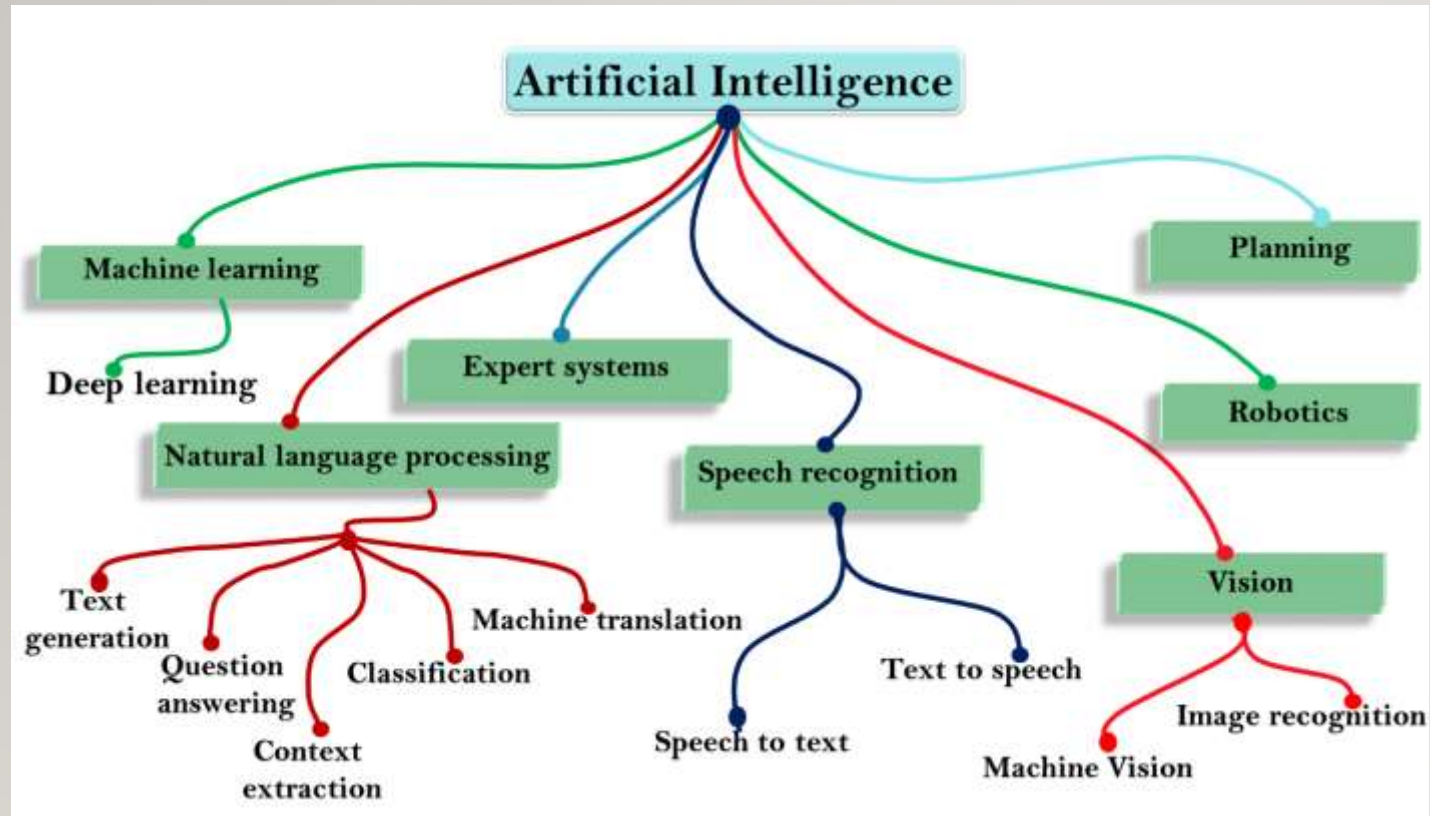


BHASKARACHARYA INNOVATION LABORATORY

ARTIFICIAL INTELLIGENCE COURSE – WEEK 1 CLASS 2

Date : 02-08-2023

BY :
GIRISH R
KEERTHIVASAN

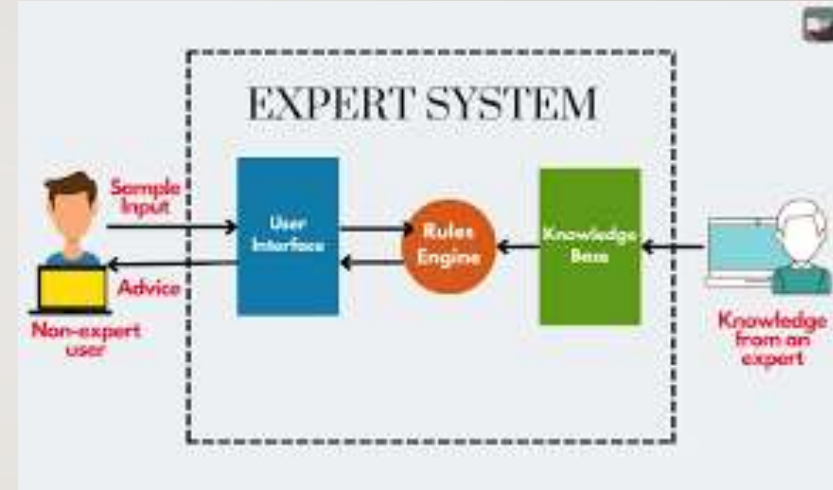


Artificial Intelligence Breakdown into Several Fields

Six Important Subfields of AI

1. Machine Learning (ML)
2. Natural Language Processing(NLP)
3. Computer Vision (CV)
4. Robotics
5. Deep Learning(DL)
6. Neural Networks(NN)

Expert Systems*



