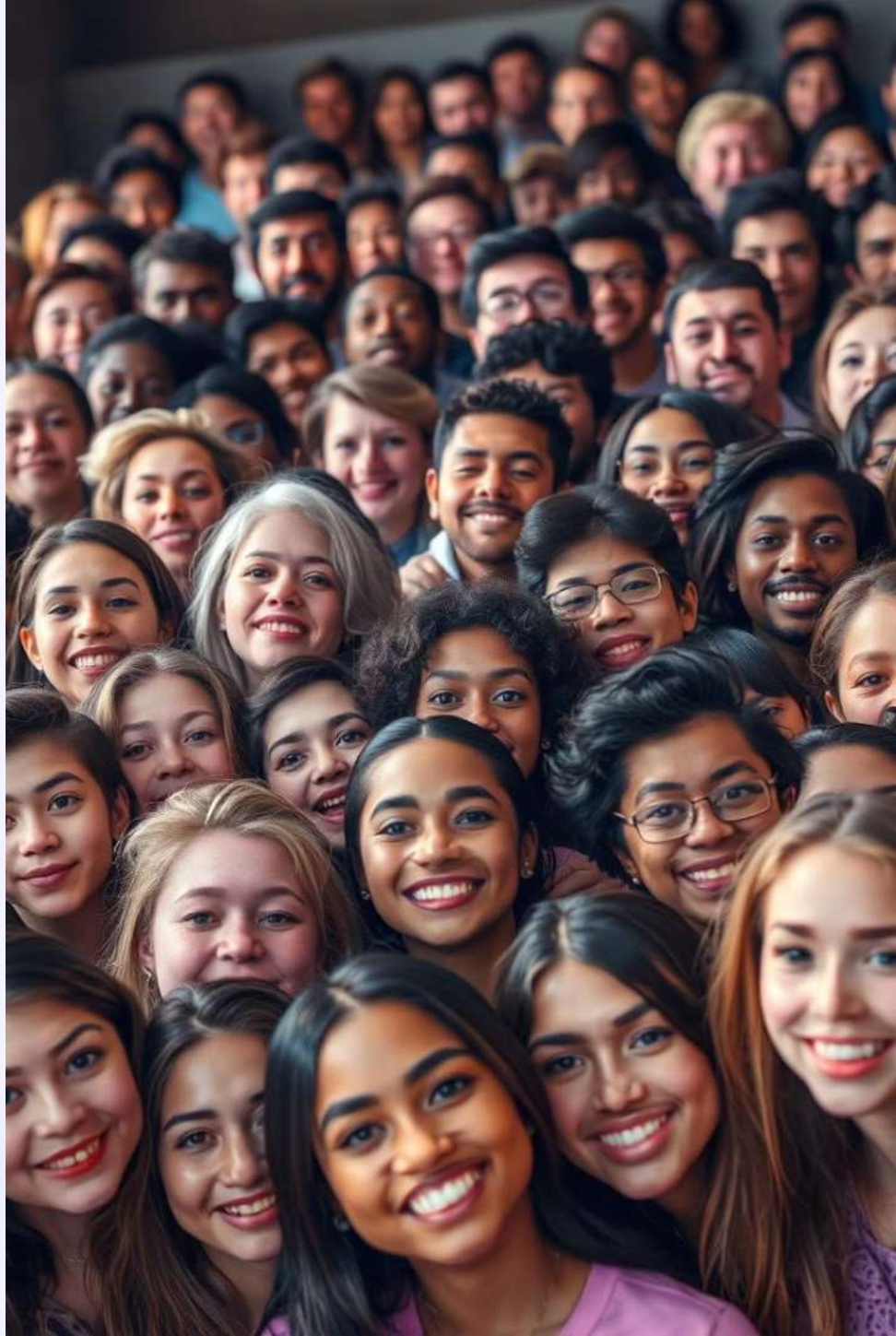
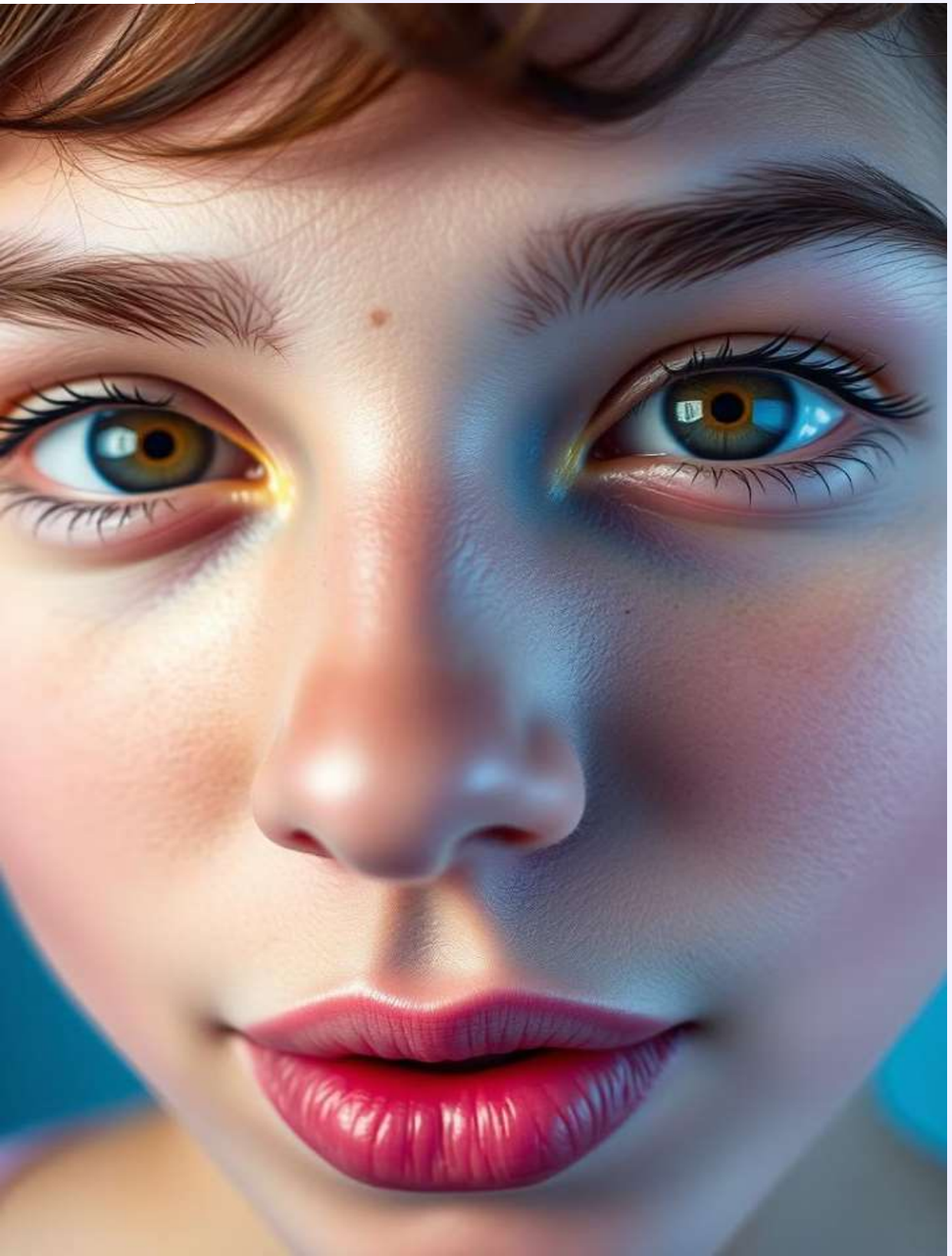
Facial Recognition Project using LFW Dataset

