A Novel Three-Staged Generative Model for Skeletonizing Chinese Characters with Versatile Styles

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Research Objectives

- ## Research Scope

  – Automatic Chinese character skeletonization

- ## Research Inspiration

  – Multi-stage model alleviates the difficulty of skeleton generation

- ## Research Purpose

  – Extract multi-style character skeleton with higher quality and less data

- ## Research Significance

  – Character skeletons has important application value

  – The model skeletonizes Chinese character with high quality and less data demand

Research Method

- We present a novel three-staged model built upon an improved G-net, an adapted X-net, and a newly proposed F-net to extract skeletons of Chinese character. The design of multi-stage and careful selections of sub-networks alleviates the difficulty of skeleton generation.

- We adopt the image-to-image translation approach to reduce the model's demand for labelled training samples.

- The distance-based loss and feature based loss are introduced to avoid significantly unbalance of negative and positive samples.

Research Results

- The proposed model achieves better perform over four evaluation metrics on three datasets than existing methods based on traditional image analysis and other state-of-the-art deep learning architectures. For example, the optimal F-measure 0.777，0.925，0.529 on three datasets, respectively.

- The top-1 and top-5 recognition accuracy of the generated handwriting skeleton (94.6%, 99.8%) is very close to the recognition accuracy of ground truth (96.6%, 99.8%), and much better than the comparison methods.

Research Conclusions

- The proposed model can extract multiple styles of Chinese character skeletons that are superior to peer methods. The experimental results indicate that the quality of the skeleton affects the performance of downstream tasks.

- The proposed model can replace the existing skeleton extraction algorithm for preprocessing in a variety of Chinese character-related tasks.