Cognitive Computing*

Based On Human Input – Decision Making

ROBOTICS

Design, construction, operation, and programming of robots

Q. Why Robotics should be placed in AI?

Due to Emerging Technologies Robotics considered as a part of AI due to following things

- ❖ Autonomous Decision Making
- ❖ Perception and Sensing
- ❖ Learning and Adaptation
- ❖ Decision Support
- ❖ Cognitive Abilities



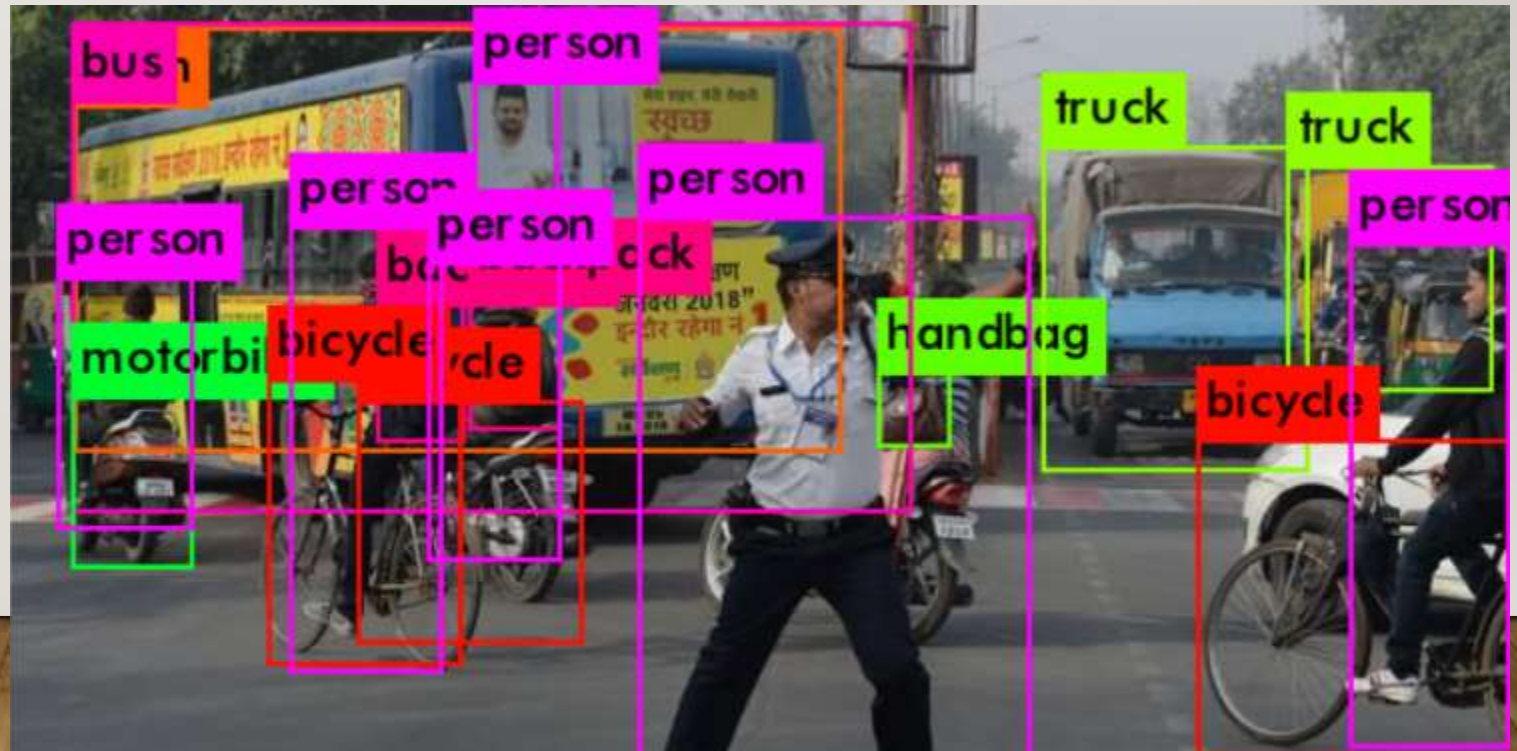
COMPUTER VISION (CV)

