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Conversation Engine for Deaf and Dumb

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Abstract: Deaf and hard hearing people use linguistic communication to exchange information between their own community and with others. Sign gesture acquisition and text/speech generation are parts of computer recognition of linguistic communication. Static and dynamic are classified as sign gestures. Both recognition systems are important to the human community but static gesture recognition is less complicated than dynamic gesture recognition. Inability to talk is taken into account to be a disability among people. To speak with others people with disability use different modes, there are number of methods available for his or her communication one such common method of communication is linguistic communication. Development of linguistic communication recognition application for deaf people is vital, as they'll be able to communicate easily with even people who don't understand language. Our project aims at taking the fundamental step in removing the communication gap between normal people, deaf and dumb people using language.
Keywords: gesture recognition, linguistic communication.

I. INTRODUCTION

A. Deep Learning

Deep learning may well be a category of machine learning algorithms that uses multiple layers to more and more extract higher-level options from the raw input as an example, in image process, lower layers could establish edges, whereas higher layers could establish the ideas relevant to an individuals like digits or letters or faces. Deep-learning architectures like deep neural networks, deep belief networks, graph neural networks, perennial neural networks and convolutional neural networks are applied to fields yet as pc vision, speech recognition, tongue process, computer science, bioinformatics, drug style, medical image analysis, material review and game programs, wherever they have created results resembling and, in some cases, surpassing human skilled performance. Deep learning architectures is created with a greedy layer-by-layer technique. Deep learning helps to disentangle these abstractions and spot that options improve performance. For supervised learning tasks, deep learning strategies eliminate feature engineering, by translating the data into compact intermediate representations principal elements, and derive bedded structures that remove redundancy in illustration. Deep learning algorithms is applied to unsupervised learning tasks. this can be often an important profit as a results of unlabeled information unit of measurement plenty of thick than the labeled information. Samples of deep structures which is able to be trained in degree unattended manner area unit neural history compressors and deep belief networks.

B. OpenCV – OpenCV

(Open-source Computer Vision Library) is associate ASCII file Computer vision and learning code library. OpenCV was built to produce a customary infrastructure laptop vision application and to accelerate the employment of machine perception. The library has over 2500 optimized algorithms. These algorithms are accustomed classify human actions in video, establish objects.

C. A Number Of Deep Learning Techniques Are As Follows

1) Convoluted Neural Network (CNN): In neural networks, Convolutional neural network (ConvNets or CNNs) is one in every of the foremost classes to do to pictures recognition, pictures classifications. Object's detections, recognition faces etc., are variety of the areas wherever CNNs are wide used.

2) Artificial Neural Network (ANN): One perceptron (or neuron) is notional as a logistical Regression. Artificial Neural Network, or ANN, could also be a cluster of multiple perceptron/ neurons at every layer. ANN is additionally mentioned as a Feed-Forward Neural network as results of inputs are processed solely within the forward.

3) Recurrent neural networks (RNN): Recurrent neural networks (RNN) are the state-of-the-art calculation for sequent data and are utilized by Apple's Siri and Google's voice search. it is the essential calculation that recollects its data, on account of an indoor memory, that creates it altogether fitted to AI problems that embrace consecutive information. It's one of the calculations guilty for the extraordinary advances in profound learning within the course of the foremost recent few years during this post, we'll cowl the fundamental ideas of however intermittent neural organizations work, what the most effective problems are and also the thanks to settle them.

