



ASSIGNMENT 2: PROJECT PROPOSAL

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Project motivation and objective:

The aim of this project is to create a range of methods that are capable of identifying hand gestures. This is done so that in the future sign language could be translated into text or speech in real time. As sign is noted for being a complex and difficult to learn as there isn't a familiar language like it. This project could be a useful tool to help those in need as they are restricted to those who only know sign and can be difficult for them to communicate with the general public as most people are not fluent in sign. This can be an important tool used to assist people who have recently become deaf, as a bridging method. This also can be used to help translate those who only communicate with sign, giving them a wider range of individuals, they could communicate with. The promise of helping people enough is interesting but designing a machine learning model that can identify hand movement like a trait such in the human face. Does cause great interest as it is a challenge to create but also a field with enough excitement to be worth doing.

Our main objective is to obtain a high level of accuracy preferably above 80 percent but without comprising time due to training taking too long to complete. This is a basic but every clear objective that is important to the success of the project. If these objectives cannot be reached, the project may have to compromise and accept a possible trade off system that may be in place. By using a different form of learning this is a preventive strategy to help circumvent this problem. Though this group has high expectations with the approaches it will take and is confident that the objective will be met. As preventive strategies and careful analysis skills well be employed to maximise success.

Dataset(s) to be used and brief details on the proposed evaluation protocol:

Dataset	Link
Hand gesture recognition: Reference: <i>Raimundo F. Pinto Jr., Carlos D. B. Borges, Antônio M. A. Almeida, and Íalis C. Paula, Jr., "Static Hand Gesture Recognition Based on Convolutional Neural Networks," Journal of Electrical and Computer Engineering, vol. 2019, Article ID 4167890, 12 pages, 2019. https://doi.org/10.1155/2019/4167890.</i>	https://iee-dataport.s3.amazonaws.com/open/12699/Dataset%20ASL%20Hand%20Gestures.zip?response-content-disposition=attachment%3B%20filename%3D%22Dataset%20ASL%20Hand%20Gestures.zip%22&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAJOHYI4KJCE6Q7MIQ%2F20200430%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20200430T071357Z&X-Amz-SignedHeaders=Host&X-Amz-Expires=86400&X-Amz-Signature=d8bfd9d0abb36a3a0605c6d2ee4fb1aed8c3ba455cf2fcb44efad6e740c4d269

The image data will be classified using 3 methods which will be rigorously tested and compared, in particular, noting the accuracy and computational time and load.

- Deep Convolutional Neural Networks (DCNN)
 - The use a DCNN should be considered the gold standard and it is anticipated it will provide the highest test classification accuracies.
- Decision Tree

- Using a classification type decision tree should be well suited to this dataset and it will be interesting to see how it compares to DCNNs
- Support Vector Machine (SVM)
 - SVM is anticipated to perform as well as close to decision tree classification, however, it will be interesting to see how these both rank in classification for this particular dataset.

The anticipation is to pre-process the image data the same for each classification method if original images are used. Although, as displayed below, in the provided dataset, the authors supplied original frames, grayscale frames and binary frames. The authors achieved high accuracies of up to 96.83% using the images supplied so it would be ideal to start with those images before implementing our own image processing to improve.

