Smart School Management System

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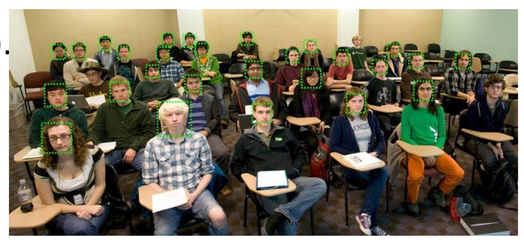
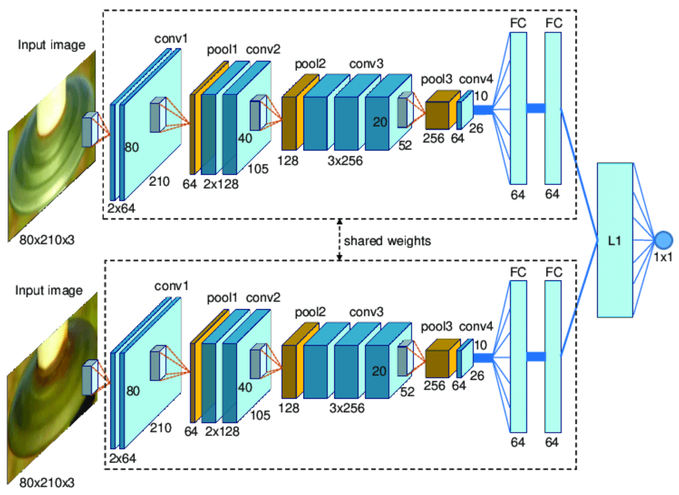
Introduction

- Smart School Management System (ScMS) is a technological solution that uses computer vision and deep learning models to automate various tasks including attendance tracking, uniform detection, students' behavior monitoring and academic performance evaluation by monitoring students' attention level.
- The system uses a camera for students recognition in real-time and advanced algorithms are used to analyze data to provide insights into attendance rates, students behavior patterns and academic performances.
- ScMS can help schools to improve their efficiency and effectiveness with least effort and time providing a safer and more secure environment for students and staff.

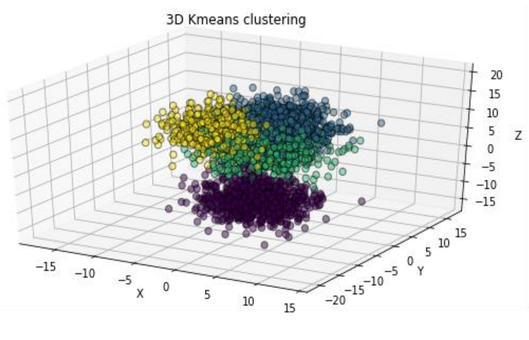
Methods

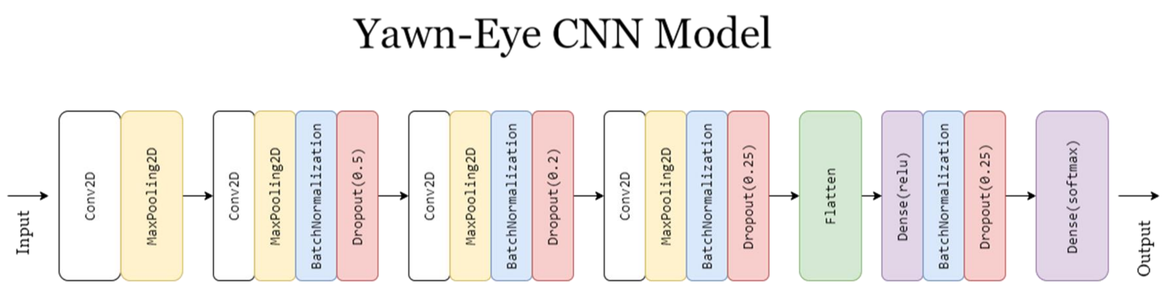
- Faces' Locations Detection:
  - HOG (Histogram of Oriented Gradients).
- Attendance Recording :
  - Siamese (InceptionResNet V2) CNN.
- Uniform Detection :
  - Clustering using K-means.
- Attention Level Recording:
  - Head pose using OpenCV and Yawn-Eye CNN model.





