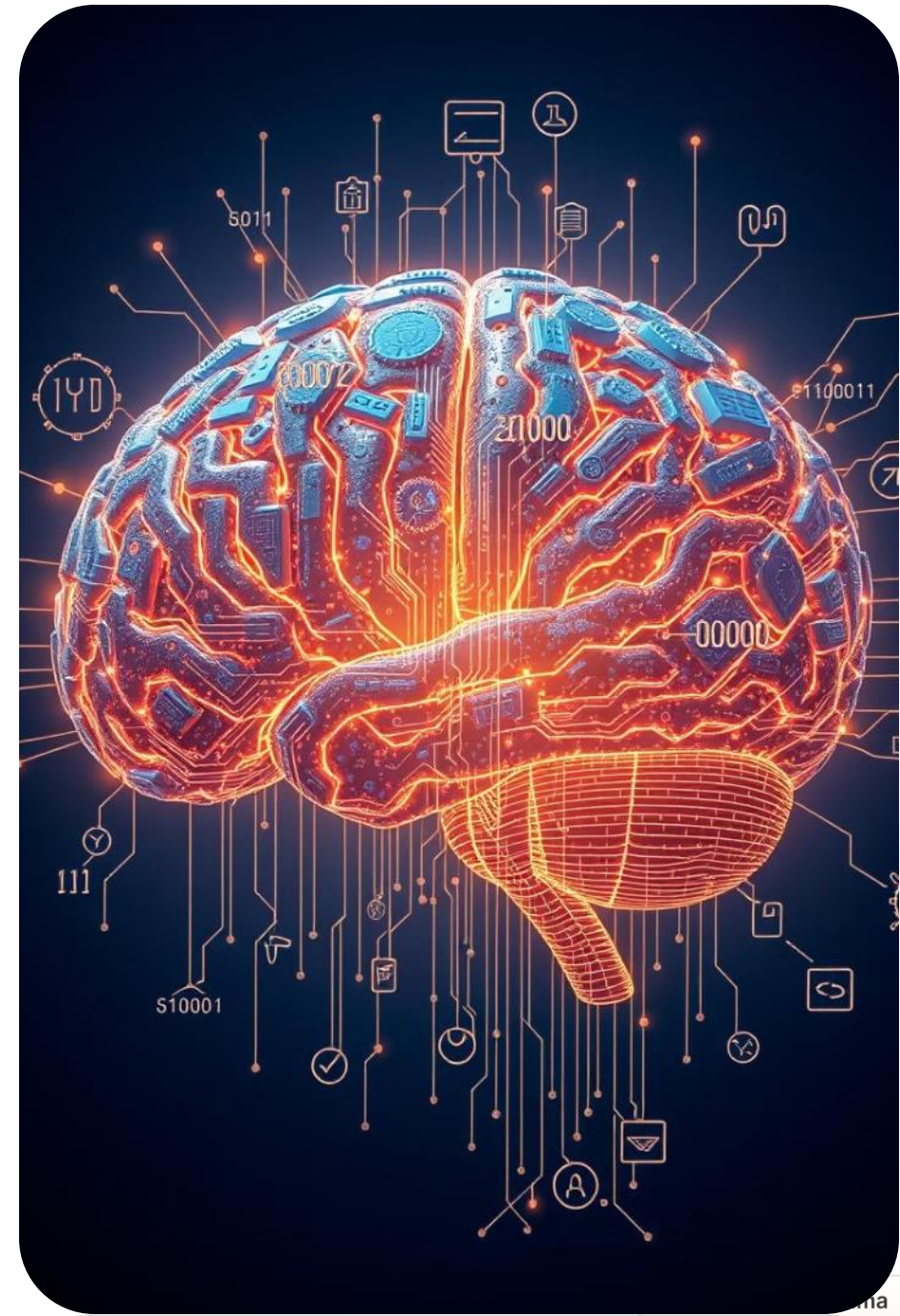
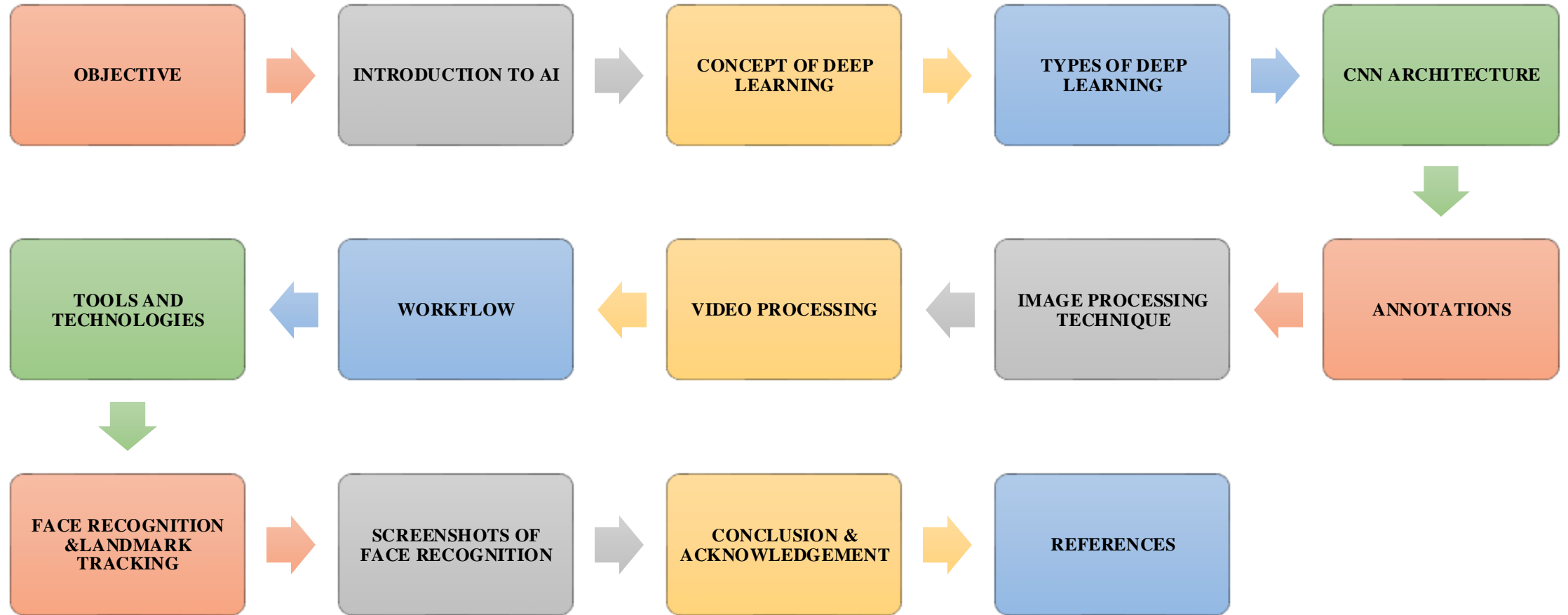


