SURGE PROJECT PROPOSAL

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Project title: Sign Language Translation

Introduction:
Sign languages (SL) are the primary means of communication for an estimated 466 million deaf or hard-of-hearing people worldwide (World Health Organization 2019. Deafness and hearing loss). This project aims to develop a sign language to spoken language translation system for existing datasets. Spoken language consists of various linguistic elements which are conveyed using various sound patterns. In contrast, sign language makes use of multiple combinations of gestures and facial expressions to convey information. The final goal of the project would be to develop a bi-directional sign language translation system for establishing easier communication between the communities using sign languages and spoken languages.

Sign languages make use of multiple visual cues like handshape, palm orientation, various gestures, and other markers like the movement of head mouth eyebrows, eye-gaze, etc. The use of information from multiple sources and facial cues makes the translation task more challenging as for a system to work, it should not only be able to capture these cues but also be able to fuse the extracted cues to generate the textual representation of the language content. Recent developments in the existing benchmarks for sign language have tried to incorporate this information using multiple sensors like depth sensors and images in multi-view camera settings. We aim to exploit these multiple modalities for capturing the cues and develop a sign language to the spoken language translation system.

We further plan to explore various available benchmarks for sign language translation and study the performance of the developed architecture.

Method:
Given the nature and wider scope of the project, it will be done in a group of 3 students.
The project consists of two phases

1. **Exploration and comparison of existing benchmarks on sign language to spoken language translation:**
    We plan to explore multiple benchmarks for sign language to spoken language translation and run existing deep learning approaches as baselines for performance comparison.

2. **Developing a neural model for multimodal sign language translation:**
    In this phase, we plan to develop a deep learning architecture that will be able to capture information coming from multiple modalities and detect various visual cues required for language translation. Further, these cues will be combined to develop a sign language to the spoken language translation system.

Analysis:
The developed deep learning architecture will be studied using multiple available benchmarks. Moreover, a detailed error analysis of the architecture will be done to provide a clear understanding of the developed deep learning architecture.

Expected result:
- ☐ Explore multiple benchmarks for Sign language to spoken language translation and vice versa.
- ☐ Comparison and analysis of the selected benchmarks/datasets.
- ☐ Development of a new deep learning architecture for translating sign language via visual cues (face, gestures, and body pose).
- ☐ Performance comparison of existing neural models with the developed architecture on multiple benchmarks.

Weekly Schedule:

Week No.	Dates	Schedule
Week 1	May 16th - May 20th	Exploring multiple benchmarks for Sign language to spoken language translation and vice versa.
Week 2	May 23rd - May 27th	Comparison and analysis of the selected benchmarks
Week 3	May 30th - Jun 3rd	Implementation of the existing works on the selected benchmarks
Week 4	Jun 6th - Jun 10th	Implementation of the existing works on the selected benchmarks
Week 5	Jun 13th - Jun 17th	Developing new architecture for Sign language to spoken language translation task
Week 6	Jun 20th - Jun 24th	Developing new architecture for Sign language to spoken language translation task
Week 7	Jun 27th - Jul 1st	Testing the developed architecture's performance on the selected benchmarks
Week 8	Jul 4th - Jul 8th	Analysis and comparison of existing works with the developed architecture