# INTRODUCTION TO MACHINE LEARNING

LECTURE 1

# CONTACTS

## INSTRUCTORS

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INTRODUCTION TO MACHINE LEARNING

# SCOPE AND OBJECTIVE

- This course aims to provide students with in-depth Machine Learning knowledge.
- The course lays the groundwork for further exploration through personal and professional projects and research.
- The curriculum begins with Python basics and gradually covers fundamental Machine Learning concepts.

# TIMELINE

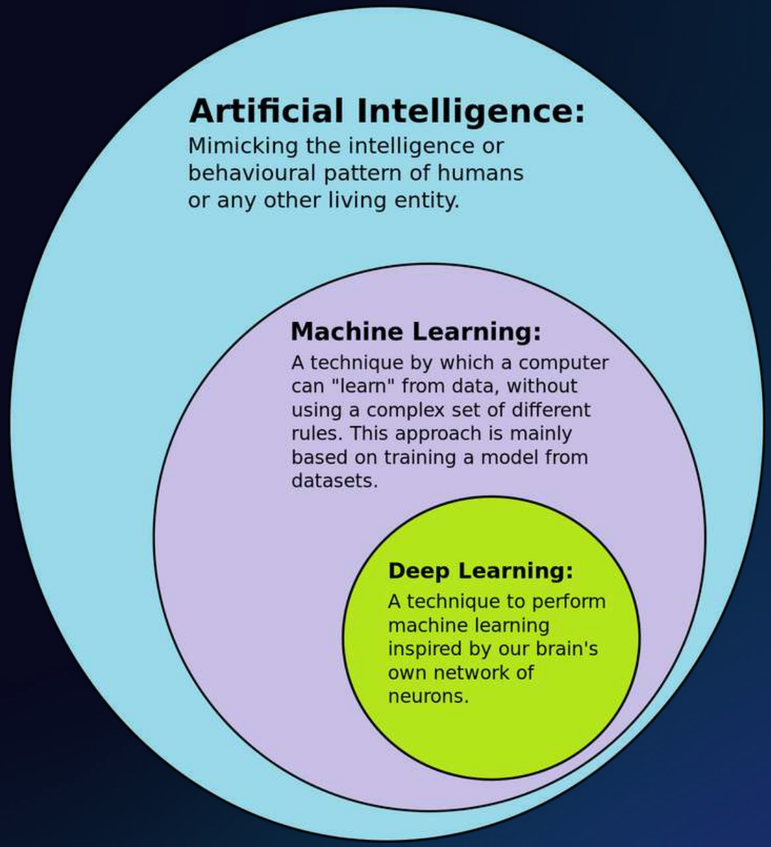
| | |
|---|---|
| **WEEK 1** | What are ML, DL, and AI? Intro to Python |
| **WEEK 2** | Linear and Logistic Regression, Exploratory Data Analysis, Feature engineering |
| **WEEK 3** | KNN, SVM, Naive Bayes Classifier |
| **WEEK 4** | Decision tree, GBM, and Random forests. |
| **WEEK 5** | Introduction to Neural Networks and Deep Learning |

# Will this course be too challenging?

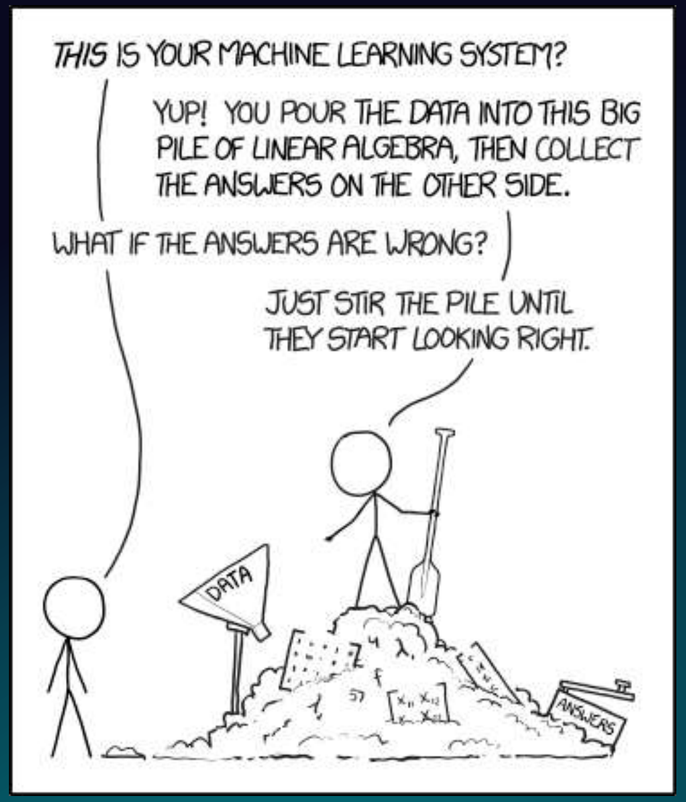
- Absolutely not!
- Beginner friendly course which covers basic machine learning algorithms
- Fun to work with hands-on projects from start to finish
- Abundant resources available online

# What is Artificial Intelligence?

- Artificial Intelligence (AI) involves computers and machines mimicking human-like thinking.
- It enables technology to understand, learn from experiences, and tackle human-like tasks.
- AI involves making decisions, predictions, and solving problems based on data and patterns.



