A

MINI PROJECT REPORT

ON

‘DIGITAL CLOCK USING PYTHON IN DATASCIENCE’

Submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

BY

SADHU SUSHANTIKA

II YEAR CSE

Submitted

to

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SRI PADMAVATI MAHILA VISVAVIDYALAYA,TIRUPATHI

(2019-2023)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SRI PADMAVATHI MAHILA VISVAVIDYALAYA,TIRUPATHI

(AN AUTONOMOUS INSTITUTION)

.

CERTIFICATE

This is to certify that the project entitled **"DIGITAL CLOCK USING PYTHON IN DATASCIENCE "** is a bonafide record submitted by **SADHU SUHANTIKA II YEAR** in partial fulfilment of the requirements for the award of Degree of Bachelor of Technology in "Computer science and Engineering". The results encountered in this report have not been submitted to any university or institute for the award of any degree for the year 2020-2021

SUPERVISOR **HEAD OF THE DEPARTMENT**

S.NO	CONTENTS	PAGENO.

1. DATASCIENCE

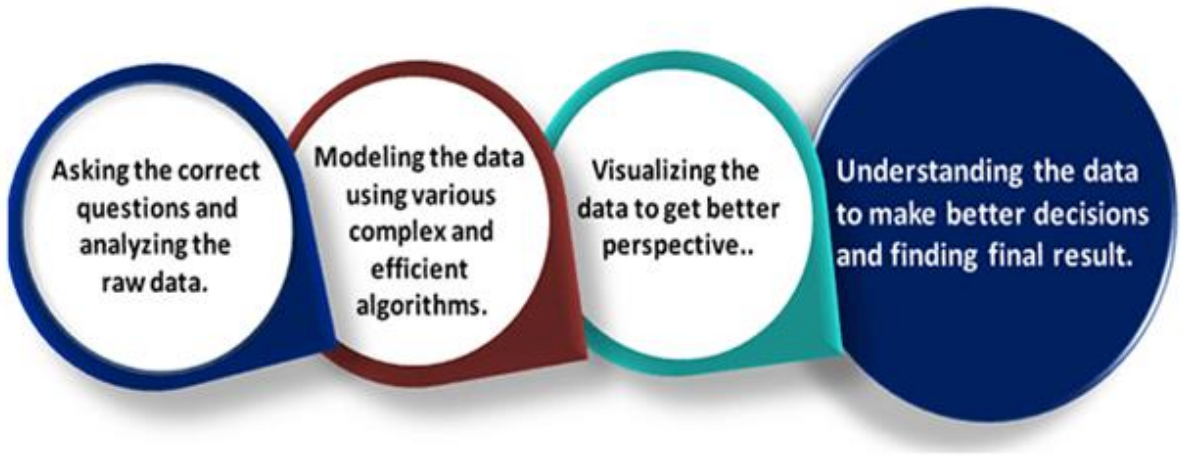
Data science is a deep study of the massive amount of data, which involves extracting meaningful insights from raw, structured, and unstructured data that is processed using the scientific method, different technologies, and algorithms.

It is a multidisciplinary field that uses tools and techniques to manipulate the data so that you can find something new and meaningful.

Data science uses the most powerful hardware, programming systems, and most efficient algorithms to solve the data related problems. It is the future of artificial intelligence.

In short, we can say that data science is all about:

