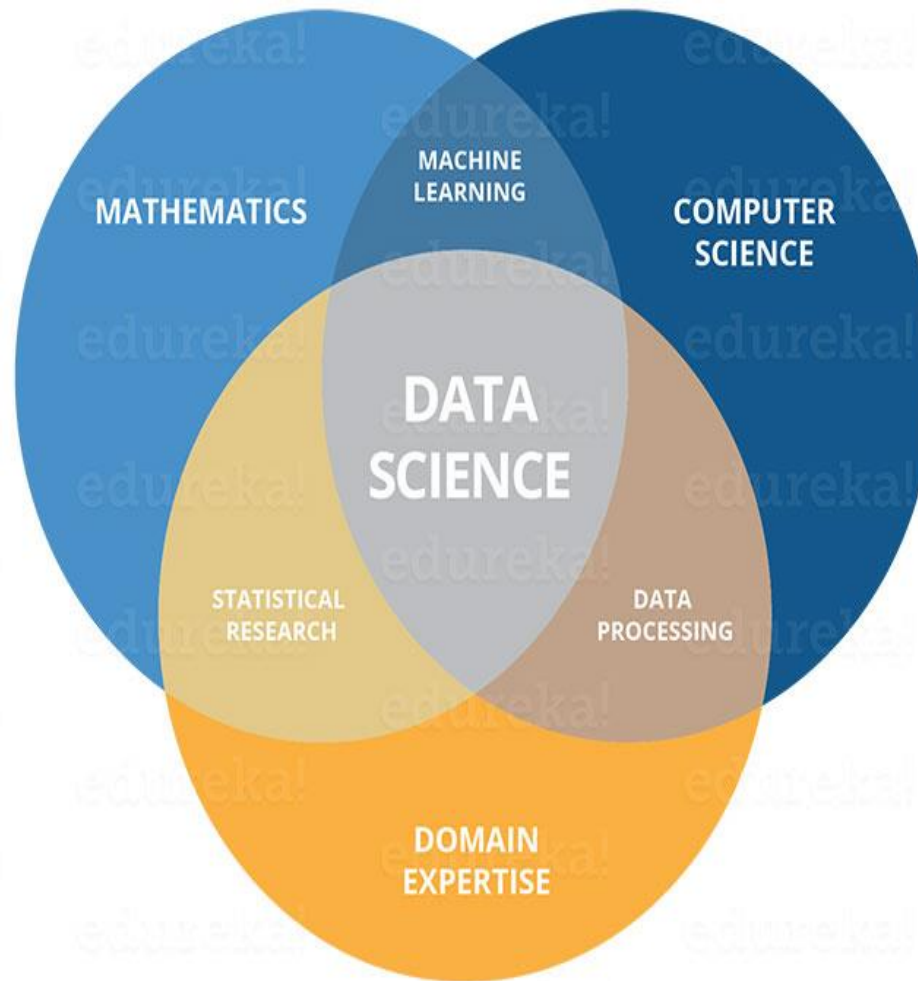
Data science is one of the hottest professions of the decade, and the demand for data scientists who can analyze data and communicate results to inform data driven decisions has never been greater.

Data science is the process of deriving knowledge and insights from a huge and diverse set of data through organizing, processing and analysing the data. It involves many different disciplines like mathematical and statistical modelling, extracting data from its source and applying data visualization techniques.

Introduction to Data Science

Data science involves a plethora of disciplines and expertise areas to produce a holistic, thorough and refined look into raw data. Data scientists must be skilled in everything from data engineering, math, statistics, advanced computing and visualizations to be able to effectively sift through muddled masses of information and communicate only the most vital bits that will help drive innovation and efficiency. Data scientists also rely heavily on artificial intelligence, especially its subfields of machine learning and deep learning, to create models and make predictions using algorithms and other techniques.

Introduction to Data Science



Introduction to Data Science

Data science generally has a five-stage lifecycle.

Capture: Data acquisition, data entry, signal reception, data extraction

Maintain: Data warehousing, data cleansing, data staging, data processing, data architecture

Process: Data mining, clustering/classification, data modeling, data summarization

Communicate: Data reporting, data visualization, business intelligence, decision making

Analyse: Exploratory/confirmatory, predictive analysis, regression, text mining, qualitative analysis

Python in Data Science

The programming requirements of data science demands a very versatile yet flexible language which is simple to write the code but can handle highly complex mathematical processing. Python is most suited for such requirements as it has already established itself both as a language for general computing as well as scientific computing. More over it is being continuously upgraded in form of new addition to its plethora of libraries aimed at different programming requirements.

Python in Data Science

Below we will discuss such features of python which makes it the preferred language for data science.

1) A simple and easy to learn language which achieves result in fewer lines of code than other similar languages like R. Its simplicity also makes it robust to handle complex scenarios with minimal code and much less confusion on the general flow of the program. It is cross platform, so the same code works in multiple environments without needing any change. That makes it perfect to be used in a multi-environment setup easily.

Python in Data Science

2) It executes faster than other similar languages used for data analysis like R and MATLAB.

3) Its excellent memory management capability, especially garbage collection makes it versatile in gracefully managing very large volume of data transformation, slicing, dicing and visualization.

4) Most importantly Python has got a very large collection of libraries which serve as special purpose analysis tools.

Python in Data Science

For example – the NumPy package deals with scientific computing and its array needs much less memory than the conventional python list for managing numeric data. And the number of such packages is continuously growing.

5) Python has packages which can directly use the code from other languages like Java or C. This helps in optimizing the code performance by using existing code of other languages, whenever it gives a better result.

Why is Data Science so Important?

