



Face Mask Detection Using Deep Learning

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Project Overview

- AI model to detect mask usage
 - Uses deep learning and computer vision
 - Supports public safety and automated monitoring



The Problem

- Manual mask monitoring is inconsistent and costly.
- AI-based detection improves safety in hospitals, airports, schools, and restaurants.

Related Work

- Several studies have proposed deep learning-based solutions for face mask detection.
Loey et al. used ResNet50 and SVM to classify masked faces and achieved high accuracy on controlled datasets.
Chowdary et al. applied MobileNetV2 for lightweight deployment and demonstrated good performance for mobile devices.
Nagrath et al. introduced SSD-MobileNet for real-time mask detection from video streams.
- Most existing works focus on accuracy in ideal conditions but do not fully address real-time performance and environmental variations such as different lighting, face orientation, and mask types.

Project Goal

- Build a CNN-based model
 - Achieve over 90% accuracy
 - Enable real-time detection

Methodology

- Preprocessing: resizing, normalization
 - Model: CNN + MobileNetV2 (transfer learning)
 - Evaluation: Accuracy, Precision, Recall, F1-Score



Dataset Used

- Kaggle Face Mask Detection Dataset
- Publicly available, labeled dataset for supervised learning
- Balanced samples of masked and unmasked faces
- Includes variations in lighting, angles, and environments
- Commonly used in research, enabling performance comparison



Results

- Accuracy above 90%
 - MobileNetV2 performed best
 - Strong classification shown by confusion matrix

Conclusion

- Deep learning is effective for mask detection
 - Model suitable for real-time public monitoring
 - Future work: real-world testing

References

- Andrew Mvd (2021) – Kaggle Dataset
 - Loey et al. (2021) – ResNet50 Study
 - Chowdary et al. (2020) – MobileNetV2
 - Nagrath et al. (2021) – Real-Time Detection