D. Applications of Deep Learning

1) *Image Recognition:* Image Recognition is one among the foremost vital Machine Learning and computing examples. Basically, it's Associate in tending approach for distinctive Associate in Tending interfering a feature or an object within the digital image. Moreover, this method could also be used for more analysis, like pattern recognition, face detection, face recognition, optical character recognition, and much of recognitions is desirable. An exceedingly machine learning approach for image-recognition is worried extracting the key options from the image and thus input these options to a machine learning model.
2) *Speech Recognition:* Speech Recognition is the method of transforming vocable into text. It's additionally, referred to as automatic speech recognition, computer speech recognition, or speech to text. This field is benefited from the advancement of machine learning approach and massive Data. At present, all business purpose speech recognition system uses a machine learning approach to acknowledge the speech. The speech recognition system mistreatment machine learning approach outperforms on top of the speech recognition system employing ancient methodology. Because, during a machine learning approach, the system is trained before it goes for the validation. Basically, the machine learning code of speech recognition works 2 learning phases: one. Before the pc code purchase (train the pc code in a very freelance speaker domain) a pair of. Once the user purchases the pc code (train the pc code during a speaker dependent domain). This application could also be used for extra analysis, i.e., health care domain, instructional, and military.
3) *Virtual Personal Assistant:* A virtual personal assistant is that the advanced application of machine learning and technology. within the machine learning technique, this method acts as machine- learning based system takes input, and processes the input and provides the resultant output. The machine learning approach is important as they act supported the expertise, completely different virtual personal assistant's area unit sensible speakers of Amazon Echo and Google Home, Mobile Apps of Google Allo.
4) *Recommendation for Products and Services:* This refers to a system that's capable of predicting the longer-term preference of a set of things for a user, and advocate the best things. One key reason why we wish a recommender system in trendy society is that individuals have an excessive number of choices to use from due to the prevalence of net. we'll notice massive scale recommender systems in retail, video on demand, or music streaming. So on develop and maintain such systems, an organization usually wants a gaggle of pricy knowledge person and engineers. Machine learning algorithms in recommender systems are usually classified into 2 classes - content based and cooperative filtering ways though trendy recommenders mix each approach. Content primarily based ways are supported similarity of item attributes and cooperative ways calculate similarity from interactions. Below we've a bent to debate largely cooperative ways sanctionative users to search out new content dissimilar to things viewed within the past.

