Sign Language Gesture Recognition

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Motivation

Not many people understand sign language and mute people have a hard time communicating. Sign language recognition is a challenging problem and has attracted research mainly due to its significant impact on the social life of mute people. Sign gesture recognition will

- empower mute people to interact easily with other people.
- enable touch free interaction with the devices around us.

Problem statement

To implement sign language gesture recognition using SVM, CNN and draw comparison between the above methods.

Project tasks

1. Extract hand signs from images/video frames.
2. Extracting features from the images.
3. Using SVM on extracted set of features for classification..
4. Using CNN on extracted set of features for classification

Literature review

- ***G.Anantha Rao, K.Syamala, P.V.V.Kishore, "Deep Convolutional Neural Networks for Sign Language Recognition" :*** The paper uses CNN with stochastic pooling strategy for classification of gestures in selfie videos. CNN training is performed with 3 different sample sizes, each consisting of multiple sets of subjects and viewing angles.
- ***Vivek Bheda, N. Dianna Radpour, "Using Deep Convolutional Networks for Gesture Recognition in American Sign Language" :*** The paper uses CNN (max pooling strategy) with dropout to classify images of both the the letters and digits in American Sign Language.
- ***Juhi Ekbote, Mahasweta Joshi, "Indian Sign Language Recognition using SVM and ANN classifiers" :*** The gestures were recognized using various feature extraction techniques like shape descriptors, SIFT and HOG individually along with SVM classifier

Data Sets

- **LSA64:** Dataset for Argentinian Sign Language
  - 3200 videos with 5 repetitions of 64 different type of signs. Database recorded in two sets.
    - 23 one-handed signs
    - 41 signs (22 two-handed and 19 one-handed).
- **American Sign Language Lexicon Video Dataset:** 3,300 ASL signs each produced by 1-6 native signers.
  - Multiple synchronized videos showing signs from different angles.
- **Sign Language MNIST**
  - Train set - 27455 American Sign Language labeled grayscale images of size 28x28
  - Test set - 7172 labeled grayscale images of size 28x28
- **IIITA Indian Sign Language Gesture Database:** RGB frames of 23 isolated Indian Sign Language gestures.

Timeline

Understanding problem and reading relevant literature.
Week 1-2

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Data collection, Preprocessing
Week 2-3

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Writting End-to-End Trainable network
Week 3-5

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Training SVM, CNN
Week 5-7

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Compilation of result
Week 8

Performance metrics

- Precision
- Recall
- ROC Curve
- CMC Curve
- F1 Score