AI-Enhanced Engagement Tracker for young learners

Welcome! In this presentation, we will explore the transformative impact of AI on engagement tracking across various sectors. We will dive into key concepts, analyze the technology behind it, and showcase how AI is revolutionizing engagement monitoring.



ROADMAP

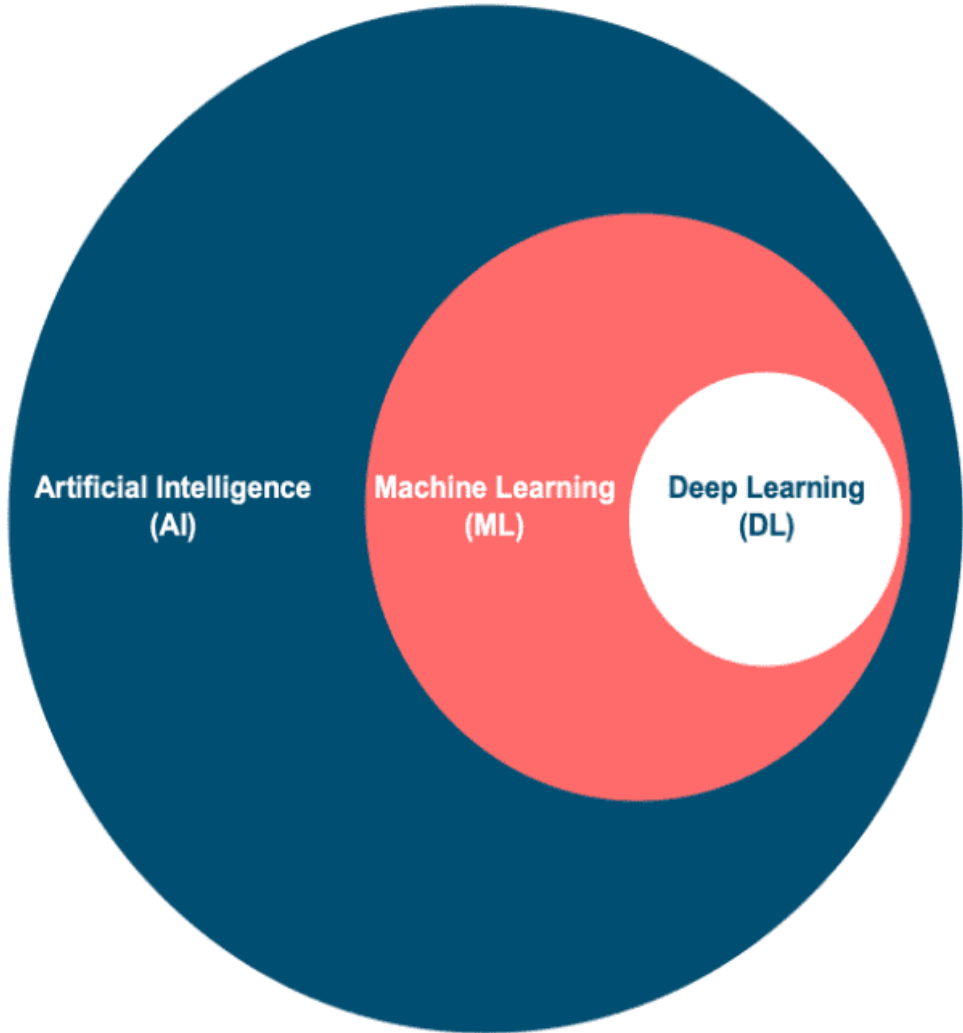




OBJECTIVE

The goal is to develop an AI-driven system to monitor and enhance the engagement levels of young learners in educational settings. The system will analyze various engagement metrics, such as attention span, participation, and interaction, to provide actionable insights for educators to improve teaching strategies and student outcomes.

