**Image Processing for Machine Learning**

### **Overview of the Project:**

The "Image Processing for ML" project is designed to provide mentees with a comprehensive introduction to image processing techniques and their integration into Machine Learning (ML) modeling. This initiative aims to empower participants with the skills and knowledge needed to harness the power of visual data in various applications, including computer vision, object recognition, and image classification.

### **Tech Stacks:**

* **Programming Languages:** Python
* **Libraries and Frameworks:** OpenCV, numpy, PIL, sci-kit-learn
* **Tools:** Google Colab

### **Project Timeline:**

*Week 1 & 2: Basics of Image and Various Processing Techniques*

* Comprehensive understanding of image fundamentals
* Exploration of various image processing techniques
* Small intermediary projects to apply learned concepts

*Week 3 & 4: Further Image Processing Techniques and Introduction to Image-related ML*

* Delving deeper into advanced image processing methods
* Introduction to the integration of image processing with Machine Learning
* Hands-on exercises to solidify knowledge

*Week 5: Final Project on Optical Character Recognition (OCR)*

* Application of various image processing techniques
* Encouraging the use of Convolutional Neural Networks (CNNs)
* The culmination of acquired skills in a real-world OCR project

### **All Resources to be Used and Delivered:**

Resources:

*Learning Materials:*

* Curated tutorials, articles, and documentation for theoretical understanding
* Practical coding assignments for hands-on learning

*Projects:*

* Real-world projects designed to apply acquired skills
* Emphasis on practical application for a well-rounded learning experience

*Interactive Sessions:*

* Live sessions for doubt resolution and discussions
* Ensuring active participation and engagement

*Feedback Mechanism:*

* Regular assessments to track progress
* Constructive feedback to enhance learning

*Final Project:*

* A capstone project to showcase proficiency in machine learning concepts
* Demonstration of the ability to integrate image processing techniques into ML models

Holistic Learning Approach:

The project is meticulously designed to provide participants with a holistic understanding of Image Processing and its applications in Machine Learning. The curriculum combines theoretical knowledge, practical skills, and ethical considerations. The selected tech stacks and timeline ensure a gradual and comprehensive learning experience.

**Setup: Using google collab:** [**https://youtu.be/tCVXoTV12dE?si=Ni0DL1szT20k-qrB**](https://youtu.be/tCVXoTV12dE?si=Ni0DL1szT20k-qrB) **Using Jupyter, Virtual Environment and IDE (like VSCode):** [**https://www.youtube.com/watch?v=W8MipCdX1To&list=PL2EKpjm0bX4LOE\_p9WuxVegOaZXhE3QIe**](https://www.youtube.com/watch?v=W8MipCdX1To&list=PL2EKpjm0bX4LOE_p9WuxVegOaZXhE3QIe)

**Text Tutorials: Python:** [**https://www.w3schools.com/python/**](https://www.w3schools.com/python/)

**NumPy:** [**https://www.w3schools.com/python/numpy/default.asp**](https://www.w3schools.com/python/numpy/default.asp)

**OpenCV:**[**https://docs.opencv.org/4.x/d7/da8/tutorial\_table\_of\_content\_imgproc.html**](https://docs.opencv.org/4.x/d7/da8/tutorial_table_of_content_imgproc.html)

**Video Tutorials: Python:** [**https://www.youtube.com/watch?v=kqtD5dpn9C8**](https://www.youtube.com/watch?v=kqtD5dpn9C8)**,** [**https://www.youtube.com/watch?v=vLqTf2b6GZw**](https://www.youtube.com/watch?v=vLqTf2b6GZw)

**NumPy:** [**https://www.youtube.com/watch?v=QUT1VHiLmmI**](https://www.youtube.com/watch?v=QUT1VHiLmmI)

**OpenCV:** [**https://youtu.be/oXlwWbU8l2o**](https://youtu.be/oXlwWbU8l2o)

[**YouTube**](https://www.youtube.com/)

[**NeuralNine**](https://www.youtube.com/channel/UC8wZnXYK_CGKlBcZp-GxYPA)

[**Google Colab Introduction For Machine Learning**](https://www.youtube.com/watch?v=tCVXoTV12dE)

[**YouTube**](https://www.youtube.com/)

[**Cool IT Help**](https://www.youtube.com/channel/UC2bxQotH5ZHYwejc8QGbHoQ)

[**Jupyter Notebooks Environment setup in Visual Studio Code**](https://www.youtube.com/watch?v=W8MipCdX1To)

**Python basics:** <https://www.geeksforgeeks.org/data-science-tutorial/>

<https://youtu.be/kqtD5dpn9C8>

<https://homepages.inf.ed.ac.uk/rbf/HIPR2/gsmooth.htm>

**OpenCV :** <https://youtu.be/oXlwWbU8l2o>

**NumPy:** <https://youtu.be/QUT1VHiLmmI>

**OCR Technology:** <https://www.forbes.com/sites/technology/article/what-is-ocr-technology/>

**CNN:**<https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53>

**Resource drive:** <https://drive.google.com/drive/folders/1ouRUnobdNAozn37VJXI7zM6QtGjuSZCR?usp=sharing>

**Assignments:**

<https://drive.google.com/file/d/1c4u3-dGfckvRljQXilO6HNJgd5V3RMvM/view?usp=sharing>

<https://docs.google.com/document/d/1jdPwTGnPd3nHOkNg0SobIadRHkJQR3RItp6Zbzhe-T8/edit?usp=sharing>

**Prerequisite**:  
The only prerequisite is enthusiasm to learn and complete the project. This project welcomes individuals passionate about gaining expertise in image processing and its integration with machine learning.

In conclusion, the "Image Processing for ML" project offers a well-structured and comprehensive learning journey, ensuring that participants not only grasp the theoretical foundations but also gain practical proficiency in applying these concepts to real-world scenarios.

**Project Mentor:**

**Pavan Kumar C**