International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 06 | June - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

SIGN LANGUAGE RECOGNITION

Challa Nanda kishor
B.Tech AI&ML
Malla Reddy University
Hyderabad

K.Venkatesham
B.Tech AI&ML
Malla Reddy University
Hyderabad

A.Venkat sai
B.Tech-AI&ML
Malla Reddy University
Hyderabad

A.Vikas reddy
B.Tech-AI&ML
Malla Reddy University
Hyderabad

N.omkar sainath B.Tech-AIM&ML Malla ReddyUniversity
Hyderabad

K.Senthil kumar
Professor
Artificial Intellignce and Machine Learning
Malla ReddyUniversity
Hyderabad

Abstract : Sign language recognition plays a vital role in bridging communication gaps between the deaf and hearing communities. Traditional approaches to sign language recognition often rely on handcrafted features and shallow learning models, limiting their performance and scalability. In recent years, deep learning techniques have shown promising results in various computer vision tasks, including sign language recognition. This paper presents a comprehensive review of deep learning methods for sign language detection. We discuss different architectures, including convolutional neural networks (CNNs), recurrent neural networks (RNNs), and their variants, which have been successfully applied to sign language recognition tasks. Furthermore, we highlight various challenges and opportunities in this field, such as dataset availability, model complexity, and real-time performance. Finally, we provide insights into potential future directions for advancing sign language detection using deep learning techniques.

I. INTRODUCTION

Sign language is a fundamental mode of communication for deaf and hard-of-hearing individuals, allowing them to express thoughts,emotions, and ideas through hand gestures, facial expressions, and body movements. Despite its importance, there exists a significant communication gap between the deaf and hearing communities, primarily due to the limited availability of effective tools for sign language recognition and translation. However, recent advancements in deep learning have shown great promise in various computer vision tasks, including object recognition, image classification, and natural language processing. Deep learning techniques, particularly convolutional neural networks (CNNs) and recurrent neural networks (RNNs), offer a data- driven approach to learning complex patterns

II. DEEP LERNING ALGORITHMS

Convolutional Neural Networks:

Convolutional Neural Network (CNN) is the extended version of artificial neural networks(ANN) which is predominantly used to extract the feature from the grid-like matrix dataset. Forexample visual datasets like images or videos where data patterns play an extensive role.

Recurrent Neural Networks (RNNs):A recurrent neural network (RNN) is a deep learning model that is trained to process and convert a sequential data input into a specific sequential data output. Sequential data is data—such as words,

sentences, or time-series data—where sequential components interrelate based on complex semantics and syntax rules.

III. REQUIRED TOOLS

- MS Word
- VS code
- Python3
- Data set
- Deep Learning Algorithm

IV. DATA COLLECTION

Gather a diverse dataset of sign language gestures, including various hand shapes, movements, and facial expressions.Annotate the dataset with labels corresponding to the gestures being performed.Preprocess the data, which may include resizing, normalization, background removal, and hand segmentation to standardize the input for themodel.

Model Architecture Selection:Choose an appropriate deep learning architecture for sign language recognition. This may include CNNs, RNNs, or hybrid architectures.Consider factors such as the complexity of gestures, temporal dependencies, and computational efficiency when selecting the architecture.Experiment with different architectures and configurations to find the most suitable one for the task.

V. METHODS&LIBRARIES

METHODS

- Dataset Preparation: Start by collecting a large and diverse dataset of images containing various types of bone fractures. A well-curated dataset is crucial for training a robust model.
- Data Augmentation:

Augment the dataset to increase its diversity and prevent overfitting. Common data augmentation techniques include rotation, flipping, zooming, and changes in brightness and contrast.

- Preprocessing:

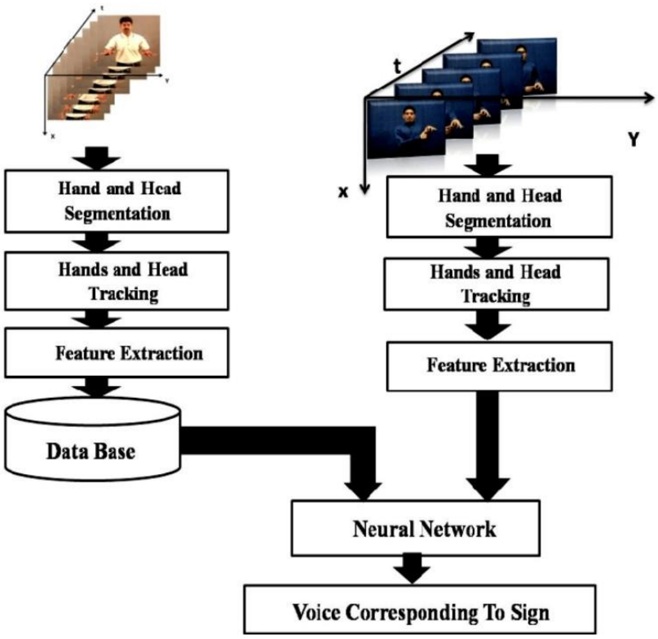
Process the images to make them suitable for input to the neural network. This may involve resizing, normalization, and other techniques to enhance the quality of the input data. • Model Selection:

Choose suitable pre-trained CNN architectures for your task. You mentioned ResNet, DenseNet, and VGG16, which are popular choices due to their success in image classification tasks. These architectures have proven to capture complex features effectively.