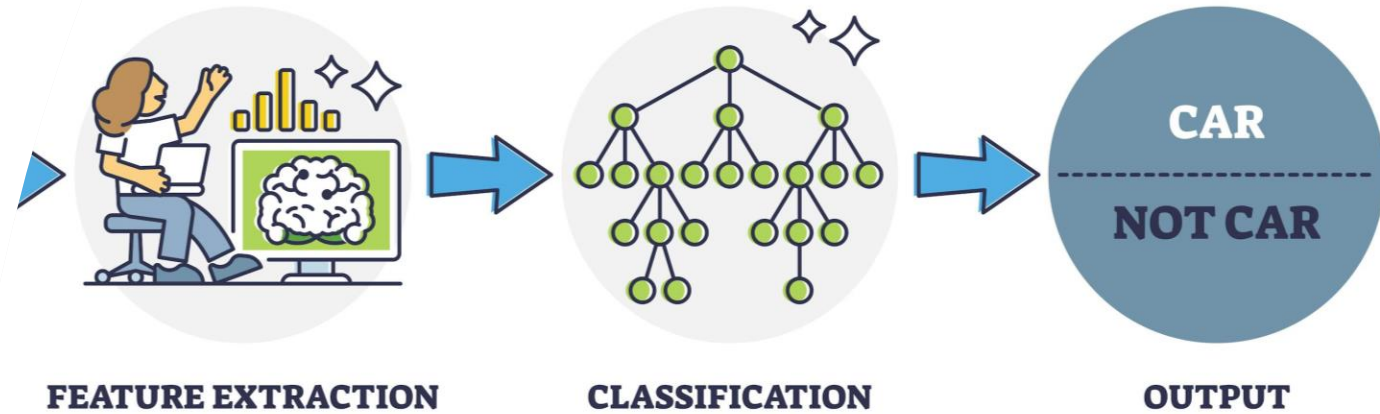
INTRODUCTION TO AI



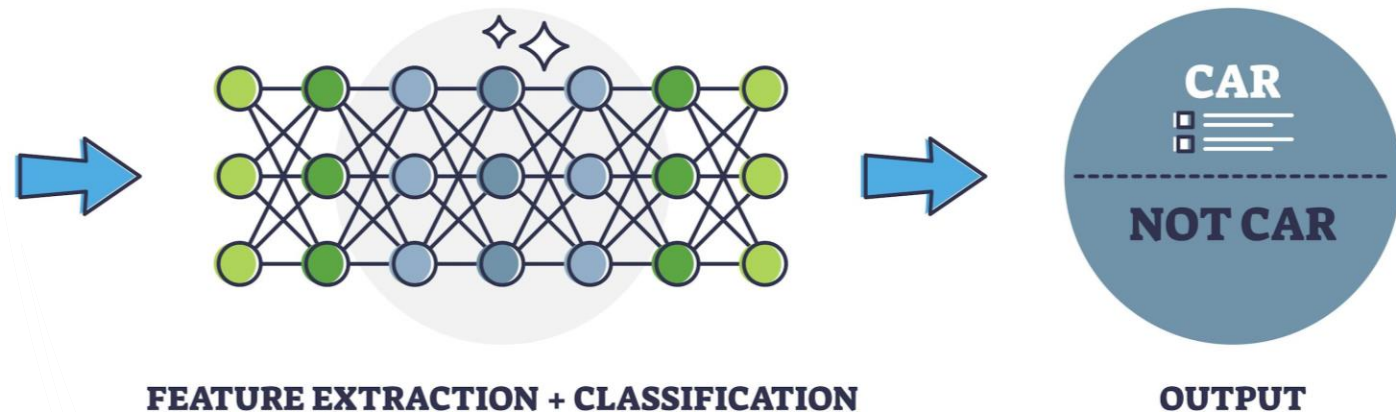
ASPECT	AI	ML	DL
Definition	Simulates human intelligence.	Allows machines to learn from data.	Utilizes deep neural networks.
Scope	Broad	Narrower, focuses on learning.	Specialized subset of ML.
Data Handling	Can operate with rules	Requires structured data.	Handles unstructured data effectively.
complexity	General intelligence.	Task-oriented.	High due to neural networks