Interdisciplinary field which enables computers to interpret and understand visual information from the world

It involves processing and analysing digital images and videos to extract meaningful insights and make intelligent decisions based on the visual data

Applications:

- Object Identification
- Object Tracking
- Object Segmentation

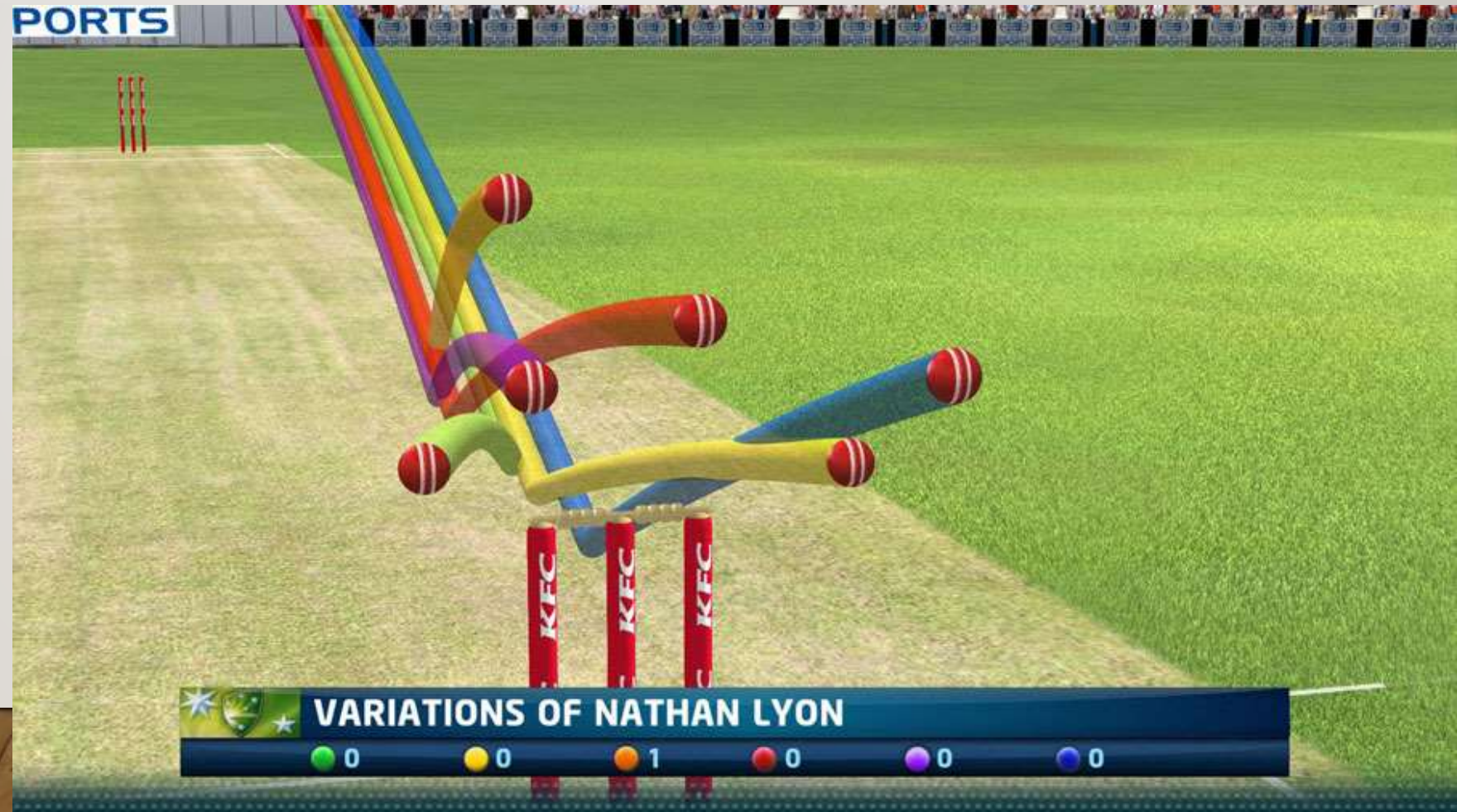


- In Modern-day advancements in Cricket as well as Technology, CV has been used extensively in ball tracking from multiple angles.

