**Facial Recognition Project Report**

**Cover Page**

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**1. Definition of the Problem**

In the realm of image processing and computer vision, the identification of individuals within images plays a pivotal role. The challenge addressed in this project is the reliable detection of faces, including scenarios with multiple faces and obscured facial features.

**2. Method**

**2.1 Image Preprocessing Pipeline**

The initial step in our preprocessing pipeline involves face detection. Once a face is identified, the subsequent stage is the detection of eyes. Only images with at least two clearly detected eyes are retained, ensuring the reliability of facial features.

**2.2 Wavelet Transformation**

To enhance the identification of facial features, we employed wavelet transformation on the images. This process accentuates edges, providing crucial clues for discerning facial components such as eyes, nose, and lips.

Python function was developed to take an input image and return a cropped version if a face and at least two eyes are detected. Images failing to meet this criterion are discarded.

**3. Experiment**

The dataset was systematically processed using the established preprocessing pipeline. Cropped images were generated for each photograph, and a "cropped" folder was organized within the dataset directory.

**4. Data Cleaning**

The "cropped" folder was manually reviewed to eliminate any undesirable images. This step ensures that only high-quality images, crucial for model training, are retained in the dataset.

**5. Model Training**

**5.1 Data Preparation**

The cleaned dataset, comprising raw and wavelet-transformed images, was prepared for model training. Features (X) and labels (y) were organized accordingly.

**5.2 Model Selection and Fine-Tuning**

Grid Search was employed to explore different models and parameter combinations. The goal was to identify the optimal model with finely tuned parameters for facial recognition.

**5.3 Model Saving**

The trained model was saved for future use.

**6. Report on Model Performance**

Following model training, a classification report was generated using a test set. This report provides insights into the model's accuracy, precision, recall, and F1 score across different classes.

**7. Conclusion**

The facial recognition project successfully addressed the challenge of detecting faces and crucial facial features. The implemented preprocessing pipeline, model training, and evaluation processes collectively contribute to the project's success.

**8. References**

Include citations for any external resources, libraries, or algorithms utilized during the project.