

Writer Verification

Event under NCVPRIPG'23

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Abstract— The Writer Verification challenge is a competition focused on determining whether a given pair of handwritten text samples is written by the same person or two different individuals. This task is accomplished using a Siamese neural network in conjunction with OpenCV for image processing. The goal of this challenge is to improve the accuracy of the model for writer verification by exploring methods based on alignment and darkness of letters in the handwriting.

The main code for the project is found in the main.py file. The project utilizes a dataset consisting of handwritten text samples from various writers. The model is trained to recognize patterns that distinguish between the handwriting styles of different individuals.

A. Overview of the Dataset

The dataset used in this project comprises the following components:

- Training Set: 1352 folders, each containing a collection of images written by the same individual.
- Validation Set: Images from 92 distinct writers, along with a CSV file ('val.csv') containing pairs of image names and corresponding labels. A label of 1 denotes that the images were written by the same writer, while a label of 0 indicates different writers.
- Test Set: Images from 360 writers. The 'test.csv' file includes image pairs, and the goal is to predict the label for each image pair.

B. Methodology

- The primary method used to address the challenge involves a Siamese neural network architecture based on the ResNet-50 model. The Siamese network is trained to learn the similarity between two input images. The network is compiled with binary cross-entropy loss and optimized using the Adam optimizer.
- The training process is carried out in the main.py file. The script loads and preprocesses the images, creates pairs of same-writer and different-writer

examples, and trains the Siamese network. The trained model is then saved for later use in verification.

- The image processing steps are conducted using OpenCV in the image_processing.py file. This includes edge detection, contour identification, and perspective transformation to enhance the quality of the input images.
- For validation and testing purposes, the evaluation.py script reads pairs of images from the validation CSV file, preprocesses them, loads the trained Siamese model, makes predictions on the image pairs, and assigns labels based on a threshold

C. References

The project is based on the following references:

1. [SigNet: Convolutional Siamese Network for Writer Independent Offline Signature Verification.](#)
2. [Attention-based Writer Independent Verifications.](#)

D. Future work

- The project acknowledges that there are potential areas for improvement and enhancement. The methodology suggests that the alignment and darkness of letters can provide valuable features for writer verification. However, due to time constraints during the competition, these aspects were not thoroughly explored in the current implementation. Future iterations of the project aim to incorporate these features into a refined neural network architecture to achieve better accuracy in writer verification.
- The code and associated files are accessible on [GitHub](#) for individuals interested in further development and exploration of the project.
- *Note: The provided code snippets and explanations are based on the information you provided. If there are any specific questions or additional details you'd like to include in the report, please let me know.*