II. SYSTEM DESIGN

A. Block Diagram

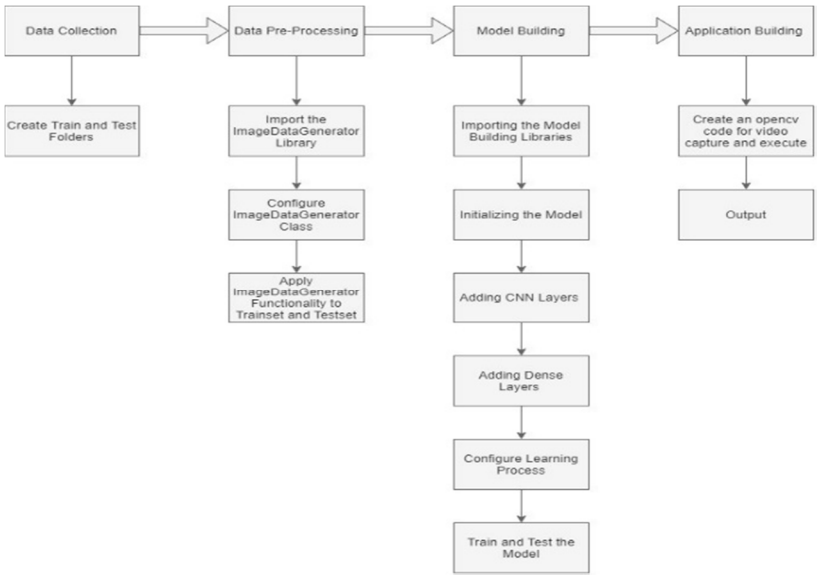

Fig. 1 Block Diagram of Model

1) *Data Collection:* The method of gathering data depends on the sort of project, for an DL projects, images are used. the information set is collected from various sources like file, database and other sources. Kaggle and UCI Deep learning repository are the repositories that are used for many of information collection for deep learning models.
2) *Preprocessing:* Preprocessing refers to any or all or any the transformations on the info before it's fed to the machine learning or deep learning rule. As an example, training a convolutional neural network on raw pictures can possibly cause dangerous classification performances. The preprocessing is additionally important to hurry up training (for instance, centering and scaling techniques).
3) *CNN Model:* CNN could be a modified variety as deep neural net which depends upon the correlation of neighboring pixels. It uses randomly defined patches for input at the beginning, and modifies them within the training process. Once training is completed, the network uses these modified patches to predict and validate the lead to the testing and validation process. Convolutional neural networks have achieved success within the image classification problem, because the defined nature of CNN matches the info point distribution within the image. As a result, many image processing tasks adapt CNN for automatic feature extraction.
4) *Train and Test Data:* For training a model, initially split the model into a pair of sections that unit 'Training data' and 'Testing data'. The classifier is trained exploitation 'training information set', so tests the performance of classifier on unseen 'test information set'. Training set: The training set is that the fabric through that the pc learns the thanks to method data. Training information set is used for learning and to suit the parameters of the classifier. Testing set: a gaggle of unseen information used solely to assess the performance of a fully-specified classifier.
5) *Evaluation:* Model Evaluation is integral part of the model development method. It helps to hunt out the only model that represents the data and therefore the way well the chosen model can add the future. to spice up the model hyper-parameters of the model could also be tuned and also the accuracy is also improved. The output is predicted by analyzing the check data as input beside check data output and then the output is displayed.

B. Flow Chart

The computer-aided mechanisms are applied to detect hand gestures. The data set used consists of hand gestures of numbers from zero to five, with around 780 images belonging to 6 gesture categories as shown in Fig 2.

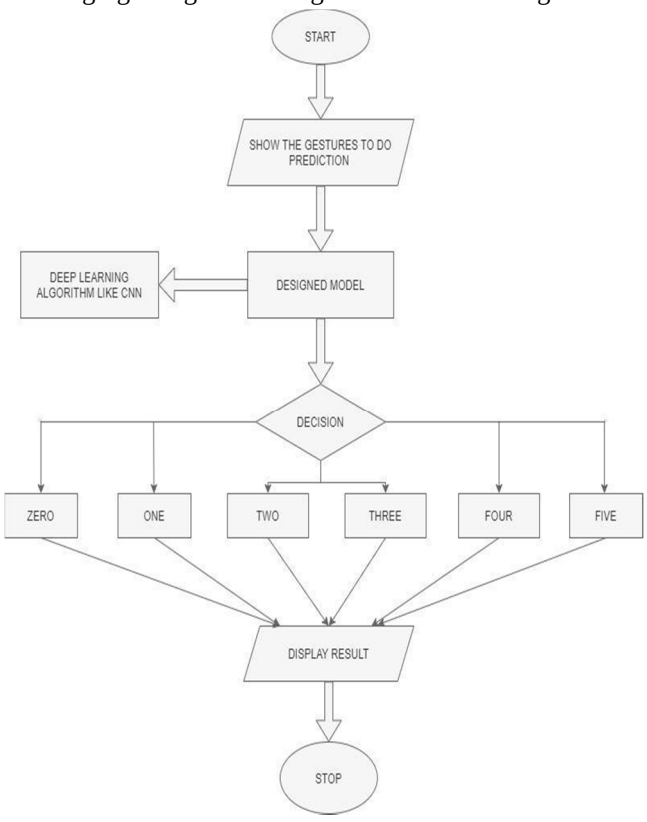

Fig. 2 Flowchart

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III. IMPLEMENTATION

A. Dataset Description

For implementation, considering hand gestures of numbers dataset. This dataset contains two folders: test set and training set. In training set and test set folder, there are six categories from zero to 5. Training set consists of 600 images belonging to six classes and test set consists of 180 images belonging to six classes.

B. Steps involved in building the model

1) Step 1: Install and import required libraries.

Importing the desired libraries is that the beginning in building the model.

```
In [1]: # Importing the Keras libraries and packages
        from keras.models import Sequential
        from keras.layers import Convolution2D
        from keras.layers import MaxPooling2D
        from keras.layers import Flatten
        from keras.layers import Dense
```

2) Step 2: Building the CNN.