CONCEPTS OF DEEP LEARNING

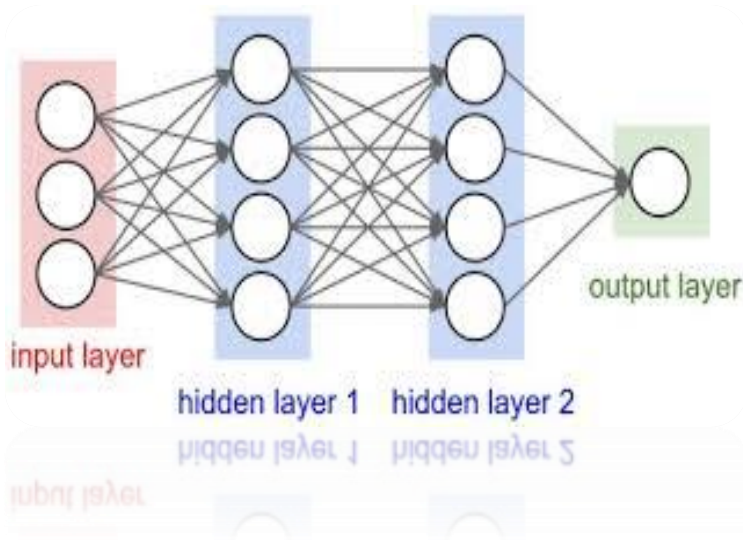
MACHINE LEARNING



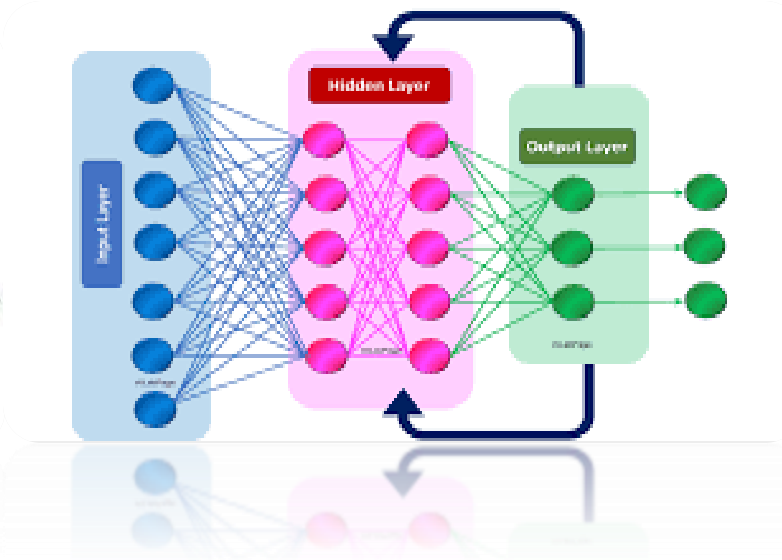
DEEP LEARNING



