IEEE NITK CHAPTER

PROJECT – FACE DETECTION AND RECOGNITION

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| Tip icon | **ABSTRACT**  **This project focuses on implementing algorithms to detect faces in an image and recognizing these faces by sufficiently training a Neural Network (CNN) on datasets obtained from Kaggle.** |

# Section 1 – project overview

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| Tip icon | *The proposal is divided into two sections namely – Project Overview and Literature Review. The first section will cover the motivation, objectives, methodology, timeline, budget and deliverables of the project. The second section contains the literature review regarding the different phases of the project.* |

## The Motivation

The project spans across the fields of Deep Learning and Computer Vision which are some of the most happening and popular fields in electronics today. This project can be applied in many daily-life situations too. (eg. Taking employees’ attendance in workplaces by setting up cameras at entry/exit)

## The Opportunity

The project requires good understanding of fairly complex topics like Deep Learning and Computer Vision, thus there is a lot of scope for learning. Considering the fact that freshers might not be sufficiently exposed to coding, high level PLs (Python) will be predominantly used, making the implementation part manageable and Understanding the underlying concepts will be given top priority. First years will get exposure to topics like Machine Learning, Neural Networks, Signal/Image Processing which will surely help them in their future pursuits and studies.

## Project Approach

Initially much time will be spent on bringing the first years up to speed on the concepts i.e., Basics of Python programming, Image processing, Machine Learning, Deep Learning (timely tasks will also be provided so that the juniors can get accustomed to the implementation). Till this time, second years will be working on the algorithms to be used and try to get a good idea of what needs to be done. Then, the first years will be provided with resources pertaining to the problem to gain some understanding.

Finally, the mentees will be tasked with carrying out the face detection and recognition implementation under the constant guidance of the mentors. (if anything is beyond the first years, the second years will be taking it up)

## Project Deliverables

The following are the full list of deliverables which will be achieved through the entire project timeline:

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| Deliverable | Description |
| Python programming | Basics of coding in Python language and some of the Python libraries required for the project. |
| Image processing | Concepts beginning from digital image representation to algorithms behind basic image operations. Image operations are implemented in OpenCV after understanding the algorithms behind it. |
| Deep learning | Deep learning, artificial neural networks, convolutional neural networks. |
| Face detection and recognition | Face detection using Haar cascade classifier (tentatively, we will finalize before project starts), face recognition using CNN. |

At the end of this project, first years will be familiarized with Python, deep learning, artificial neural networks, convolutional neural networks and are able to come up with a model and technique which can be used as a face recognition software.

## Timeline for Execution

Key project dates are outlined below. Dates are best-guess estimates and are subject to change until a contract is executed.

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| Tip icon | *In the Table below, the dates and duration of the project are tentative and subjected to change as it depends on the availability of resources to accomplish some tasks.* |

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| Description | Start Date | End Date | Duration |
| Phase 1 : Python and image processing | | | |
| Implementing decision statements, loops, functions in Python | After midsem |  | 1 week |
| Image representation and operations |  |  | 3 weeks |
| Phase 2 : Deep learning | | | |
| Deep learning basics and ANN |  |  | 2 weeks |
| CNN  Keras library |  |  | 2 weeks  1 week |
| Phase 3 : Face detection | | | |
| Face detection technique, algorithm (theory) |  |  | 1 week |
| Implementation |  |  | 2 weeks |
| Phase 4 : Face recognition | | | |
| Face recognition technique, algorithm(theory)  Implementation |  |  | 1 week  2 weeks |
| Phase 5 : Report | | | |
| Final report |  | 4 months | 1 week |
| Project End | | | |

## References

1. <https://arxiv.org/ftp/arxiv/papers/1302/1302.6379.pdf>
2. <https://www.researchgate.net/publication/321407418_Face_verification_using_convolutional_neural_networks_with_Siamese_architecture>
3. <https://towardsdatascience.com/face-recognition-how-lbph-works-90ec258c3d6b#:~:text=Local%20Binary%20Pattern%20(LBP)%20is,powerful%20feature%20for%20texture%20classification>
4. <https://thesai.org/Downloads/Volume9No6/Paper_6-Study_of_Face_Recognition_Techniques.pdf>

# SECTION 2 – LITERATURE REVIEW

Some resources which give an idea about the problem at hand and some datasets that we plan to use are listed below,

1) <https://www.mygreatlearning.com/blog/face-recognition/>

2) [Understanding Face Detection with the Viola-Jones Object Detection Framework | by Socret Lee | Towards Data Science](https://towardsdatascience.com/understanding-face-detection-with-the-viola-jones-object-detection-framework-c55cc2a9da14)

3) **Reference Course for CNNs**: [Convolutional Neural Networks | Coursera](https://www.coursera.org/learn/convolutional-neural-networks?specialization=deep-learning#syllabus)

4) **Datasets:** [10 Face Datasets To Start Facial Recognition Projects (analyticsindiamag.com)](https://analyticsindiamag.com/10-face-datasets-to-start-facial-recognition-projects/)

5) <https://www.kaggle.com/samansiadati/face-detection-in-images>

<https://www.kaggle.com/imrandude/olivetti>

6) [Real-Time Face Recognition: An End-To-End Project | by Marcelo Rovai | Towards Data Science](https://towardsdatascience.com/real-time-face-recognition-an-end-to-end-project-b738bb0f7348)

7) **Resource for learning Image processing with OpenCV:** <https://www.geeksforgeeks.org/introduction-to-opencv//>