**Applied Machine Learning in Natural Language Processing and Video Processing Techniques for Sign Languages - (12cp)**

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Major: Data Engineering Major

**Objective:**

Determine if a software model can be trained to accurately translate sign language videos of a specific language.

Machine learning for video processing is an area of study that has been explored quite extensively. However, much less attention has been given to applying machine learning techniques to the area of sign language. Automatic Sign Language Recognition (ASLR) presents a number of challenges, including differentiating between sign languages for each sign, identifying the completion of a particular sign and start of the next sign in a video, and combining facial expressions with hand gestures and body movement to recognise signs. Sign language is a crucial tool for communication between hearing-impaired people and hearing persons, and any development towards improving ASLR is a great benefit to this area.

In this capstone project, I present two machine learning methods for accurate classification of sign instances. The first model utilises MATLAB, combining a pre-trained convolutional neural network image classification model with a Long Short-Term Memory network to create a network for video classification. The second model utilises Python, developing a Keras-based sequential convolutional neural network that classifies sign videos using a single-frame CNN approach.

Both models were trained and tested with ten classes found in the American Sign Language Linguistic Research Project (ASLLRP) dataset. The dataset provides hundreds of instances of short individual sign instance videos, and the largest classes in this dataset were chosen for the development of the models.

The results of both models are detailed in this work, along with a discussion regarding the validity of findings, possible future work, and overall contribution of the project towards determining if a software model can be trained to accurately classify signs of a specific language.