

Filipino Sign Language (Fsl) Recognition System using Resnet-50 and Resnet-101 Architecture

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Abstract:

Communication barriers between hearing and deaf communities in the Philippines remain significant, compounded by limited technological support for Filipino Sign Language (FSL) recognition. This study developed a deep learning-based computer vision system to recognize static FSL alphanumeric gestures using ResNet-50 and ResNet-101, translating static hand signs for letters (A-Y, excluding Z and J) and numbers (0-9) into text. A dataset of 34,000 labeled images was collected from 10 FSL-proficient participants, with 100-150 original images per class expanded to 1,000 through augmentation applied only to training data. Preprocessing included grayscale conversion, three-channel adaptation, Gaussian blur, and region-of-interest cropping. Evaluation used Leave-Subjects-Out (LSO) cross-validation and random split testing. Under 10-fold LSO, ResNet-50 achieved 69.12% ($\pm 14.87\%$) accuracy, while ResNet-101 achieved 69.72% ($\pm 17.03\%$), indicating moderate cross-subject generalization. ResNet-101 showed a 0.60% improvement with significantly higher complexity. User testing (n=10) produced a System Usability Scale score of 72.00, NASA-TLX of 2.55, and Net Promoter Score of +10, indicating acceptable usability and initial deployment potential.

Keywords:

Filipino Sign Language (FSL), sign language recognition, computer vision, deep learning, ResNet-50, ResNet-101, gesture recognition, image classification, assistive technology, accessibility.