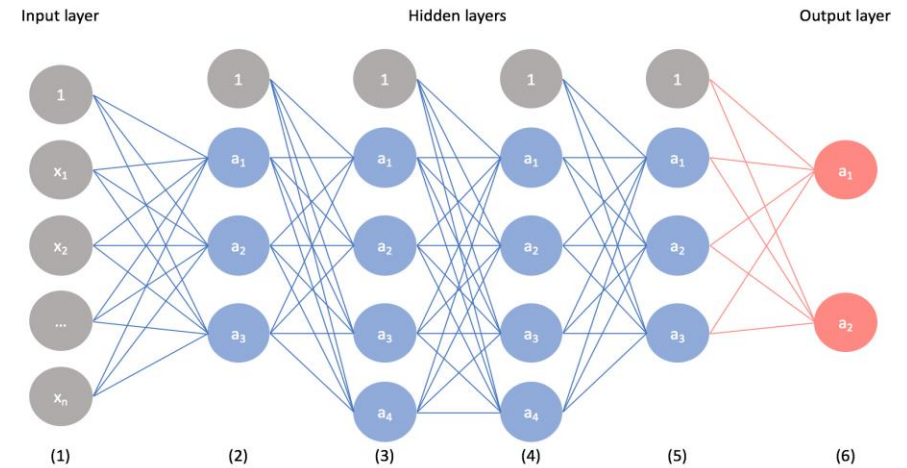
TYPES OF DEEP LEARNING



FEEDFORWARD NEURAL
NETWORK(FNN)

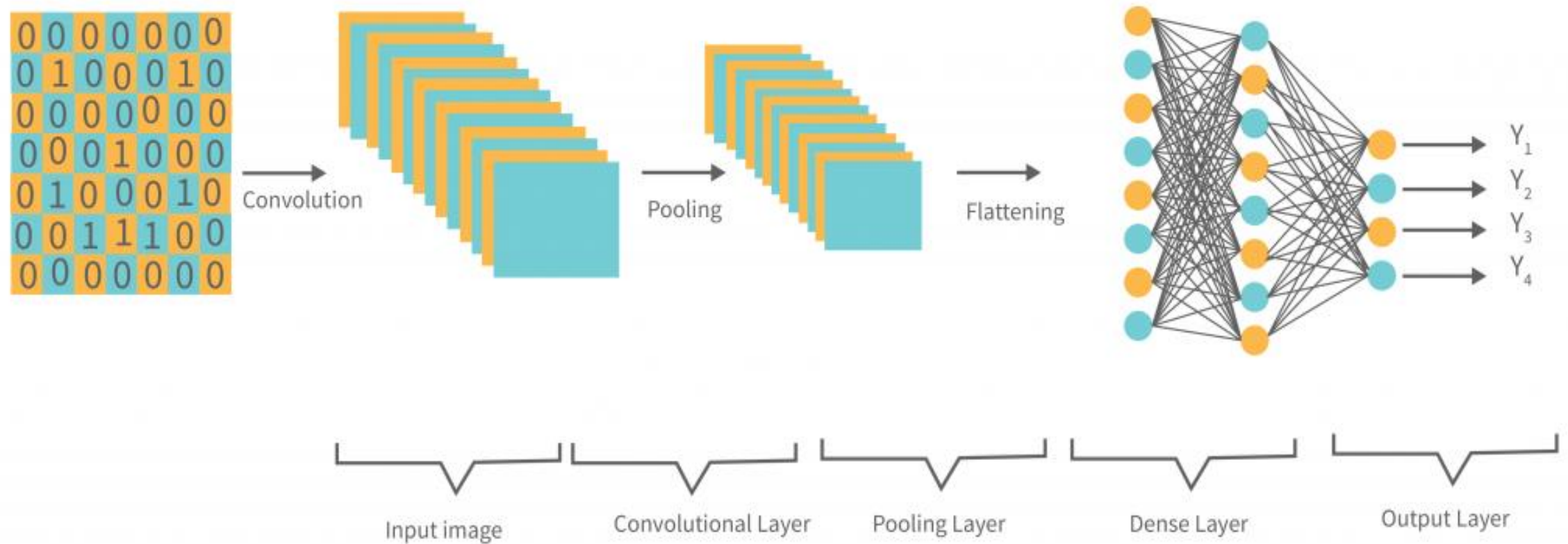


RECURRENT NEURAL
NETWORK(RNN)