REAL TIME APPLICATION OF CV

CRICKET BALL TRACKING

- It is also used in LBW and Hawk-eye technology in giving important decision of OUT and NOT OUT in cricket





Real Time Ball Tracking :

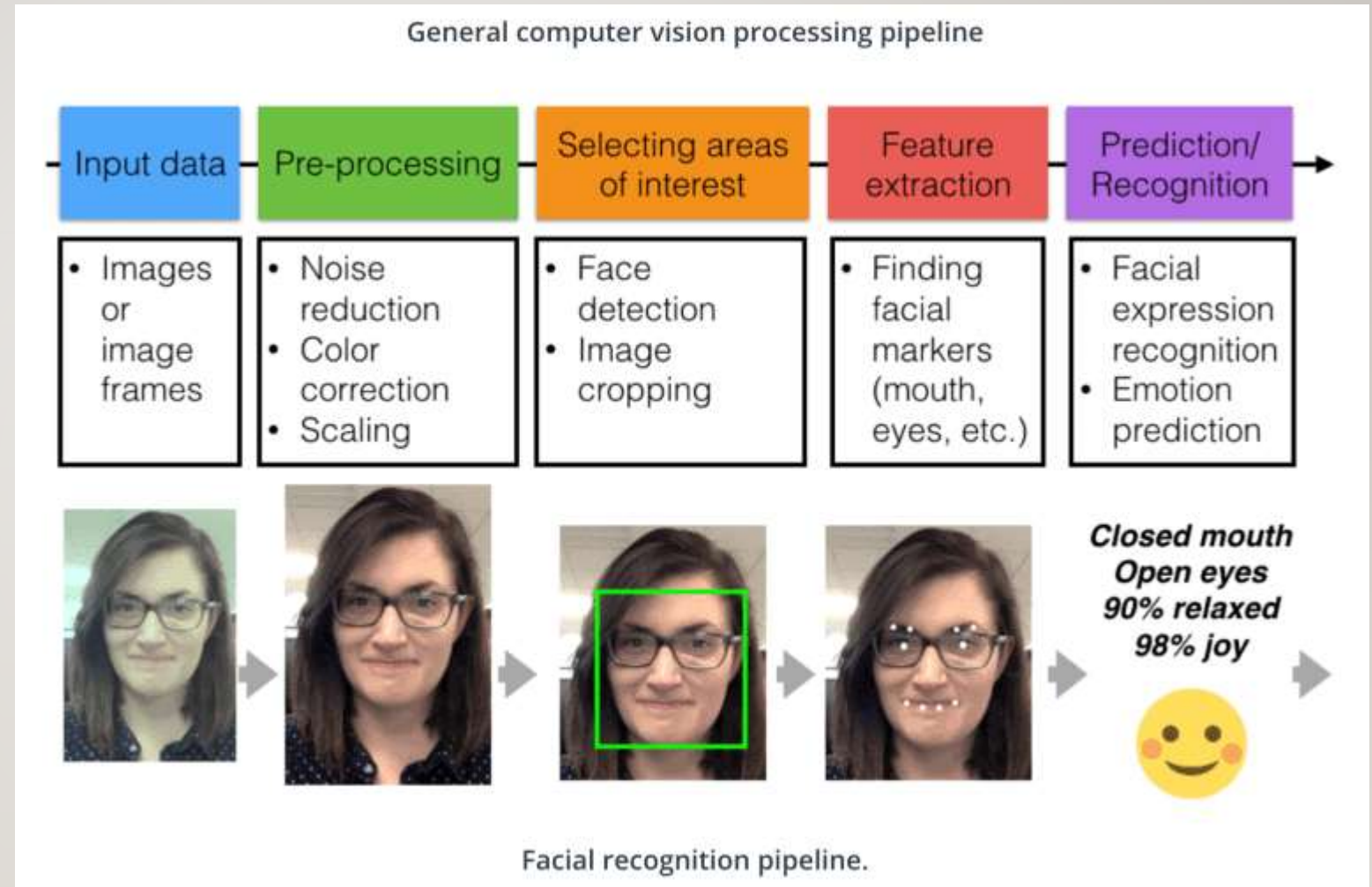
LBW Review

Nathon Lyon to Ben Stokes

Series :Ashes 2019

Steps in CV:

1. Image Acquisition
2. Image Preprocessing
3. Image Segmentation
4. Feature Extraction
5. Object Detection and Recognition
6. Image Classification
7. Object Tracking
8. Scene Understanding
9. Pose Estimation
10. Image Generation
11. Semantic Segmentation