Siamese (InceptionResNet V2) CNN



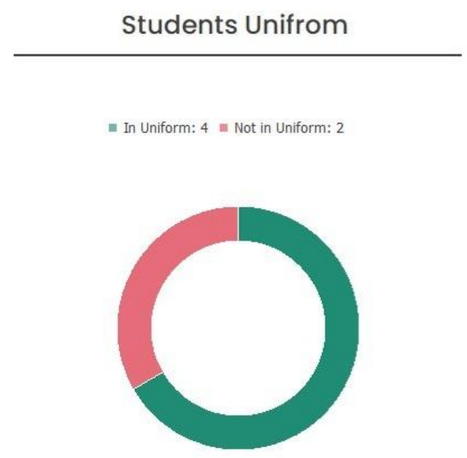


Results

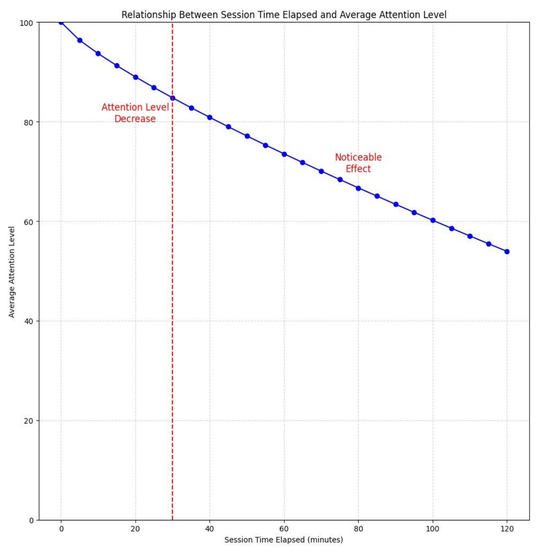
Two datasets

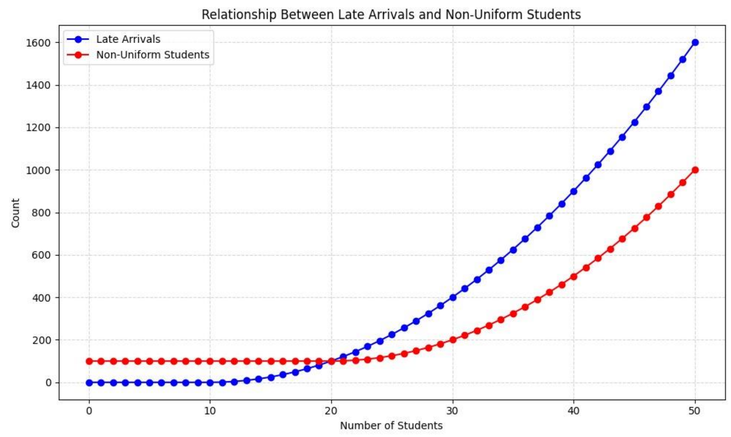
- Labeled Faces in the Wild (LFW) Face dataset used to train the face recognition model, Inception ResNet V2 model with accuracy 95%
  - ~10K images for 1000 people in training data
  - ~4K images for 350 people in testing data
- Yawn _eye _dataset_new dataset used to train students' attention level model, Yawn eye CNN-model with accuracy 97.7%
  - 4 classes which are yawn, no yawn, open and closed
  - 600 images for each training class
  - 100 images for each testing class

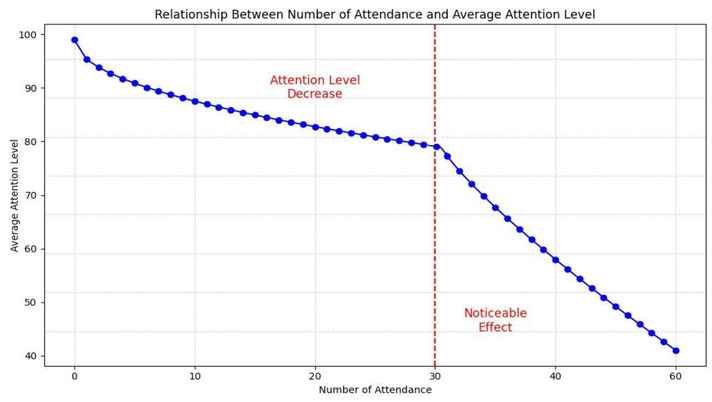
Results Cont.



A Session System Result to track students' uniform







Conclusion

In this work, a desktop application is developed for an educational service to enhance the educational process, improve classroom management and increase students' engagement and learning outcomes. Our system provides features as attendance recording, uniform detection and attention level recording.

The pipeline of our system is that a camera records through the school day in classrooms, a video frame is taken, face locations are detected using HOG (Histogram of Oriented Gradients), these face locations are the input of siamese(InceptionResNet V2) CNN for attendance recording and for uniform detection, segmentation is applied by a user-defined function using K-means clustering and for attention level recording, head poses are estimated using openCV library using deep learning model, Yawn eye CNN-model.

Acknowledgments

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