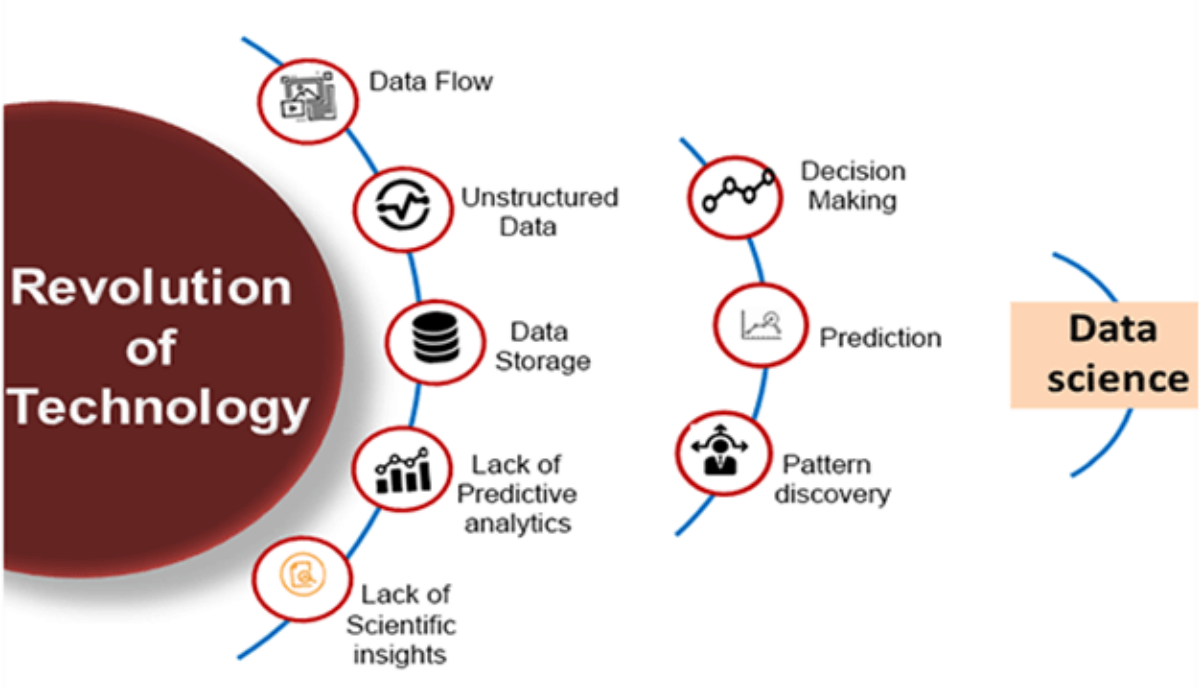
- Asking the correct questions and analyzing the raw data.
- Modeling the data using various complex and efficient algorithms.
- Visualizing the data to get a better perspective.
- Understanding the data to make better decisions and finding the final result.



Example:

Let suppose we want to travel from station A to station B by car. Now, we need to take some decisions such as which route will be the best route to reach faster at the location, in which route there will be no traffic jam, and which will be cost-effective. All these decision factors will act as input data, and we will get an appropriate answer from these decisions, so this analysis of data is called the data analysis, which is a part of data science.

2. Need for Data Science:



Some years ago, data was less and mostly available in a structured form, which could be easily stored in excel sheets, and processed using BI tools.

But in today's world, data is becoming so vast, i.e., approximately **2.5 quintals bytes** of data is generating on every day, which led to data explosion. It is estimated as per researches, that by 2020, 1.7 MB of data will be created at every single second, by a single person on earth. Every Company requires data to work, grow, and improve their businesses.

Now, handling of such huge amount of data is a challenging task for every organization. So to handle, process, and analysis of this, we required some complex, powerful, and efficient algorithms and technology, and that technology came into existence as data Science. Following are some main reasons for using data science technology:

- With the help of data science technology, we can convert the massive amount of raw and unstructured data into meaningful insights.
- Data science technology is opting by various companies, whether it is a big brand or a startup. Google, Amazon, Netflix, etc, which handle the huge amount of data, are using data science algorithms for better customer experience.

- Data science is working for automating transportation such as creating a self-driving car, which is the future of transportation.
- Data science can help in different predictions such as various survey, elections, flight ticket confirmation, etc.

3. Prerequisite for Data Science

Non-Technical Prerequisite:

- **Curiosity:** To learn data science, one must have curiosities. When you have curiosity and ask various questions, then you can understand the business problem easily.
- **Critical Thinking:** It is also required for a data scientist so that you can find multiple new ways to solve the problem with efficiency.
- **Communication skills:** Communication skills are most important for a data scientist because after solving a business problem, you need to communicate it with the team.