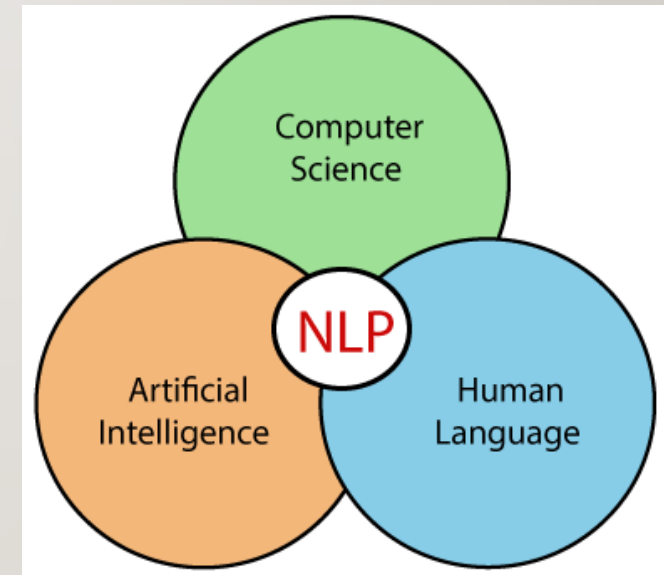
NATURAL LANGUAGE PROCESSING

Focuses on the interaction between computers and human language

It enables computers to understand, interpret, and generate human language in a way that is both meaningful and contextually appropriate.

Steps:

1. Tokenization
2. Text Preprocessing
3. POS Tagging (Part-Of-Speech)
4. Parsing
5. Named Entity Recognition (NER)
6. Sentiment Analysis
7. Word Embeddings
8. Text Classification
9. Machine Translation
10. Question Answering



Key Items:

Tokenization : Breaking down piece of text into smaller parts

Text Preprocessing : Cleaning and Normalizing

Part of Speech : Grammar identification and correction

Parsing:Analysing Grammatical Structure

NER: Identification of Entities

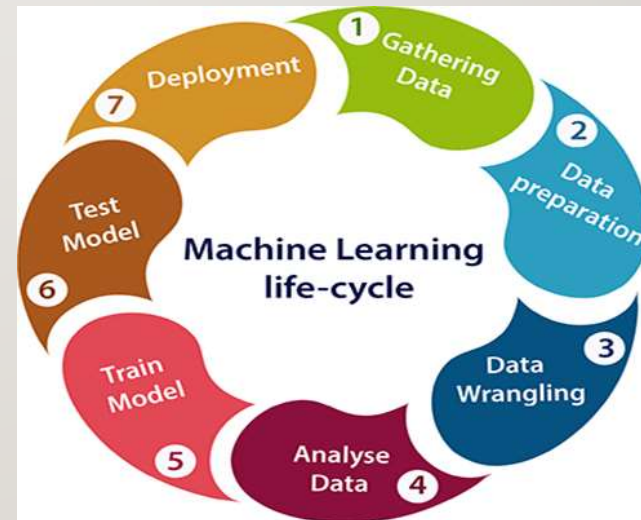
Applications of Natural Language Processing



