**SIGN LANGUAGE RECOGNITION USING GRAPH AND GENERAL DEEP NEURAL NETWORK BASED ON LARGE SCALE DATASET**

**ABSTRACT**

Sign Language Recognition (SLR) is a transformative technology that aims to bridge communication gaps between hearing-impaired and non-hearing-impaired communities, moving beyond traditional interpreter-based methods. Existing automatic SLR techniques predominantly utilize hand skeleton joint data to tackle issues like partial occlusion and irrelevant backgrounds but often overlook the importance of body motion and facial expressions. The proposed novel approach of the two-stream multistage Graph Convolution with Attention and Residual Connection (GCAR) model, is designed to overcome these limitations by capturing comprehensive spatial-temporal contextual information. The GCAR model processes joint key features and joint motion data through parallel streams: the first stream applies Separable Temporal Convolutional Networks (Sep-TCN), Graph Convolution layers, and a Channel Attention Module to extract detailed spatial-temporal features from static joint data. Simultaneously, the second stream handles dynamic joint motion information, following a similar processing path to generate complementary features. The fusion of these features creates a robust final feature vector for classification. Extensive experiments conducted on large-scale datasets, including WLASL, PSL, MSL, and ASLLVD, showcase the model's efficacy, achieving remarkable accuracy rates of 90.31%, 94.10%, 99.75%, and 34.41%, respectively, with only 0.69 million parameters. The innovative feature fusion and dynamic attention mechanisms contribute to the model's high performance and generalizability. The approach not only sets a new benchmark in SLR but also promises to significantly enhance communication accessibility for the hearing-impaired community by addressing previous limitations in gesture recognition.

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**BHAGYA A JAI**

**B21CSB18**