Technical Prerequisite:

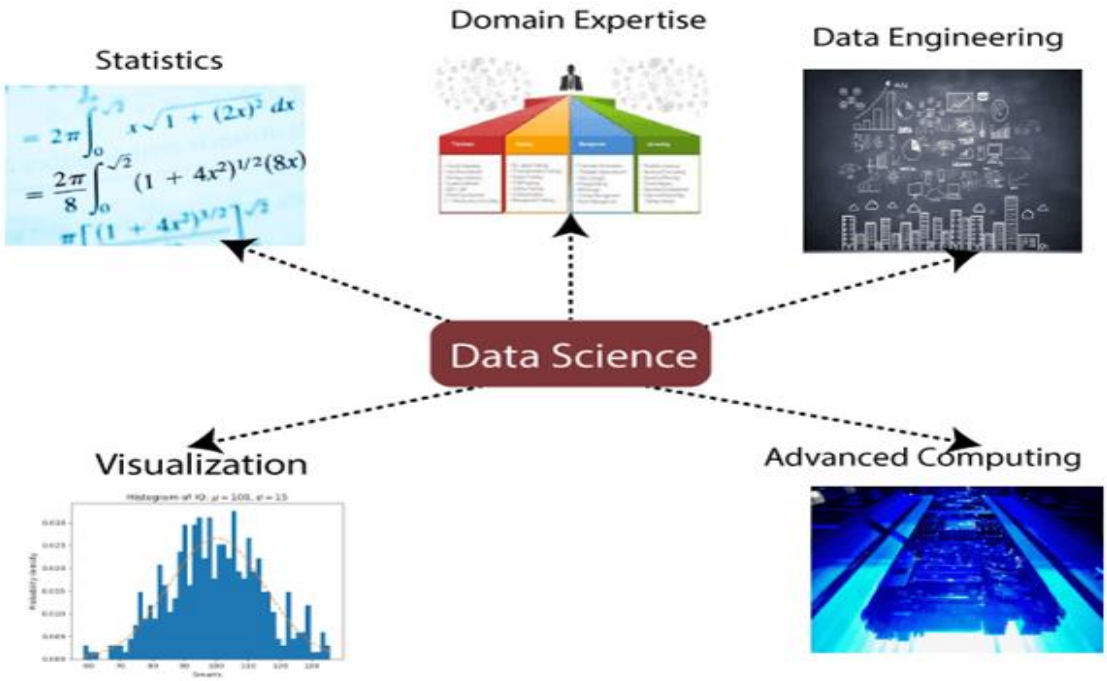
- **Machine learning:** To understand data science, one needs to understand the concept of machine learning. Data science uses machine learning algorithms to solve various problems.
- **Mathematical modeling:** Mathematical modeling is required to make fast mathematical calculations and predictions from the available data.
- **Statistics:** Basic understanding of statistics is required, such as mean, median, or standard deviation. It is needed to extract knowledge and obtain better results from the data.
- **Computer programming:** For data science, knowledge of at least one programming language is required. R, Python, Spark are some required computer programming languages for data science.
- **Databases:** The depth understanding of Databases such as SQL, is essential for data science to get the data and to work with data.

4. Difference between BI and Data Science

BI stands for business intelligence, which is also used for data analysis of business information: Below are some differences between BI and Data sciences:

Criterion	Business intelligence	Data science
Data Source	Business intelligence deals with structured data, e.g., data warehouse.	Data science deals with structured and unstructured data, e.g., weblogs, feedback, etc.
Method	Analytical(historical data)	Scientific(goes deeper to know the reason for the data report)
Skills	Statistics and Visualization are the two skills required for business intelligence.	Statistics, Visualization, and Machine learning are the required skills for data science.
Focus	Business intelligence focuses on both Past and present data	Data science focuses on past data, present data, and also future predictions.