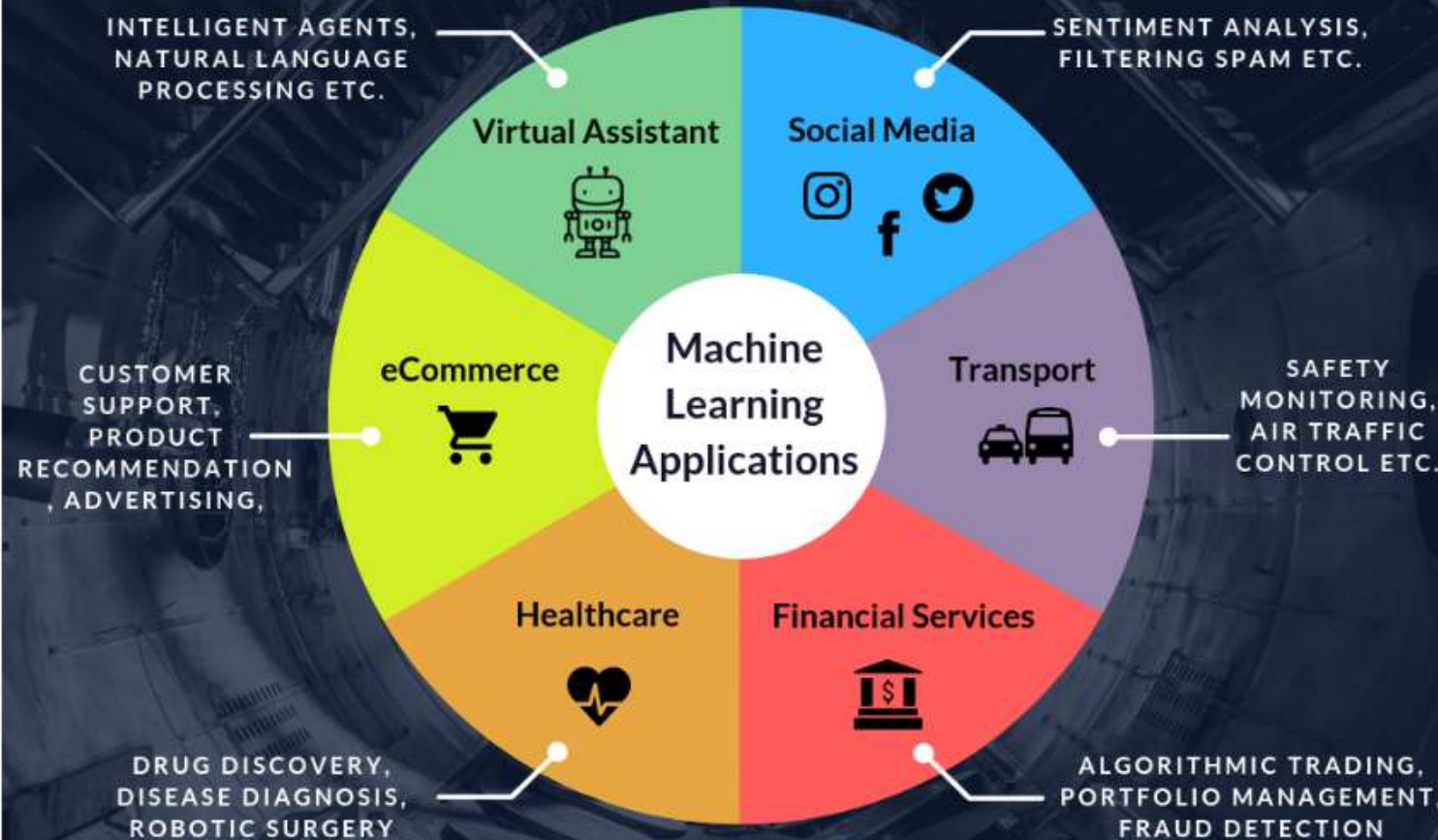
MACHINE LEARNING

Machine learning is a branch of AI and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy

It focuses on usage of algorithms in already visualized data to view or understand the patterns in the given data and produce output according to it