CONVOLUTIONAL NEURAL
NETWORK(CNN)

CNN ARCHITECTURE





ANNOTATIONS

- Annotation and Labeling Using LabellImg:
- Purpose of Image Annotation: To prepare labeled datasets for training machine learning models.
- Each labeled object helps the model identify and learn specific features.
- Annotation Tool: LabellImg
- An open-source graphical tool for annotating images. Supports annotation in Pascal VOC and YOLO formats.



IMAGE PROCESSING TECHNIQUES

- Blurring: Reduces noise and smooths the image.
- Example: Gaussian Blur, Median Blur
- Contours: Detects the boundaries of objects.
- Useful for identifying face regions or features..
- Cropping: Extracts a specific region of the image.
- HSV Conversion: Converts image colors to Hue, Saturation, and Value format.

VIDEO PROCESSING FOR ENGAGEMENT ANALYSIS



FPS: 71
FPS: 127
FPS: 10
FPS: 122
FPS: 126
FPS: 120
FPS: 8
FPS: 64
FPS: 131
FPS: 71
FPS: 11
FPS: 62
FPS: 49
FPS: 167
FPS: 11
FPS: 91
FPS: 161
FPS: 123
FPS: 8
FPS: 151
FPS: 74
FPS: 66
FPS: 10



1

Frame Extraction

Video processing starts by extracting individual frames from a video stream. These frames are then analyzed individually for relevant information.

2

Video Recording

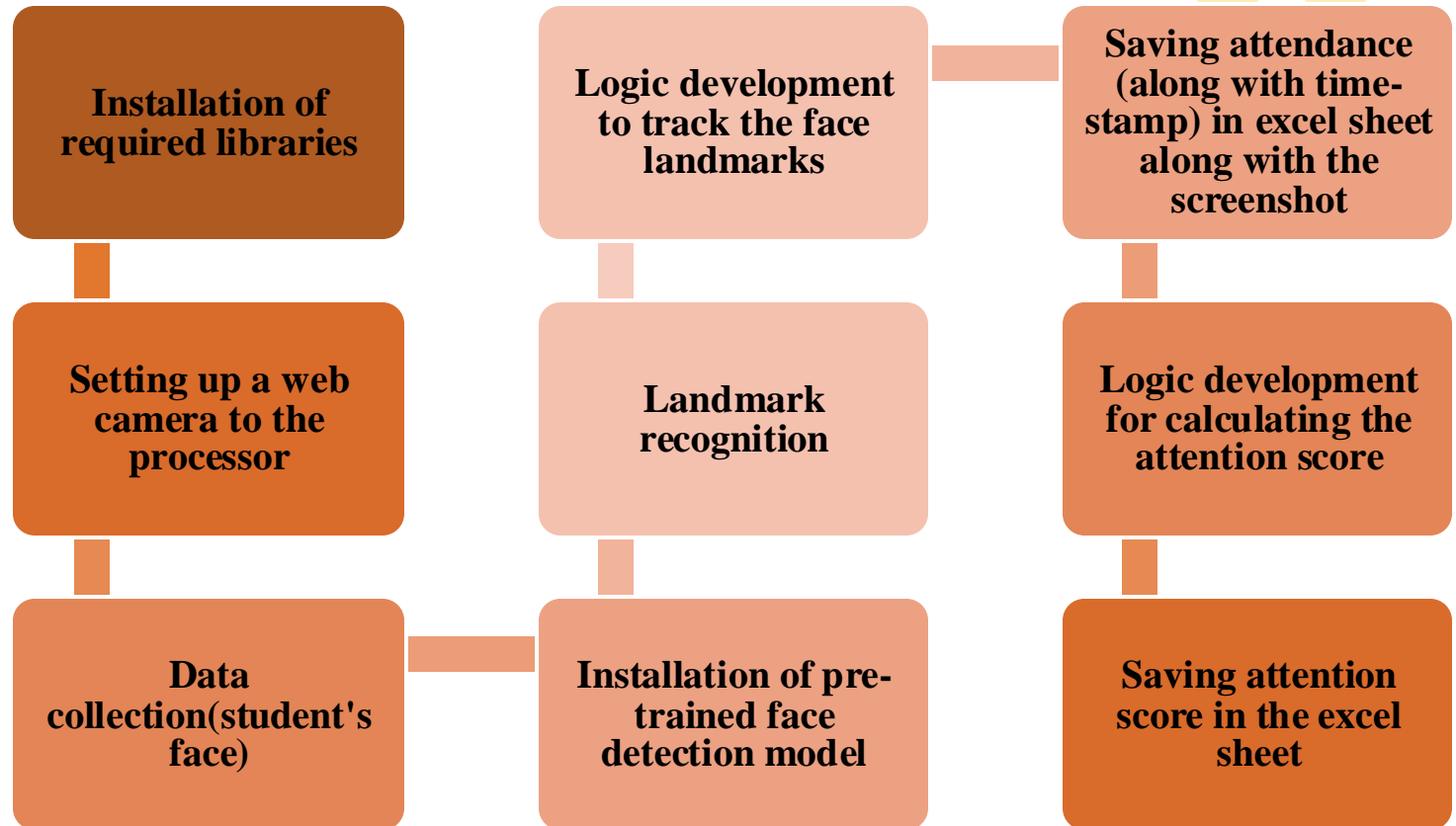
Video recording involves capturing live video footage through a camera and saving it to a file format such as MP4 or AVI. It is essential for various applications, including surveillance, content creation, and video conferencing