Here the model is ready using CNN by adding two convolutional layer then connecting two dense layers for fully connected layers among the neurons and adam optimizer is employed to optimize the model.

```
In [2]: # Step 2 - Building the CNN

        # Initializing the CNN
        classifier = Sequential()

        # First convolution layer and pooling
        classifier.add(Convolution2D(32, (3, 3), input_shape=(64, 64, 1), activation='relu'))
        classifier.add(MaxPooling2D(pool_size=(2, 2)))
        # Second convolution layer and pooling
        classifier.add(Convolution2D(32, (3, 3), activation='relu'))
        # input_shape is going to be the pooled feature maps from the previous convolution layer
        classifier.add(MaxPooling2D(pool_size=(2, 2)))

        # Flattening the layers
        classifier.add(Flatten())

        # Adding a fully connected layer
        classifier.add(Dense(units=128, activation='relu'))
        classifier.add(Dense(units=6, activation='softmax')) # softmax for more than 2

        # Compiling the CNN
        classifier.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy']) # categorical_crossentropy for more t
```

3) Step 3: Preparing the train/test data and training the model

Here the dataset is pre-processed and therefore the data is taken into training set to coach the model using classifier.fit_generator method and to validate the model test_set is employed which check accuracy of the model.

```
# Step 3 - Preparing the train/test data and training the model

from keras.preprocessing.image import ImageDataGenerator

train_datagen = ImageDataGenerator(
        rescale=1./255,
        shear_range=0.2,
        zoom_range=0.2,
        horizontal_flip=True)

test_datagen = ImageDataGenerator(rescale=1./255)

training_set = train_datagen.flow_from_directory('data/train',
                                                 target_size=(64, 64),
                                                 batch_size=5,
                                                 color_mode='grayscale',
                                                 class_mode='categorical')

test_set = test_datagen.flow_from_directory('data/test',
                                            target_size=(64, 64),
                                            batch_size=5,
                                            color_mode='grayscale',
                                            class_mode='categorical')
classifier.fit_generator(
        training_set,
        steps_per_epoch=600, # No of images in training set
        epochs=10,
        validation_data=test_set,
        validation_steps=30)# No of images in test set
```

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4) Step 4: Saving the model.

Here the model is saved.

```
# Saving the model
model_json = classifier.to_json()
with open("model-bw.json", "w") as json_file:
    json_file.write(model_json)
classifier.save_weights('model-bw.h5')
```

IV. RESULTS

In this paper, the CNN algorithm is used to predict the performance of the model.