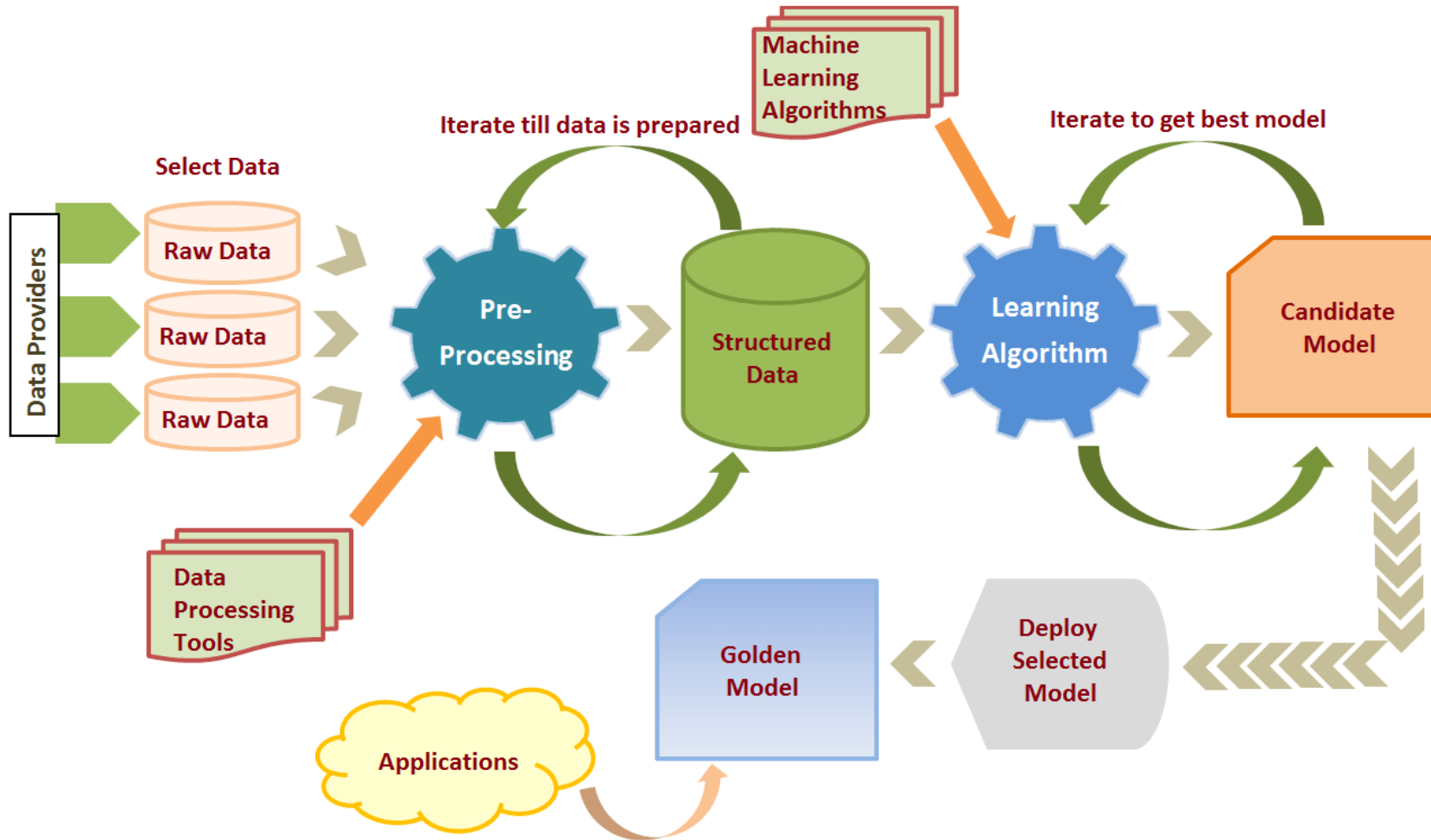
APPLICATIONS OF MACHINE LEARNING



MACHINE LEARNING APPLICATIONS

Steps in Machine Learning

Process Flow View(Understanding)



BIG QUESTION : How these above technologies are implemented ?

I. Programming

Basic Knowledge Of Programming is enough to get started



Reasons for choosing Python:

- Beginner Friendly
- Readability
- Community Support
- Rich Ecosystem of Libraries

Throughout the course ,

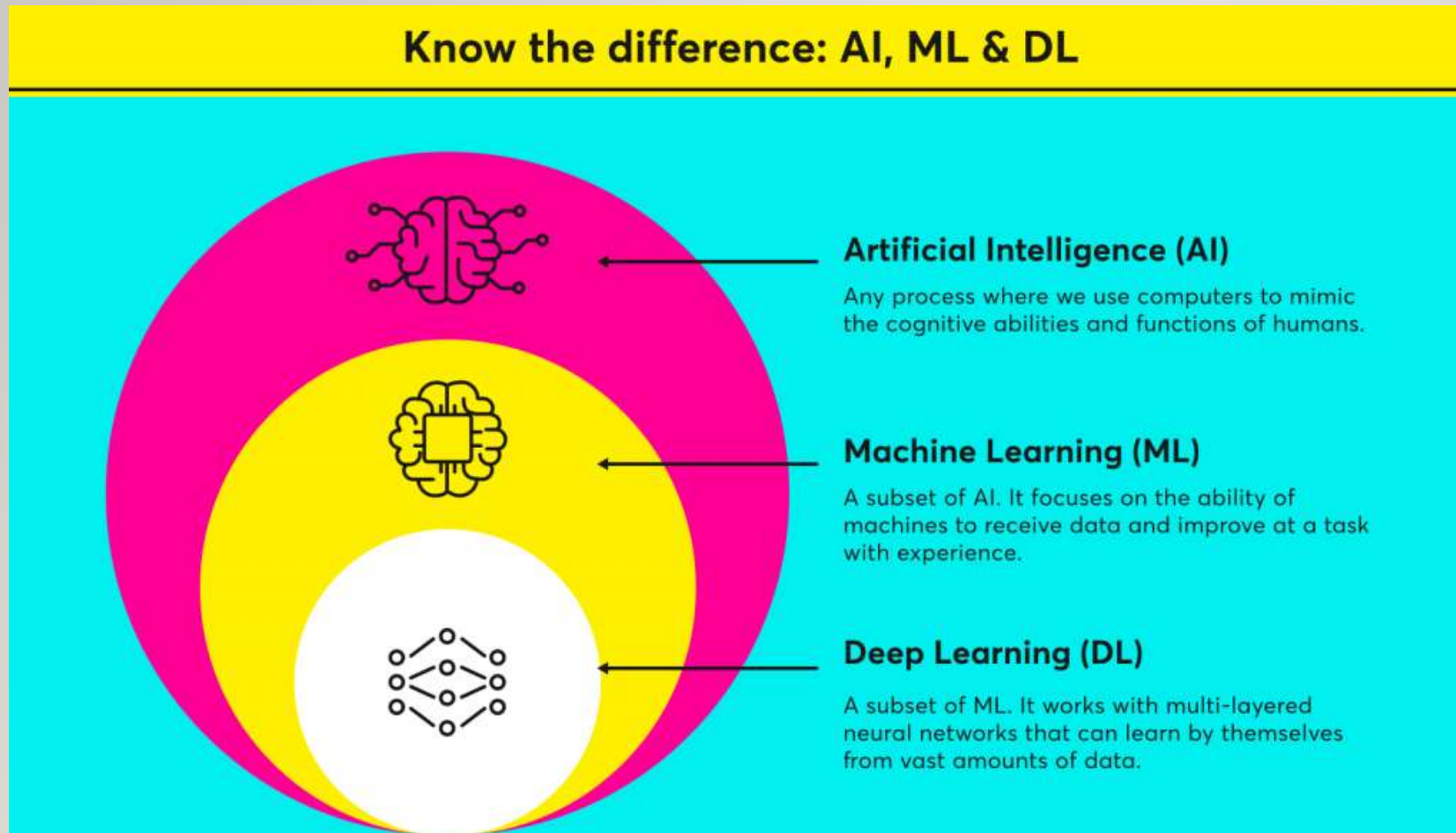
Python will be used.

