Real-time Face Recognition System using Siamese Neural Network

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Introduction

Our project aimed to develop a Real-time Face Recognition System using a Siamese Neural Network. The project was divided into two main parts: learning and implementation.

Learning (1st Part)

During the learning phase, we gained valuable knowledge from various sources, including courses and research papers. This theoretical foundation set the stage for the practical implementation of the project.

Implementation (2nd Part)

The implementation phase involved coding in a Jupyter notebook. We were provided with code snippets and tasked with completing the code to make the program functional. Key aspects of the implementation included building a Siamese neural network model, creating a distance layer, and constructing a base model.

Challenges Faced

One of the significant challenges encountered was the low accuracy of the machine. Upon investigating, we discovered that the input data consisted of rows, each containing two images and a label (0 for dissimilar images and 1 for similar images). Images were captured by the webcam, with snapshots stored as anchor and positive images. Negative images were extracted from a given dataset containing approximately 11,000 pictures of random individuals.

Model Training

Positive pairs were created by combining anchors and positive images, labeled as 1. Negative pairs were formed by combining anchors and negative images, labeled as 0. The Siamese model was trained with this labeled data, where the input was a set of image pairs with their corresponding labels.

Identification of Bugs

Despite training, the model did not perform as expected. We identified that the model was learning the background features captured by the webcam, leading to inaccurate predictions. To address this, we added a dataset of random positive images with label 1, improving the accuracy.

Optimization

To optimize the model, we included a section to capture images of different people and compared them with the user's image, labeled as 0. Adjusting image proportions and removing the sigmoid layer at the end improved model accuracy.

Error Identification

Identifying bugs and errors in the code was a challenging task. Debugging involved scrutinizing the code for data type issues and making necessary corrections.

Conclusion

The project's conclusion highlighted the importance of dataset quality and diversity in training a face recognition system. By capturing various faces and optimizing the model, we achieved better accuracy. Continuous improvements and bug fixes were essential for the success of the project.

References

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2. `https://www.cs.cmu.edu/~rsalakhu/papers/oneshot1.pdf`
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