5. Science Components:



The main components of Data Science are given below:

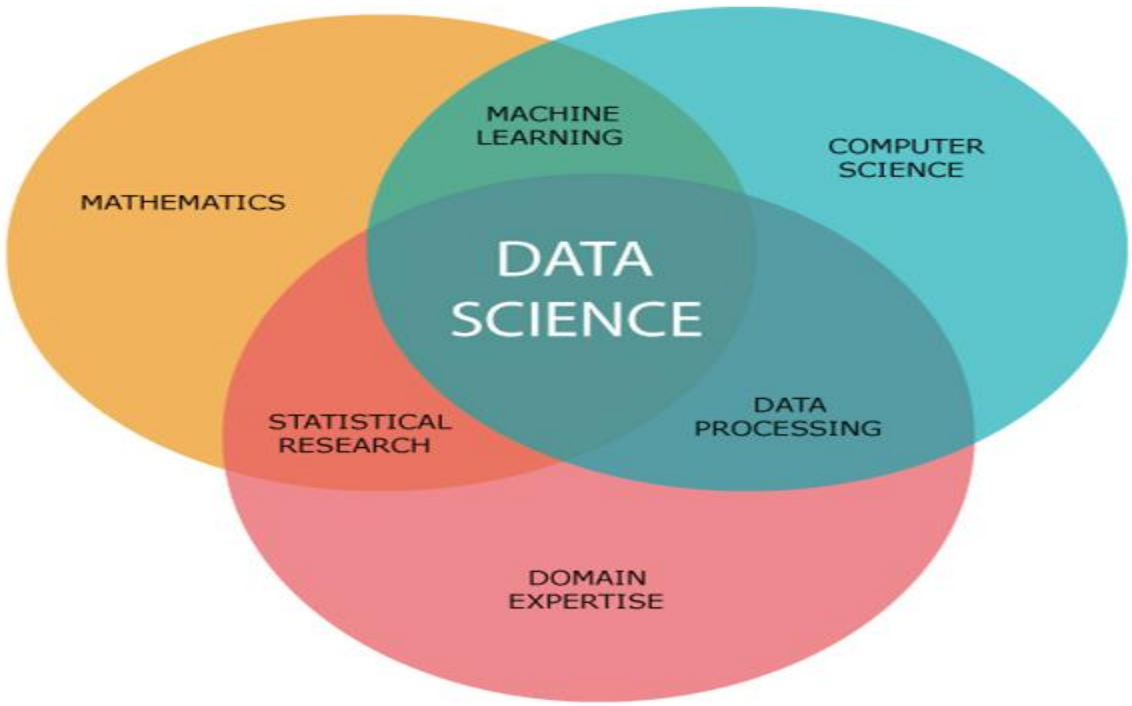
1. Statistics: Statistics is one of the most important components of data science. Statistics is a way to collect and analyze the numerical data in a large amount and finding meaningful insights from it.

2. Domain Expertise: In data science, domain expertise binds data science together. Domain expertise means specialized knowledge or skills of a particular area. In data science, there are various areas for which we need domain experts.

3. Data engineering: Data engineering is a part of data science, which involves acquiring, storing, retrieving, and transforming the data. Data engineering also includes metadata (data about data) to the data.

4. Visualization: Data visualization is meant by representing data in a visual context so that people can easily understand the significance of data. Data visualization makes it easy to access the huge amount of data in visuals.

5. Advanced computing: Heavy lifting of data science is advanced computing. Advanced computing involves designing, writing, debugging, and maintaining the source code of computer programs.



6. Mathematics: Mathematics is the critical part of data science. Mathematics involves the study of quantity, structure, space, and changes. For a data scientist, knowledge of good mathematics is essential.

7. Machine learning: Machine learning is backbone of data science. Machine learning is all about to provide training to a machine so that it can act as a human brain. In data science, we use various machine learning algorithms to solve the problems.

6. Tools for Data Science:

Following are some tools required for data science:

- **Data Analysis tools:** R, Python, Statistics, SAS, Jupyter, R Studio, MATLAB, Excel, RapidMiner.
- **Data Warehousing:** ETL, SQL, Hadoop, Informatica/Talend, AWS Redshift
- **Data Visualization tools:** R, Jupyter, Tableau, Cognos.
- **Machine learning tools:** Spark, Mahout, Azure ML studio.

