CS771 Assignment-2

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1 Solution

Our method performs image classification to determine if characters in the image have even or odd parity. It involves preprocessing the image, removing obfuscating lines, and segmenting the image into smaller segments. A convolutional neural network (CNN) model is trained using the segmented image segments, and its performance is evaluated using metrics such as accuracy, precision, recall, and F1 score. The model is trained with an Adam optimizer and uses the sparse categorical cross-entropy loss. The method utilizes techniques such as color extraction, thresholding, contour extraction, and CNNs to classify images based on the parity of characters present.

1.1 Preprocessing

- The background color of the image is extracted by taking the average color of the image's corners.
- The image is converted from BGR color space to HSV color space.

1.2 Eliminating Obfuscating Lines

- Obfuscating lines in the image are removed by creating a mask based on the background color and applying it to the image

1.3 Image Segmentation

- The image is converted to grayscale.
- A binary threshold is applied to create a binary image.
- Contours are extracted from the binary image.
- Bounding rectangles are calculated for each contour, and segments larger than a threshold size are extracted.

1.4 Model Training and Evaluation

- The extracted image segments are used as training data.
- The labels for the image segments are determined based on whether they contain characters with even or odd parity.
- The data is split into training and validation sets.
- A convolutional neural network (CNN) model is defined using the Keras API.
- The model is compiled with the Adam optimizer and sparse categorical cross-entropy loss.
- The model is trained on the training data for a fixed number of epochs.
- The model's performance is evaluated on the validation data using metrics such as accuracy, precision, recall, and F1 score.