Covered Topics

- OpenCV Multimedia Processing:

  - Image Filtering Basics

  - Morphological Image processing

  - BITWISWE

  - Transformation Functions

  - Feature Extraction

  - Operations

  - Blurring Techniques

  - Color Spaces

  - Contour Detection

  - Edge Detection

  - Masking

  - Threshold Techniques

  - Face Detection Using haar cascade

Reference:

https://drive.google.com/file/d/14BsnVqC2c6NNsV4MrAg79ltP_h6Fzd5e/view?usp=share_link

- Object Detection And Tracking With Ultralytics YOLO:

  - Model's Versions And Capabilities Exploration

  - Bounding Boxes Basics(IOU, mAP, Nms, Confidence Threshold)

  - Understanding Model's Functionalities

- Data Collection, Customization, And Annotation

- Data Augmentation tools and Techniques

- Model Related Datasets Inspection (FLW,COCO)

- Tracking Pipeline

- Tracking Algorithms (Sort Tracker, DeepSort Tracker, Byte Tracking)

- Object Trajectory

- Deep Learning:

  - Neural Networks Abstraction

  - Neural Networks Training Fundamentals

  - CNN Architecture Study (Convolution, Pooling, Activation Function)

  - CNN Popular Architectures Exploration (ResNet, VGG, MobileNet)

  - Transfer Learning

  - Bias-Variance Tradeoff

- Natural Language Processing:

  - Embeddings Understanding And Techniques

  - RAG Architecture Study

  - ChromaDB Inspection (Indexing, Retrieval, Properties)

  - Vector Database Searching Techniques

  - Ollama Integeration

  - Exploring Generation Models (GPT, BERT, DeepSeek-r1)

  - LangChain Understanding

Courses

- Neural Networks And Deep learning with Andrew Ng
- Prompt Engineering With Llama 2&3

Projects

- Customized Object Detection Using YOLO:

  - Defining Program Pipeline

  - Data Collection And Labeling Using RoboFlow

  - Data Annotation And Augmentation Using RoboFlow

  - Training The Pre-Trained Model On Customized Dataset

  - Utilizing(epochs, Precision, Recall)

  - Testing And Deploying The Model

Reference:

https://drive.google.com/file/d/1qEmj6giDQuqDh1LnE54mXFXjTUxauXkj/view?usp=share_link

- Face Detection And Tracking:

  - Defining Project Pipeline And Requirements

  - Custom Dataset Processing (Collection, Labelling, Annotation)

  - Fine Tuning Pre-Trained Model (YOLOv11)

  - Testing The Model Then Deploying it

Reference:

https://drive.google.com/file/d/1lhWVmCKeEFongyZQT9SWpgKzpNdBqKzI/view?usp=share_link

- RAG Chatbot Using DeepSeek-r1:

  - Defining The Pipeline

  - Installing And Importing Needed Libraries (Ollama, Gradio, LangChain, ChromaDB)

- Deploying DeepSeek-r1

- Developing an Interface

- Testing And Deploying

Reference:

https://drive.google.com/file/d/1MQZmB3Fo4OSAsJTsPHHfAKofoBCr7UCX/
view?usp=share_link

Extras Learned From My Instructor 'Nouman Rasheed'

- Anaconda setup And Inspection

- Ollama Probe

- LabelImg (On-premises Labeling tool)

- Handling Code Errors

- Terminal Commands Learning

- Research And Public Learning Encouragement