7.Applications of Data Science:

- **Image recognition and speech recognition:**
  Data science is currently using for Image and speech recognition. When you upload an image on Facebook and start getting the suggestion to tag to your friends. This automatic tagging suggestion uses image recognition algorithm, which is part of data science.
  When you say something using, "Ok Google, Siri, Cortana", etc., and these devices respond as per voice control, so this is possible with speech recognition algorithm.
- **Gaming world:**
  In the gaming world, the use of Machine learning algorithms is increasing day by day. EA Sports, Sony, Nintendo, are widely using data science for enhancing user experience.
- **Internet search:**
  When we want to search for something on the internet, then we use different types of search engines such as Google, Yahoo, Bing, Ask, etc. All these search engines use

the data science technology to make the search experience better, and you can get a search result with a fraction of seconds.

- **Transport:**
  Transport industries also using data science technology to create self-driving cars. With self-driving cars, it will be easy to reduce the number of road accidents.
- **Healthcare:**
  In the healthcare sector, data science is providing lots of benefits. Data science is being used for tumor detection, drug discovery, medical image analysis, virtual medical bots, etc.
- **Recommendation systems:**
  Most of the companies, such as Amazon, Netflix, Google Play, etc., are using data science technology for making a better user experience with personalized recommendations. Such as, when you search for something on Amazon, and you started getting suggestions for similar products, so this is because of data science technology.
- **Risk detection:**
  Finance industries always had an issue of fraud and risk of losses, but with the help of data science, this can be rescued.
  Most of the finance companies are looking for the data scientist to avoid risk and any type of losses with an increase in customer satisfaction.

8. PYTHON FOR DATA SCIENCE

Python is open source, interpreted, high level language and provides great approach for object-oriented programming. It is one of the best language used by data scientist for various data science projects/application. Python provide great functionality to deal with mathematics, statistics and scientific function. It provides great libraries to deals with data science application.

One of the main reasons why Python is widely used in the scientific and research communities is because of its ease of use and simple syntax which makes it easy to adapt for people who do not have an engineering background. It is also more suited for quick prototyping.

According to engineers coming from academia and industry, deep learning frameworks available with Python APIs, in addition to the scientific packages have made Python incredibly

productive and versatile. There has been a lot of evolution in deep learning Python frameworks and it's rapidly upgrading.

In terms of application areas, ML scientists prefer Python as well. When it comes to areas like building fraud detection algorithms and network security, developers leaned towards Java, while for applications like natural language processing (NLP) and sentiment analysis, developers opted for Python, because it provides large collection of libraries that help to solve complex business problem easily, build strong system and data application.

Following are some useful features of Python language:

- It uses the elegant syntax, hence the programs are easier to read.
- It is a simple to access language, which makes it easy to achieve the program working.
- The large standard library and community support.
- The interactive mode of Python makes its simple to test codes.
- In Python, it is also simple to extend the code by appending new modules that are implemented in other compiled language like C++ or C.
- Python is an expressive language which is possible to embed into applications to offer a programmable interface.
- Allows developer to run the code anywhere, including Windows, Mac OS X, UNIX, and Linux.
- It is free software in a couple of categories. It does not cost anything to use or download Pythons or to add it to the application.

Most Commonly used libraries for data science :

- **Numpy**: Numpy is Python library that provides mathematical function to handle large dimension array. It provides various method/function for Array, Metrics, and linear algebra.
  NumPy stands for Numerical Python. It provides lots of useful features for operations on n-arrays and matrices in Python. The library provides vectorization of mathematical operations on the NumPy array type, which enhance performance and speeds up the execution. It's very easy to work with large multidimensional arrays and matrices using NumPy.