Facial recognition is a powerful technology with many applications, from security to social media. In this project, we will explore using the Faces in the Wild (LFW) dataset to train and evaluate facial recognition models.





Introduction to Facial Recognition

1 **Biometric Identification**

Facial recognition uses unique facial features to identify and verify individuals.

2 **Wide Applications**

This technology has use cases in security, authentication, social media, and more.

3 **Technological Advances**

Recent improvements in deep learning have greatly enhanced facial recognition accuracy.

Overview of the LFW Dataset

Dataset Description

LFW is a popular benchmark for facial recognition, containing over 13,000 face images of 1,680 individuals.

Diversity

The dataset includes faces with varying age, gender, ethnicity, and pose, making it challenging yet realistic.

Applications

LFW is widely used to evaluate the performance of facial recognition algorithms and models.

Data Preprocessing and Cleaning

1

Face Detection

Identifying and extracting the face region from each image.

2

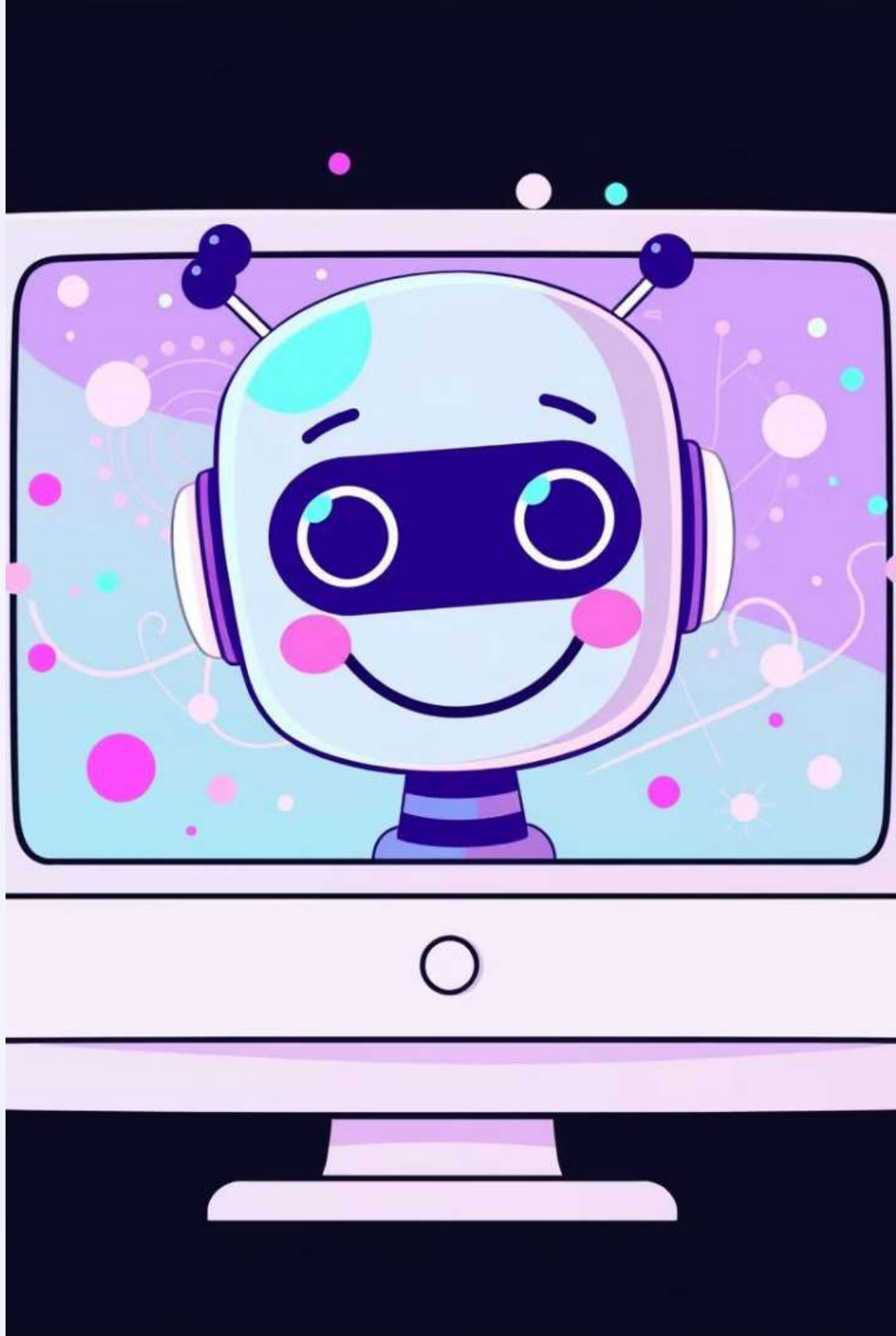
Alignment

Aligning and normalizing the face images to a consistent orientation and scale.

3

Augmentation

Applying transformations to increase the diversity of the training data.



Feature Extraction and Selection

Deep Learning

Using convolutional neural networks to automatically learn discriminative facial features.

Dimensionality Reduction

Applying techniques like PCA or SVC to visualize and select the most informative features.

Modeling and Algorithm Selection

Classifiers

Exploring different classifiers like SVC, PCA, and Deep Neural Networks.

PCA is used to reduce the dimensionality of the input data (flattened images) while preserving the most important features or components.

CNN Model for Face Classification

The CNN model is used for multi-class classification, where the goal is to identify specific individuals in the LFW dataset.

Metric: Accuracy is used to measure how well the model predicts the correct class.

Overall Workflow

Training the SVC Model: SVC is trained on the PCA-transformed training data (X_train_pca).

Testing and Evaluation: Predictions are made on the PCA-transformed test data (X_test_pca), and accuracy is

Siamese Network for Face Verification

The Siamese network is designed for binary classification (same or different), focusing on face verification. It determines whether two faces belong to the same person.