3

Video Stream

Video streaming involves capturing and transmitting video data in real-time over a network. This is widely used in live broadcasting, video conferencing, and streaming platforms.

WORKFLOW



TOOLS AND TECHNOLOGIES

LIBRARIES

- OpenCV-
python=4.10.0.84
- face recognition=1.3.0
- dib=19.24.6
- pandas=2.2.3
- NumPy=1.24.3
- imutils=0.5.4
- datetime=5.5
- Operating system

DEVELOPMENT TOOLS

- Visual Studio Code
- Python IDE

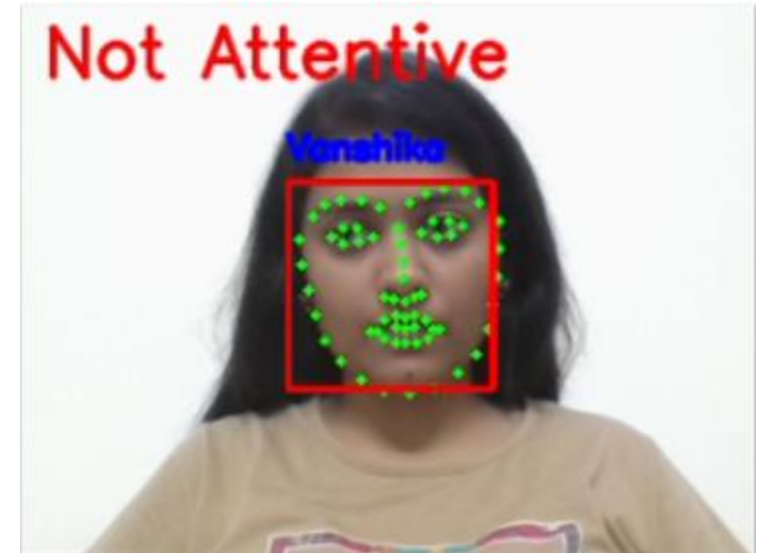
HARDWARE

- Processor(laptop)
- Web cam

FACE RECOGNITION & LANDMARK TRACKING

➤ Face Detection:

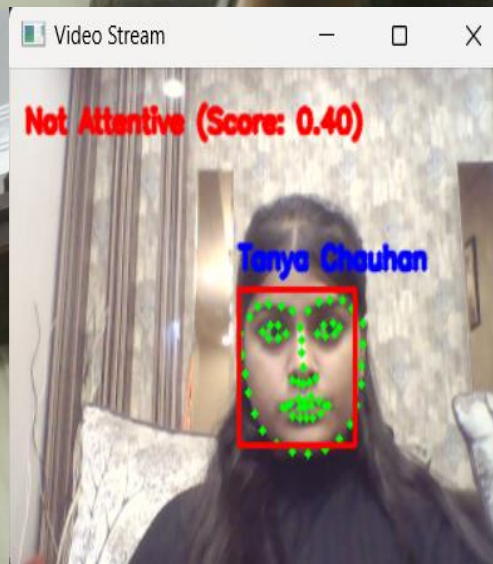
Face detection is a crucial aspect of AI-enhanced engagement tracking, allowing us to analyze facial expressions, monitor attention, and assess individual engagement levels in various settings.