Fig. 3 Detecting the hand gesture as Five

Fig. 4 Detecting the hand gesture as Four

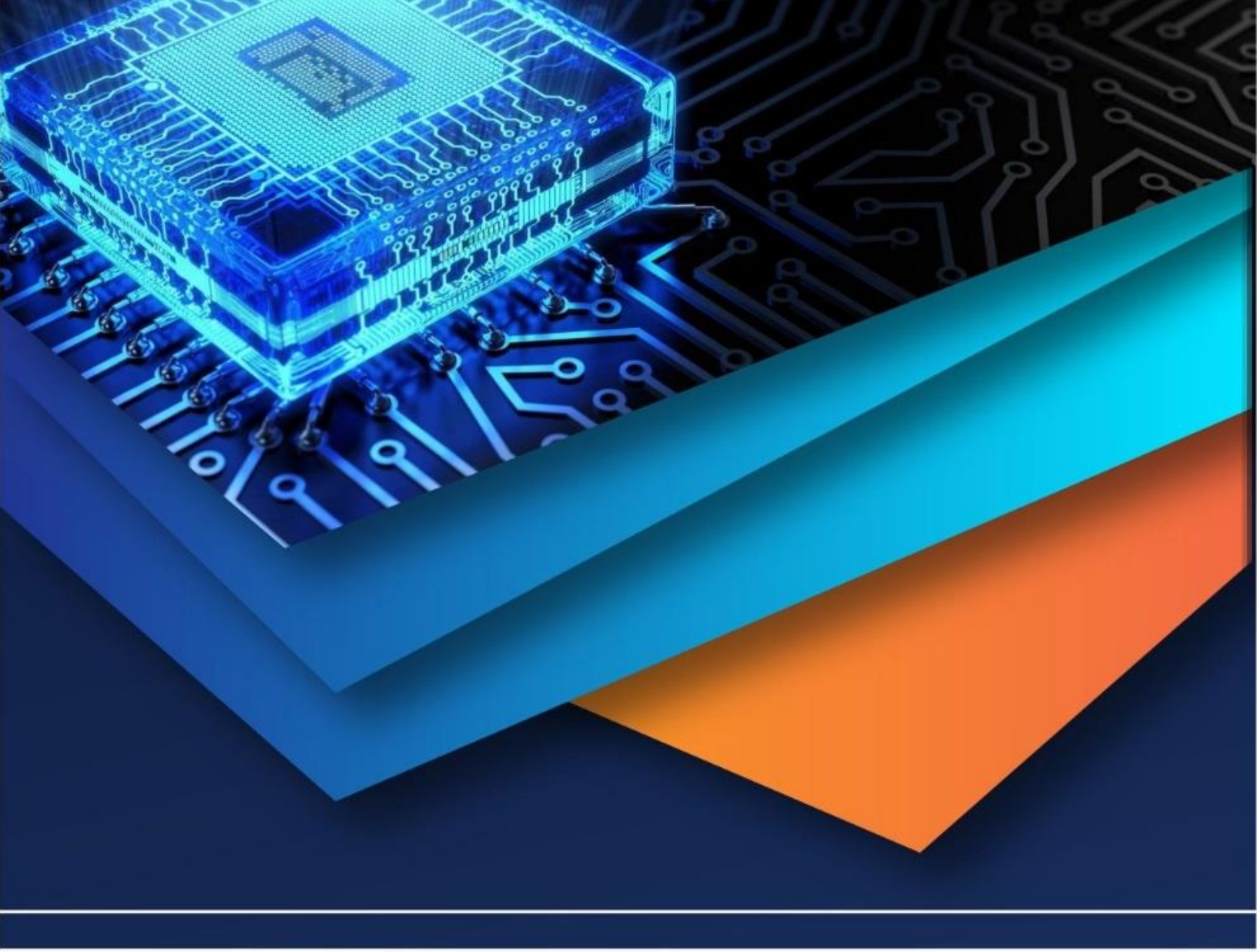
- *Description:* The results are predicted as five, four where hand gestures are converted into text language as shown in Fig.3, Fig.4, respectively. Like this the model can predict other gestures like three, two, one and 0.

V. CONCLUSION

Hand gestures are a strong way for human communication, with many potential applications within the area of human computer interaction. Hand gesture recognition could be a difficult problem and therefore the current work is just a tiny low contribution towards achieving the results needed within the field of linguistic communication gesture recognition. This paper consists of the small print about the model which was used for the detection of hand gestures using the quantity sign images. From the result, it's proven that the accuracy of the model has reached good level, if it's deployed within the real-time scenario then it'll help as a conversation engine.

REFERENCES

[1] Cooper, Helen, Brian Holt, and Richard Bowden. "Sign language recognition." In Visual Analysis of Humans, pp. 539562. Springer London, 2011.
[2] Cooper, Helen, EngJon Ong, Nicolas Pugeault, and Richard Bowden. "Sign language recognition using subunits." Journal of Machine Learning Research 13, no. Jul (2012):22052231.
[3] Bengio, Yoshua, Patrice Simard, and Paolo Frasconi. "Learning longterm dependencies with gradient descent is difficult." IEEE transactions on neural networks 5, no. 2 (1994):157166.
[4] https://acadpubl.eu/jsi/2017-116-13-22/articles/21/54.pdf



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