# Proposal: Comparative study of models for facial mask detection

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***Abstract*-** This document presents the proposal for the concluding project for the subject CS536: Machine Learning. It contains the detailed description of the problem statement at hand, the methodology that would be used to tackle the problem and the expected results that would be generated by using the described methodology.

1. Introduction

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fter recovering from a pandemic, being prepared for the next one is the need of the decade. In the recent pandemic, we saw economies failing due as a ban on gathering in large numbers deterred the supply chains. As we recover, we find it necessary to group with proper precautions. One of the important precautions is wearing a mask. Though this precaution can be enforced manually, it requires a large workforce. Having such a large workforce is not viable in all situations. Thus, there is a need to detect whether any individual in a crowd is not wearing a mask.

1. Problem statement

The problem of mask detection amongst large number of people is an old one and needs to be solved using state-of-the-art models. YOLOv7 published in 2022 are in the forefront of real-time object detection. There is a need to benchmark this model against the other leading models like Detectron2, SSD, etc., to check its performance for mask detection.

1. DATASET

Here, we would be using the Face Mask dataset. This dataset contains 853 RGB images of individuals and multiple groups of people belonging to 3 classes viz. 1. Wearing a mask 2. Not wearing a mask and 3. Wearing mask incorrectly.

1. METHODOLOGY

In this project, we'll put many models into practice to address the facial mask recognition issue and evaluate their effectiveness using the Facial Mask Dataset. These models would be benchmarked on their accuracy and speed. Our goal is to determine the most efficient and accurate model for facial mask detection, which could potentially be used in real-world scenarios to help enforce the wearing of masks in public places. Additionally, we might also explore the possibility of combining multiple models to improve the overall performance of the facial mask detection system. We would be implementing the following models:

1. YOLOv7

2. Detectron2

3. SSD

1. Expected Results

The following evaluation metrics for all the models will be evaluated and compared:

* 1. Accuracy
  2. Inference time
  3. Precision
  4. Recall
  5. F1 Score
  6. Loss

1. CONCLUSION

Thus, the leading real-time object detection models will be compared.

1. REFERENCES

These are some of the references we will be using to implement our hypothesis:

1. Redmon, J., & Farhadi, A. (2018). YOLOv3: An Incremental Improvement.
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4. Lin, T. Y., Goyal, P., Girshick, R., He, K., & Dollar, P. (2017). Focal loss for dense object detection. IEEE International Conference on Computer Vision (ICCV), 2980-2988
5. Wu, Y., Kirillov, A., Massa, F., Lo, W. Y., & Girshick, R. (2021). Detectron2