- **Pandas:** Pandas is one of the most popular Python library for data manipulation and analysis. Pandas provide useful functions to manipulate large amount of structured data. Pandas provide easiest method to perform analysis. It provide large data structures and manipulating numerical tables and time series data. Pandas is a perfect tool for data wrangling. Pandas is designed for quick and easy data manipulation, aggregation, and visualization. There two data structures in Pandas – Series – It Handle and store data in one-dimensional data. DataFrame – It Handle and store Two dimensional data.
- **Matplotlib**: Matplolib is another useful Python library for Data Visualization. Descriptive analysis and visualizing data is very important for any organization. Matplotlib provides various method to Visualize data in more effective way. Matplotlib allows to quickly make line graphs, pie charts, histograms, and other professional grade figures. Using Matplotlib, one can customize every aspect of a figure. Matplotlib has interactive features like zooming and planning and saving the Graph in graphics format.
- **Scipy**: Scipy is another popular Python library for data science and scientific computing. Scipy provides great functionality to scientific mathematics and computing programming. SciPy contains sub-modules for optimization, linear algebra, integration, interpolation, special functions, FFT, signal and image processing, ODE solvers, Statmodel and other tasks common in science and engineering.
- **Scikit – learn:** Sklearn is Python library for machine learning. Sklearn provides various algorithms and functions that are used in machine learning. Sklearn is built on NumPy, SciPy, and matplotlib. Sklearn provides easy and simple tools for data mining and data analysis. It provides a set of common machine learning algorithms to users through a consistent interface. Scikit-Learn helps to quickly implement popular algorithms on datasets and solve real-world problems.

SAMPLE PROJECT ON DATASCIENCE USING PYTHON

DIGITAL CLOCK USING PYTHON

AIM:

The objective of our project is to implement an alarm clock using Python. Python consists of some very innovative libraries such as datetime and tkinter which help us to build the project using the current date and time as well as to provide a user interface to set the alarm according to the requirement in 24-hour format.

REQUIREMENTS:

This project requires good knowledge of Python and GUI (Graphic User Interface). Python when combined with Tkinter provides a fast and easy way to create GUI applications. Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit. All the modules used need not be downloaded beforehand like the other libraries like NumPy, thus this project will be user friendly and accessible in any virtual environment used for python programming.

PROJECT FILE STRUCTURE

First, let's check the steps to build an Alarm Clock program in Python:

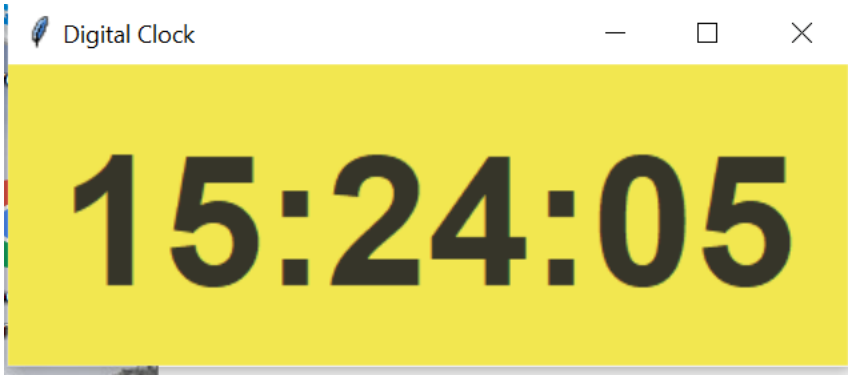
- Importing all the libraries and modules required
- Putting forward a while loop which takes the argument of the time, the user wants to set the alarm on and automatically breaks when the time is up, with sound
- Create a display window for user input.

PROJECT CODE:

```
from tkinter import Label, Tk

import time

app_window = Tk()

app_window.title("Digital Clock")

app_window.geometry("420x150")
```

```
app_window.resizable(1,1)


text_font= ("Boulder", 68, 'bold')
background = "#f2e750"
foreground= "#363529"
border_width = 25

label = Label(app_window, font=text_font, bg=background, fg=foreground, bd=border_width)
label.grid(row=0, column=1)


def digital_clock():
   time_live = time.strftime("%H:%M:%S")
   label.config(text=time_live)
   label.after(200, digital_clock)

digital_clock()
app_window.mainloop()
```

Output



CONCLUSION:

Digital clock to show the time is being shown when the program gets executed successfully. This clock helps us to show the time in hours, minutes and seconds digitally