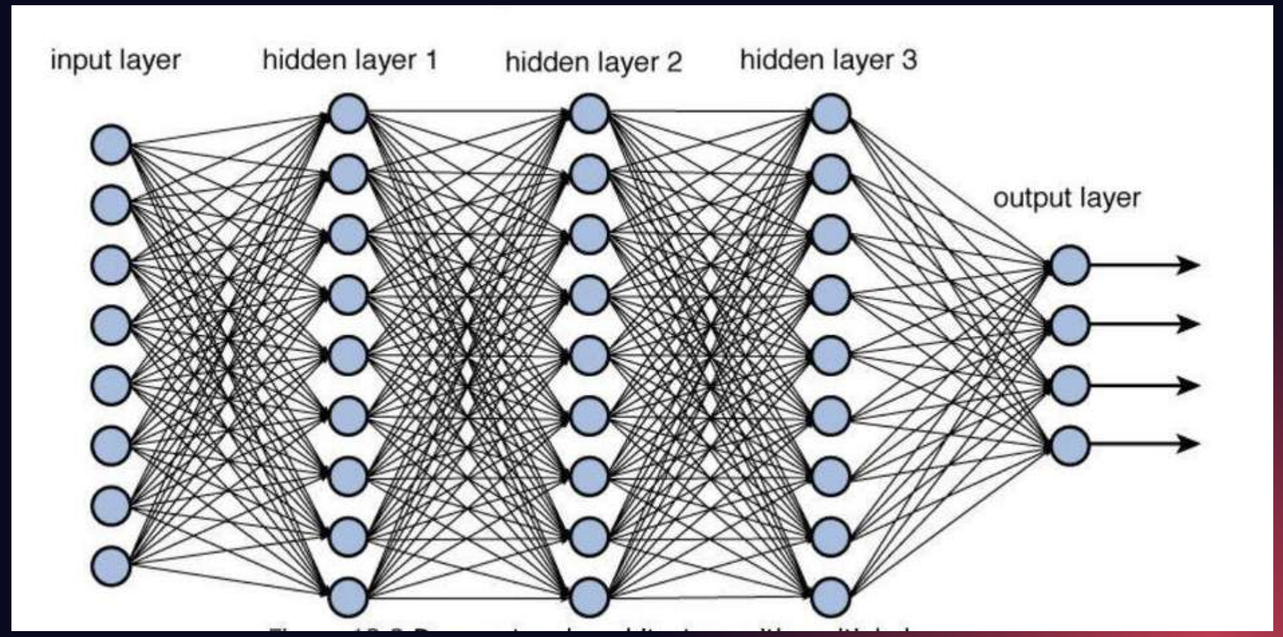
# What is Machine Learning?




- Machine Learning is the study of computer algorithms that improve automatically through experience and data. It is seen as a subset of Artificial Intelligence.
- We come across various applications of machine learning everyday, ranging from the results on your Google Search, as well as the recommendations you get on Netflix.
- Machine Learning has become an integral part of new age technology. Technologies like Self Driving Cars, GPT3 and Deepfake are all applications of machine learning.

# What is Deep Learning?

Deep learning is a subset of machine learning where computers learn to understand and analyze data in a way that's inspired by the human brain. It uses neural networks, which are like interconnected layers of virtual "neurons," to process information, recognize patterns, and make decisions. Just as we learn from experience, deep learning systems learn from large amounts of data to become smarter over time.



# Basic Terms

| MODEL | LABEL | DATASET | TRAIN/TEST |
| --- | --- | --- | --- |
| Expression of an algorithm that has been trained over a dataset to recognize certain types of patterms | Output predicted by the model | Data fed to the model has the data which the model will make its predictions on as well as the correct labels for the same(not always) | Data fed into the model is split into train and test data, which is used to train the model and test its accuracy, respectively. |