Libraries associated with Python/can be accessed through Python will be used in this course

2. Usage of Tools



Difference Between ML & DL



Why Deep Learning is necessary?

- Deep learning eliminates some of data pre-processing that is typically involved with machine learning.
- These algorithms can ingest and process unstructured data, like text and images, and it automates feature extraction, removing some of the dependency on human experts.

Deep learning (DL)	Machine learning (ML)
A lot of unlabeled training data is required to make correct conclusions	ML can work on lesser amount of data provided by users
DL creates new features by itself	In ML features are accurately identified by users
DL solves the larger problem on the end-to-end basis	ML divides larger problem into sub problems and then results are combined into one conclusion
DL needs much more time to train	ML needs less time to train as compared to deep learning
DL does not require feature engineering	ML requires feature engineering
DL can have more hidden layers that make it deeper. Deeper network gives more accurate results	ML can give good results with a network having single input, hidden, and output layer
DL gives best results on large data	ML can give good results on large and small data both

Next Week Topics :

1. Introduction to Deep Learning and Neural Networks
2. Python Programming – Fundamentals (Which of Them are mostly required)
3. Importance of Data Visualization in process of ML as well as in AI

Python :

- ❖ Usage of **Google Collaboratory** (Colab) (Generally used for learning purposes)
- ❖ Programming fundamentals – Data Types and variables
- ❖ Conditional Statements and Loops
- ❖ Usage of structures – Lists in Python & Dictionary(Introduction)
- ❖ Importing Libraries in Python

Minimum Requirement :

3 Classes (1.5 Weeks)



APPENDIX – INFORMATION TO READ (ADDITIONAL INFORMATION)

Steps in NLP (Brief)

1. ****Tokenization****:

Tokenization is the process of breaking down a piece of text into smaller units called tokens. Tokens can be individual words, phrases, or even characters. This step is essential as it helps to analyze and process the text at a more granular level.

2. ****Text Preprocessing****:

Text preprocessing involves cleaning and normalizing the text data to make it suitable for analysis. Common preprocessing steps include converting text to lowercase, removing punctuation, handling special characters, and eliminating stop words (commonly used words like "the," "is," "and" that do not carry significant meaning).

3. ****Part-of-Speech (POS) Tagging****:

POS tagging involves assigning grammatical parts of speech (e.g., noun, verb, adjective) to each word in the text. This helps in understanding the syntactic structure of sentences and is crucial for various NLP tasks, such as parsing and text understanding.



4. ****Parsing****:

Parsing is the process of analyzing the grammatical structure of sentences to understand the relationship between words and phrases. It involves creating a parse tree or syntactic structure that represents how the words are connected in a sentence.

5. ****Named Entity Recognition (NER)****:

NER is the task of identifying and classifying named entities in the text, such as names of people, organizations, locations, dates, and numerical values. It helps in extracting important information from unstructured text and is useful in various applications, such as information extraction and sentiment analysis.

6. ****Sentiment Analysis****:

Sentiment analysis is the process of determining the sentiment or emotion expressed in a piece of text, whether it is positive, negative, or neutral. It is commonly used to understand public opinion, customer feedback, and social media sentiment.

7. ****Word Embeddings****:

Word embeddings are numerical representations of words or phrases. They capture the semantic relationships between words, enabling NLP models to work with continuous vector representations of words rather than discrete symbols. Word embeddings are essential for various NLP tasks, such as machine translation, document classification, and information retrieval.



8. ****Text Classification****:

Text classification is the process of categorizing text into predefined classes or categories based on its content. This task is commonly used in spam detection, sentiment analysis, topic categorization, and many other applications.

9. ****Machine Translation****:

Machine translation is the task of translating text from one language to another using NLP techniques. This involves understanding the meaning of the input text in one language and generating the equivalent text in another language.

10. ****Question Answering****:

Question answering is the task of developing models that can understand questions and provide relevant answers by processing large amounts of text. It involves natural language understanding and retrieval of information from text to generate accurate responses to user queries.

These steps represent the foundational processes in NLP, and they can be combined and extended to solve more complex language-related problems and tasks.

