Identifying Sign Language Characters from Images

Exploratory Analysis

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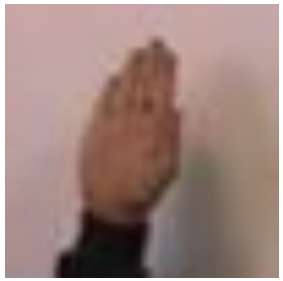
The challenge is to have computers recognize and "translate" sign language characters from diverse, complex images

The Challenge

In: *Raw Sign Language Images*



Out: *Identified / "Translated" Characters*

A	B	C	5	Point	V

Image Source: http://www.idiap.ch/resource/gestures/

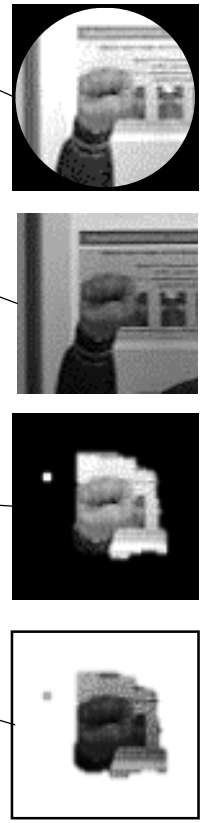
In this exploratory analysis, we achieved ~40% accuracy, over 100% better than baseline

Results

Rank	Model	Accuracy
1	**Ensemble Logistic + Linear SVM** *Fully Optimized*	38.8%
2	**Ensemble Logistic + Linear SVM** *Fully Optimized*	38.5%
3	**Ensemble Logistic + Linear SVM** *Optimized PCA + Logistic*	38.4%
4	**Ensemble Logistic + Linear SVM** *Optimized PCA*	37.9%
5	**Ensemble Logistic + Linear SVM** *with PCA*	35.5%
6	**Ensemble Logistic + Linear SVM**	33.9%
7	**Logistic Regression**	33.8%
8	**Logistic Regression**	32.6%
9	**Multinomial Naïve Bayes**	30.0%
10	**Random Guess**	16.7%

0% Accuracy 50%

Image Processing*



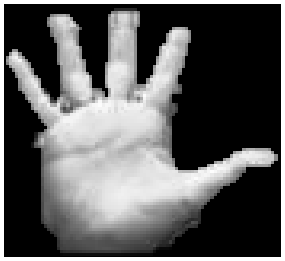
*Examples only. Real processed images vary somewhat

Given more time, the accuracy could be improved even further

Opportunities for Improvement

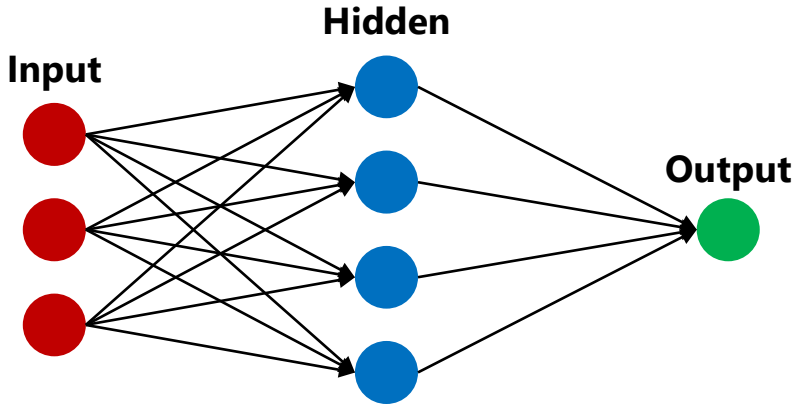
Image Processing

- The current best approach uses relatively little image processing
- The current model could benefit greatly from **better isolating the hand** in the images
  - More fine-tuned, accurate (rule based?) skin detection
  - Scaling the identified hands to a consistent size
  - Rotating / jittering the hands
- **Example:**



Neural Networks

- Though computationally intensive and slow to train, neural networks (specifically convolutional neural networks) are the **current gold standard** in many image classification problems



Questions?