# Important Tools

- Python
  - NumPy
  - Pandas
  - Matplotlib
- Jupyter Notebooks

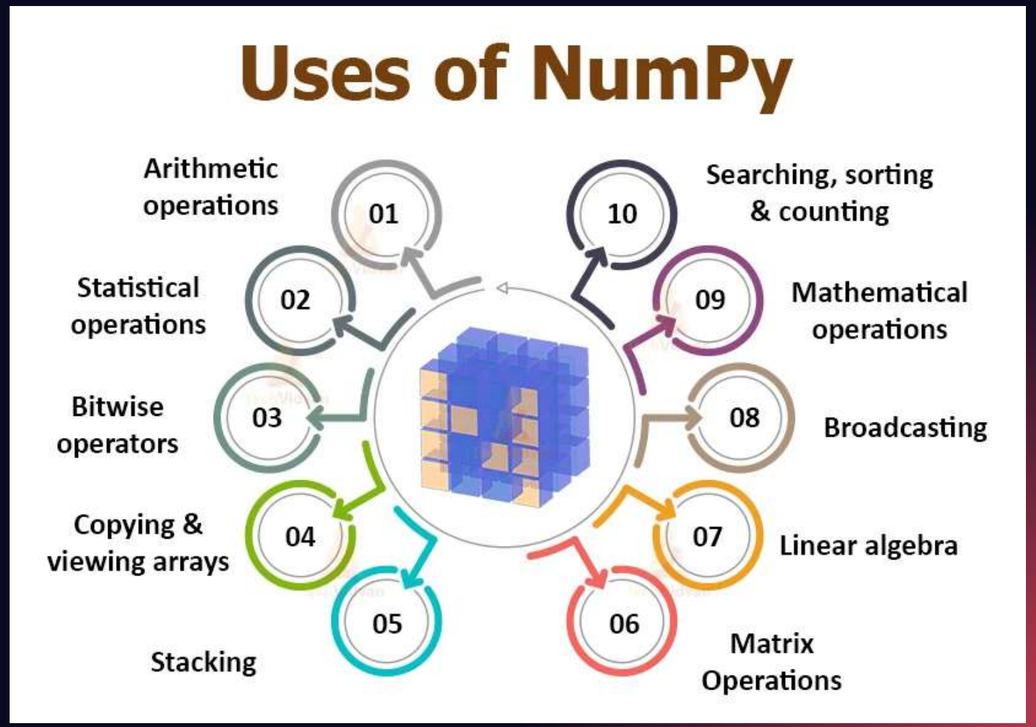
# Python

- Python is among the best-suited programming languages for machine learning. It has multiple libraries that make manipulating and visualizing data as well as performing functions on the same very easy.
- It has various frameworks such as PyTorch and Tensorflow which encapsulates a lot of different functions and algorithms, making model building and testing a relatively simple task.

| | |
|---|---|
| Data Analysis and Visualization | NumPy, Pandas, Matplotlib, Seaborn |
| Machine Learning | PyTorch, TensorFlow, Keras, Scikit-learn |
| Computer Vision | OpenCV |
| Natural Language Processing | NLTK, spaCy |

# NumPy

- NumPy stands for Numerical python and is one of the most useful scientific libraries in Python programming. It is extremely useful when it comes to machine learning.
- NumPy adds support for large, multi-dimensional arrays and matrices, along with large collection of high level mathematical functions to operate on these arrays.



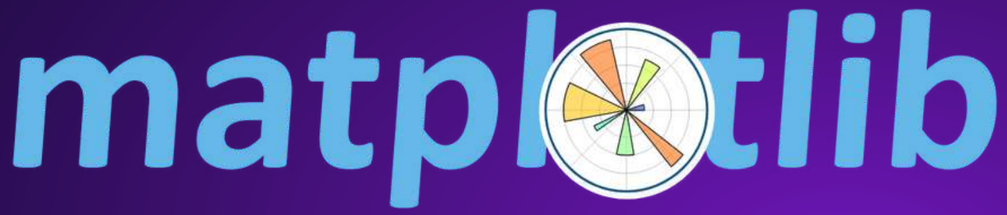
# Pandas

- Pandas is Python library used for working with data sets
- It provides data structures and functions that make it easier to work with structured data, such as tables and spreadsheets
- It is used for data cleaning and analysis and has features which are used for exploring, cleaning, transforming and visualizing from data

pandas

# Matplotlib

- Matplotlib is a low level graph plotting library in python that serves as a visualization utility.
- Usign matplotlib we can plot graphs such as :-
  - Bar graph
  - Pie chart
  - Box plot
  - Histogram
  - Line chart
  - Subplots
  - Scatter plot



# Jupyter Notebook

- In this course, we'll be using Jupyter notebooks. Jupyter allows anybody to write and execute arbitrary python code through the browser, and is especially well suited to machine learning due to their interactive nature, which allows for step-by-step code execution, data exploration, and easy integration with popular machine learning libraries
- It requires no setup to use, while providing free access to computing resources including RAM and GPUs
- Jupyter notebook is an open-source web-application that allows you to create and share documents that contain live code, equations, visualizations and narrative text.

# THANK YOU!