Data creates magic. Industries need data to help them make careful decisions. Data Science churns raw data into meaningful insights. Therefore, industries need data science. A Data Scientist is a wizard who knows how to create magic using data. A skilled Data Scientist will know how to dig out meaningful information with whatever data he comes across. He helps the company in the right direction. The company requires strong data-driven decisions at which he's an expert.

Why is Data Science so Important?

The Data Scientist is an expert in various underlying fields of Statistics and Computer Science. He uses his analytical aptitude to solve business problems. Data Scientist is well versed with problem-solving and is assigned to find patterns in data. His goal is to recognize redundant samples and draw insights from it. [Data Science](#) requires a variety of tools to extract information from the data. A Data Scientist is responsible for collecting, storing and maintaining the structured and unstructured form of data.

Why is Data Science so Important?

While the **role of Data Science** focuses on the analysis and management of data, it is dependent on the area that the company is specialized in. This requires the Data Scientist to have domain knowledge of that particular industry.

Demand:

According to LinkedIn's 2017 U.S. Emerging Jobs Report, the number of data scientists has grown over 650% since 2012. Yet there are still too few people exploiting the opportunities in this field.

Why is Data Science so Important?

Demand:

The report from Indeed showed a **29% increase in demand for data scientists** year over year and a 344% increase since 2013.

Demand for data science professionals is growing, as organizations maintain themselves through data-driven insights.

And according to the U.S. Bureau of Labor Statistics, 11.5 million new jobs will be created by the year 2026. Therefore, it's safe to say, even with the amount of shortage in talent, there might not be a dip in data science as a career option.

Why is Data Science so Important?

Data is one of the important features of every organization because it helps business leaders to make decisions based on facts, statistical numbers and trends. Due to this growing scope of data, data science came into picture which is a multidisciplinary field. It uses scientific approaches, procedure, algorithms, and framework to extract the knowledge and insight from a huge amount of data. The extracted data can be either structured or unstructured.

Why is Data Science so Important?

Data science is a concept to bring together ideas, data examination, Machine Learning, and their related strategies to comprehend and dissect genuine phenomena with data. Data Science is a huge field that uses a lot of methods and concepts which belongs to other fields like information science, statistics, mathematics, and computer science. Some of the techniques utilized in Data Science encompasses machine learning, visualization, pattern recognition, probability model, data engineering, signal processing, etc.

Why is Data Science so Important?

The developments of plenty of data have given enormous importance to many features of Data science particularly big data. But data science is not limited to big data alone as big data solutions concentrated more on organizing and pre-processing the data instead of analysing them. Also, due to Machine Learning, the importance and growth of data science has been improved.

Why is Data Science so Important?


Do we need more data scientists?

Now, knowing that data science is in huge demand, you are probably wondering who is going to do all the work. Do we have enough data scientists? Maybe the market is already flush with experts. Nothing could be further from the truth – data scientists are few and far between, and highly sought after. IBM predicts demand for data scientists will soar 28% by 2020. Machine learning and data science are generating more jobs than there are experts to fill them, which is why these two fields are the fastest growing tech employment areas today.

Application of Data Science

Often it also involves handling big data technologies to gather both structured and unstructured data. Below we will see some example scenarios where Data science is used.

Recommendation systems:

As online shopping becomes more prevalent, the e-commerce platforms are able to capture users shopping preferences as well as the performance of various products in the market. This leads to creation of recommendation systems which create models predicting the shoppers needs and show the products the shopper is most likely to buy. 

Application of Data Science

Financial Risk management:

The financial risk involving loans and credits are better analysed by using the customers past spend habits, past defaults, other financial commitments and many socio-economic indicators. These data is gathered from various sources in different formats. Organising them together and getting insight into customers profile needs the help of Data science. The outcome is minimizing loss for the financial organization by avoiding bad debt.

Application of Data Science

Improvement in Health Care services:

The health care industry deals with a variety of data which can be classified into technical data, financial data, patient information, drug information and legal rules. All this data need to be analysed in a coordinated manner to produce insights that will save cost both for the health care provider and care receiver while remaining legally compliant.

Application of Data Science

Computer Vision:

The advancement in recognizing an image by a computer involves processing large sets of image data from multiple objects of same category. For example, Face recognition. These data sets are modelled, and algorithms are created to apply the model to newer images to get a satisfactory result. Processing of these huge data sets and creation of models need various tools used in Data science.

Application of Data Science

Efficient Management of Energy:

As the demand for energy consumption soars, the energy producing companies need to manage the various phases of the energy production and distribution more efficiently. This involves optimizing the production methods, the storage and distribution mechanisms as well as studying the customers consumption patterns. Linking the data from all these sources and deriving insight seems a daunting task. This is made easier by using the tools of data science.

Application of Data Science

Following are some more applications that build upon the concepts of ***Data Science***:

[Fraud and Risk Detection](#)

[Healthcare](#)

[Internet Search](#)

[Targeted Advertising](#)

[Website Recommendations](#)

[Advanced Image Recognition](#)

[Speech Recognition](#)

[Airline Route Planning](#)

[Gaming](#)

[Augmented Reality](#)

What will you learn in this course?

- **Python Basics**
- **Python Data Structures/Data types**
- **Python Programming Fundamentals**
- **Regular expressions in python**
- **Learn Scientific libraries in Python – NumPy, Matplotlib, Pandas, etc.**
- **Working with Data and Analysing data**
- **Statistical Data Analysis**
- **Data Visualisation**
- **Machine Learning – Supervised learning**
- **Machine Learning – Unsupervised learning**
- **Project**



Thank you