LIBRARIES

- Os: For working with the operating system, file paths, and directories.
- Numpy and pandas: For data manipulation and DataFrame handling.
- Matplotlib.pyplot: For plotting accuracy and loss curves.
- Tensorflow and keras: For building and training deep learning models.
- Sklearn.model_selection.train_test_split:For splitting the dataset into training and testing sets.

VI.ARCHITECTURE :



VII. EXPERIMENTAL RESULTS

Figure 1: Model training

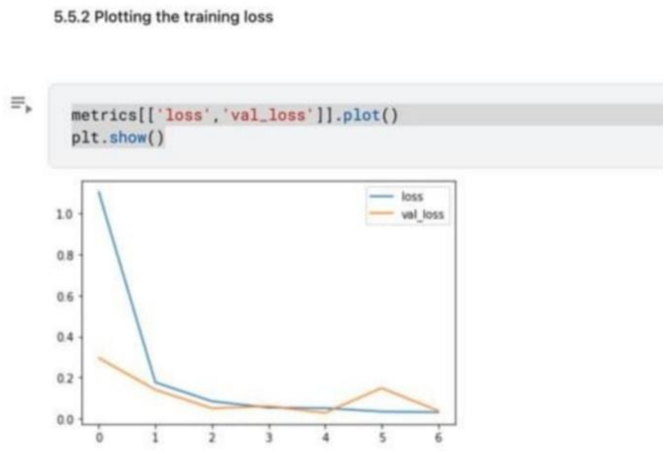


Figure 2 :Model Evalution

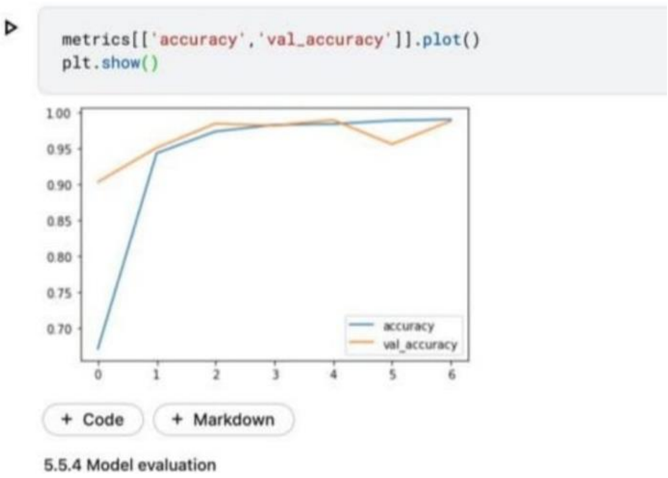


Figure 3 : Result

VIII. CONCLUSION

In conclusion, sign language detection using deep learning represents a promising application of artificial intelligence technology with significant potential for real-world impact. By leveraging deep learning models, particularly Convolutional Neural Networks (CNNs), researchers and developers can create robust systems capable of accurately interpreting sign language gestures in various contexts.

Deploying sign language detection models in practical applications involves several steps, including data collection, model training, evaluation, and deployment. Whether deployed in mobile applications, web services, or embedded systems, sign language detection systems have the potential to enhance communication accessibility for individuals who are deaf or hard of hearing.

IX.ACKNOWLEDGEMENT

We would like to express sincere gratitude to Dr. Thayyaba Khatoon, Head of the Department, Computer Science and Engineering (AI & ML), Malla Reddy University for her timely suggestions which helped us to complete the project in time. We would like to thank our project guide,K,Senthil Kumar,Professor, Computer Science and Engineering (AI & ML), for his timely cooperation and valuable suggestions throughout the project. We are indebted to his for the opportunity given to work under his guidance . Our sincere thanks to all the teaching and non-teaching staff of Department of Computer Science and Engineering (AI &ML) for their

support throughout our project

X.REFERENCES [1]

Divya Deora and Nikesh Bajaj, "Indian Sign Language Recognition", Emerging Technology Trends in Electronics Communication and Networking (ET2ECN) 2012 1st International Conf., 2012.https://ieeexplore.ieee.org/document/6470093

A. Kumar, K. Thankachan, M.M. Dominic, Sign language recognition, in 2016 3rd International Conference on Recent Advances in Information Technology (RAIT) (2016), pp. 422–428. https://doi.org/10.1109/RAIT.2016.7507939

Golestani, N.; Moghaddam, M. Human activity recognition using magnetic induction-based motion signals and deep recurrent neural networks. Nat. Commun. 2020, 11, 1551. [Google Scholar] [CrossRef].