

Read Digits in Natural Scene Images using Convolutional Neural Networks

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1 Project Description

- The project is about reading digits from the natural images with the help of convolutional neural networks(CNN).
- As Digit recognition is used in various applications such as postal mail sorting, bank check processing, form data entry, etcetera.

2 Approach

The first part of this task consists of gathering data to train the network. We will use an already available dataset, Street View House Number (SVNH)[2]. Images in this dataset come in various resolutions, colors, perspective, etcetera. In addition to this, we will create our own dataset to train and test on it. Images from dataset will be preprocessed before feeding to the network. Later on, post-processing will be needed in cases where an image contains multiple digits to get a final result by combining result of individual digit.

- Few possible approaches to solve this task are:
 - Multiple hand-crafted features
 - Template matching(might work on this also if time permits)
 - Convolutional Neural Network(we use this)
- Convolutional Neural Networks are used to extract features from the images and classify them. These networks are consists of different layers such as convolutional layers, pooling layers, and fully connected layers. Convolutional layer is first layer of the network that takes input as image and fully connected layer is final layer/output layer of the network that provides possible outcome based on input image.
- Possible outcomes will be within 10 digit classes; one for each digit from label “0” to “9” and probability score of each outcome.

3 Contribution

- Pre-processing using available dataset(Roberto Cai)

- Create the dataset and integrate with publicly available dataset (Ramesh Kumar)
- Create the Network(pair)
- Post-processing (Roberto Cai)
- Probability Score (Ramesh Kumar)
- Individual number combination in final result (Roberto Cai)
- Evaluation of approach (Ramesh Kumar)
- Documentation(pair)

4 Sample images



Figure 1: Dataset sample



Figure 2: Expected result

References

- [1] Pierre Sermanet, Soumith Chintala and Yann LeCun, "Convolutional Neural Networks Applied to House Numbers Digit Classification", The Courant Institute of Mathematical Sciences - New York University
- [2] Yuval Netzer , Tao Wang , Adam Coates , Alessandro Bissacco¹ , Bo Wu , Andrew Y. Ng, "Reading Digits in Natural Images with Unsupervised Feature Learning", In NIPS Workshop on Deep Learning and Unsupervised Feature Learning, 2011.