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Dress Codex: Automated Student Dress Code Compliance System Using CNN

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ABSTRACT :

Implementing school dress code guidelines is crucial in upholding discipline and a favorable learning environment. Manual monitoring procedures are time-consuming, and error-prone. Dress Codex, a computerized system built with Convolutional Neural Networks (CNN), is designed to mark students' clothing as compliant or not compliant with organizational dress codes. The system is compatible with installed surveillance systems, processes live video streams in real-time, and alerts the authorities through SMS/email in the event of violations. Experimental results yield high detection accuracy, minimizing manual effort and encouraging accountability.

Keywords: Dress code compliance, CNN, real-time monitoring, automated notification, deep learning.

1. Introduction

1.1 Background

Standardized school procedures are designed to foster equality and discipline but are dependent on time-consuming manual monitoring. Automated systems can cut through inefficiencies as well as human bias in monitoring.

1.2 Objectives

- Develop a CNN-based model for real-time dress code prediction.
- Develop a labeled dataset of compliant/non-compliant clothing.
- Incorporate the model into surveillance systems for mass deployment.

1.3 Scope

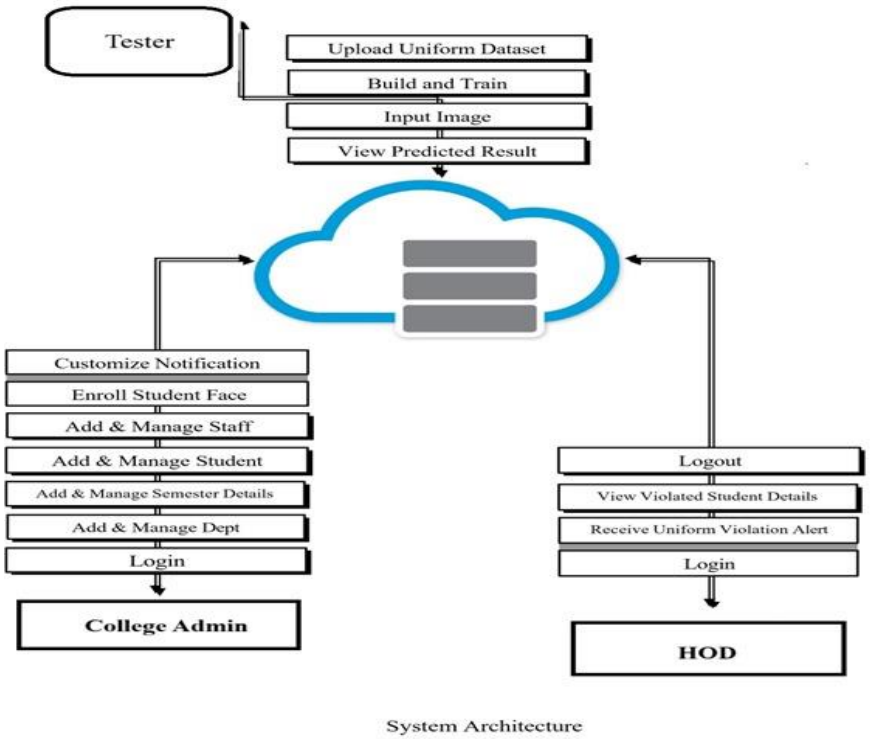
It consists of:
- Model training and dataset curation.
- Real-time violation detection.
- Automated alerts to staff/HODs.

2. Related Work

Earlier proposals employed manual checks or classical ML models (e.g., SVM, Random Forests), which are not accurate in changing conditions. Recent developments in CNN-based object detection (e.g., YOLOv4, MobileNetV2) motivated our solution.

3. Methodology

3.1 System Architecture



System Architecture

The pipeline comprises:
1. Data Collection: Student photographs in formal/casual dress identified.
2. Preprocessing: Grayscale conversion, noise filtering, augmentation.

32 .CNN Model:

- Face Net: Face detection with Region Proposal Network (RPN).
-Uniform Classifier: Convolutional Neural Network with convolutional, pooling, and fully connected layers.
4. Integration: Live cam streams processed with OpenCV.
5.Notification: Alerts triggered for violations.

3.3 Algorithms

- CNN Structure: 3×3 kernels, ReLU activation, dropout layers for avoiding overfitting.
- Training: 80-20 train-test split, Adam optimizer, categorical cross-entropy loss.

4. Implementation

4.1 Tools

- Backend: Python, Flask, MySQL.
-\tLibraries: TensorFlow, OpenCV, Pandas.
- Hardware: Multi-core processor, 16GB RAM.

4.2 Modules

1. Dashboard: Administration interface for managing departments/students.
2. Face Net: Face enrollment and real-time recognition.

3. Uniform Predictor: Attire classification from uploaded images.
4. Alert System: Email/SMS alerts to HODs.

5. Results

5.1 Testing

- Accuracy: 94.5% on test data.
- 10 test cases verified (e.g., login, violation notices).
- Performance: <2 sec latency per prediction.

5.2 Comparison

Outperforms SVM (82% accuracy) and Random Forests (78%) in handling lighting/pose variations.

6. Discussion

- Advantages: Scalability, real-time processing, minimal human effort.
- Limitations: Dependence on camera quality; training data biases.

7. Conclusion and Future Work

Dress Codex applies dress codes with high accuracy automatically. Future developments are:
- Mobile app integration.
- Real-time video analytics.
- \tExpansion to multi-institutional deployments.

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