➤ Landmark extraction:

- **shape_predictor_68_face_landmarks.dat** for precise facial landmark detections
- **Head Pose Estimation** : Calculated yaw, pitch, and roll using the landmarks to assess attentiveness Data
- **Filtering**: Skipped frames to reduce noise and avoid redundant computations. Smoothed jittery pose data for consistent results.

SCREENSHOTS OF FACE RECOGNITION



Name	Date	Time	Screenshots	Attentive	Attention Score
Tanya Cha	2024-11-1	17:29:05	screensho	No	0.428314
Tanya Cha	2024-11-1	17:29:05	screensho	No	0.457539
Tanya Cha	2024-11-1	17:29:06	screensho	No	0.42419
Tanya Cha	2024-11-1	17:29:06	screensho	No	0.427676
Tanya Cha	2024-11-1	17:29:06	screensho	No	0.429891
Tanya Cha	2024-11-1	17:29:07	screensho	No	0.433094
Tanya Cha	2024-11-1	17:29:07	screensho	No	0.442842
Tanya Cha	2024-11-1	17:29:08	screensho	No	0.401028
Tanya Cha	2024-11-1	17:29:08	screensho	No	0.400407
Tanya Cha	2024-11-1	17:29:08	screensho	No	0.407027
Tanya Cha	2024-11-1	17:29:09	screensho	No	0.3877
Tanya Cha	2024-11-1	17:29:09	screensho	No	0.417736
Tanya Cha	2024-11-1	17:29:09	screensho	No	0.473966
Tanya Cha	2024-11-1	17:29:10	screensho	No	0.432689
Tanya Cha	2024-11-1	17:29:10	screensho	No	0.434413
Tanya Cha	2024-11-1	17:29:13	screensho	No	0.491679
Tanya Cha	2024-11-1	17:29:13	screensho	No	0.448129
Tanya Cha	2024-11-1	17:29:13	screensho	No	0.40386
Tanya Cha	2024-11-1	17:29:14	screensho	No	0.348347
Tanya Cha	2024-11-1	17:29:14	screensho	No	0.347556
Tanya Cha	2024-11-1	17:29:15	screensho	No	0.386355
Tanya Cha	2024-11-1	17:29:15	screensho	No	0.367546
Tanya Cha	2024-11-1	17:29:15	screensho	No	0.368133
Tanya Cha	2024-11-1	17:29:16	screensho	No	0.306567
Tanya Cha	2024-11-1	17:29:16	screensho	No	0.460193
Tanya Cha	2024-11-1	17:29:16	screensho	No	0.368594
Tanya Cha	2024-11-1	17:29:17	screensho	No	0.357459

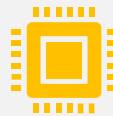
ADVANTAGES



Accuracy and Efficiency: Employing state-of-the-art CNN models ensures high accuracy in detecting and analyzing user engagement.



Real-Time Processing: The system can process video streams in real-time, making it ideal for applications such as video conferencing, online education, and surveillance.



Scalability: Designed to handle multiple video streams simultaneously, this system can scale to meet the needs of various industries.



Versatility: Applicable in diverse fields such as security, user experience enhancement, and content creation.

CONCLUSION & ACKNOWLEDGMENTS:

The project demonstrates how AI can transform engagement tracking, providing educators with actionable insights to enhance learning outcomes. Real-time analysis and logging pave the way for personalized interventions and improved student focus.

Thanks to our mentor **Ms. Jaya Darshana Ma'am** and my peers, and resources that supported the development of this project.



REFERENCE

- Dlib library GitHub Repository: [dlib library](#)
- shapepredictor_68_face_landmarks.dat : [shapepredictor](#)
- labelling - [labelling](#)
- Labelme - [labelme](#)
- Cmake- [cmake](#) 