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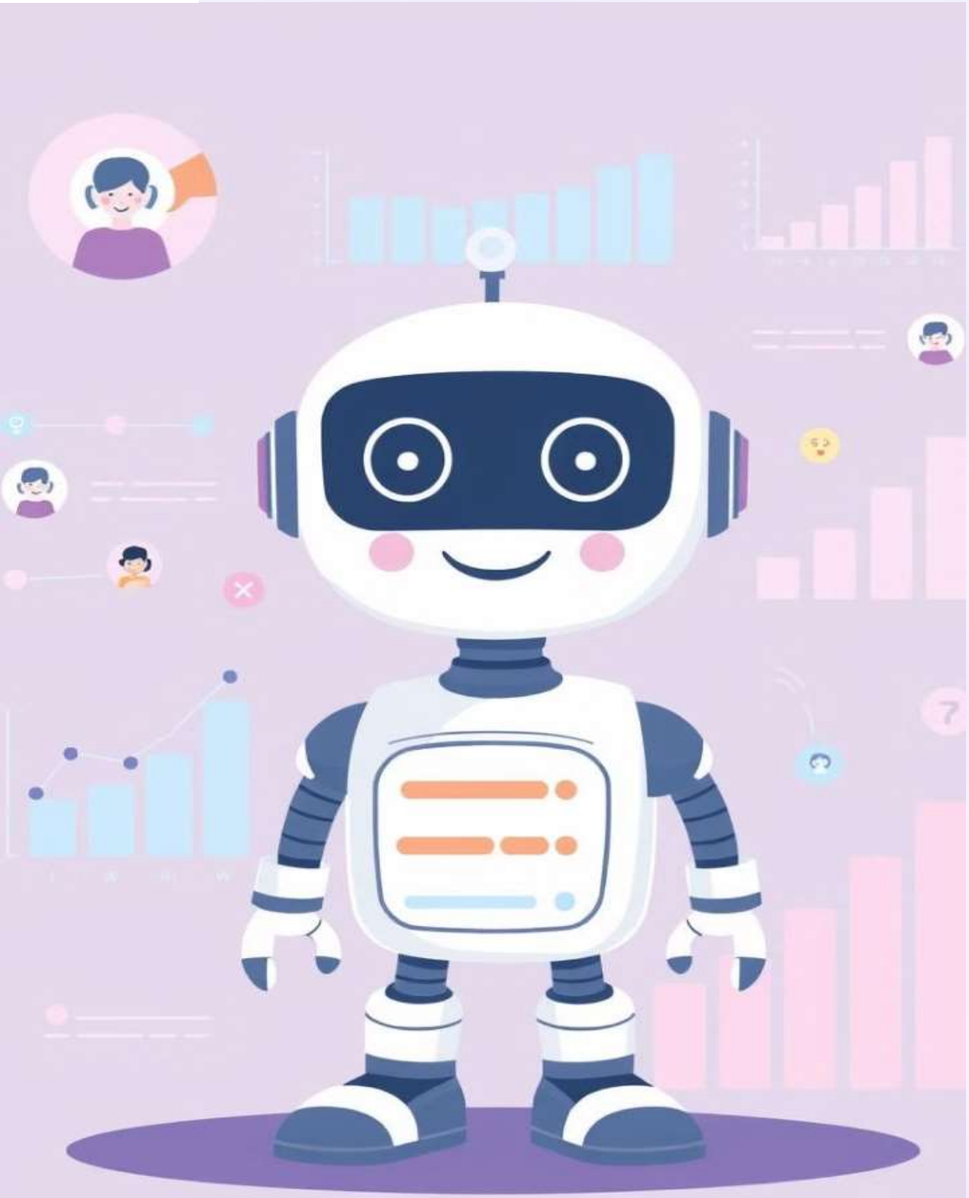

Model Training and Evaluation

1

Train

Split the dataset and train the model on the training set.

2

Validate

Monitor the model's performance on the validation set during training.

3

Evaluate

Assess the final model's accuracy, precision, recall.

Conclusion and Future Directions

Future Work

Discuss potential improvements, extensions, and real-world applications of the facial recognition system.

Impact

Highlight the broader significance and implications of advancements in facial recognition technology.

Results

CNN Test Accuracy: 45.34%

```
Epoch 10/10
31/31 ━━━━━━━━━━━━━━━━━━━━ 3s 86ms/step - accuracy: 0.3796 - loss: 1.7443 - val_accuracy: 0.4534 - val_loss: 1.6299
11/11 ━━━━━━━━━━━━━━━━━━━━ 0s 36ms/step - accuracy: 0.4921 - loss: 1.5852
CNN Test Accuracy: 45.34%
```

Results

Accuracy of PCA and SVC model

```
print(f'Accuracy of the model: {accuracy * 100:.2f}%')
```

```
Accuracy of the model: 84.47%
```

Team Members

Tanisha Lalwani

ugmr20230013@ihub-data.iiit.ac.in

Aryan Shukla

ugmr20230038@ihub-data.iiit.ac.in

Kashish Singh

ugmr20230026@ihub-data.iiit.ac.in

Akanksha Pawar

ugmr20230044@ihub-data.iiit.ac.in

Thank You

~Tech Bots