Hand gesture recognition technique steps vary from simple to complex applications. Generally, the steps are usually divided as the following:

1. **Hand tracking**
2. **Feature extraction**

PROPOSED SYSTEM

Modules

1. DATA ACQUISTION

To achieve a high accuracy for sign recognition in sign language recognition system, 6 images will be taken for each 26 signs and others. These images are included in training and testing database. The captured image at a distance is adjusted by the signer to get the required image clarity. In my project we build a new dataset of 700 images of 70% training section and 30% testing section.

2. PRE-PROCESSING

Pre-processing consists of image acquisition, segmentation and morphological filtering methods.

i) Image acquisition

This is the first step of pre-processing. This is the process of sensing of an image. In image acquisition, image is sensed by “illumination”. It will also involve pre-processing such as scaling. In image acquisition the image will be taken from database.

ii) Segmentation

Segmentation is the process in which image is converted into small segments so that the more accurate image attribute can be extracted. If the segments are properly autonomous (two segments of an image should not have any identical information) then representation and description of image will be accurate and while taking rugged segmentation, the result will not be accurate. Here the Segmentation of hands is carried out to separate object and the background.

iii) Morphological Filtering

The image components are extracted by Morphological Filtering tools which are useful for

representation and description of shape. Definitely the output of this process is image attribute. The features extracted from the segmentation operation used for gesture recognition. The smooth contour is obtained by removing the noise from the images with Morphological filtering techniques. The pre-processing operation is done on the stored database

3. FEATURE EXTRACTION

The reduction of data dimensionality by encoding related information in a compressed representation and removing less discriminative data is called as Feature extraction Technique. Feature extraction is vital to gesture recognition performance. Therefore, the selection of which features to deal with and the extraction method are probably the most significant design decisions in hand motion and gesture recognition development. Here principal component is used as main features.

4. SIGN RECOGNITION

Sign recognition using LDA is a dimensionality reduction technique based on extracting the desired number of principal components of the multi-dimensional data. The gesture recognition using LDA algorithm that involves two phases

- Training Phase
- Recognition Phase

Each gesture is represented as a column vector in the training phase. These gesture vectors are then normalized with respect to average gesture. Next, the algorithm finds the eigenvectors of the covariance matrix of normalized gestures by using a speed up technique that reduces the number of multiplications to be performed. The corresponding gesture space projections were obtained by the eigenvector matrix then multiplied by each of the gesture vectors.

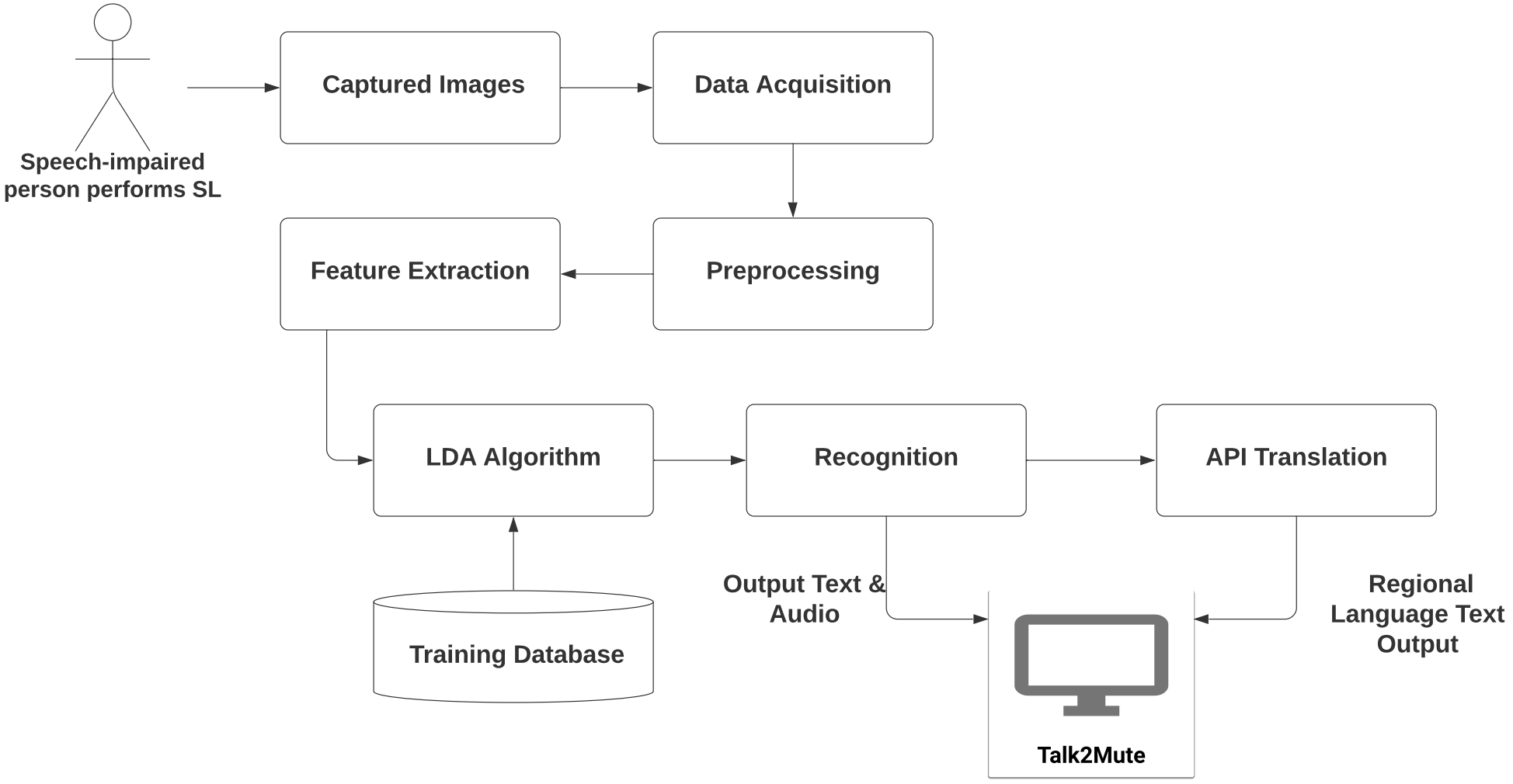
In the recognition phase, a subject gesture is normalized with respect to the average gesture and then projected onto gesture space using the eigenvector matrix. Lastly, Euclidean distance is computed between this projection and all known projections. The minimum value of these comparisons is selected for recognition during the training phase. Finally, recognized sign is converted into appropriate text and voice which is displayed on GUI.

5. TRANSLATION OF OUTPUT TEXT INTO REGIONAL LANGUAGE AND AUDIO

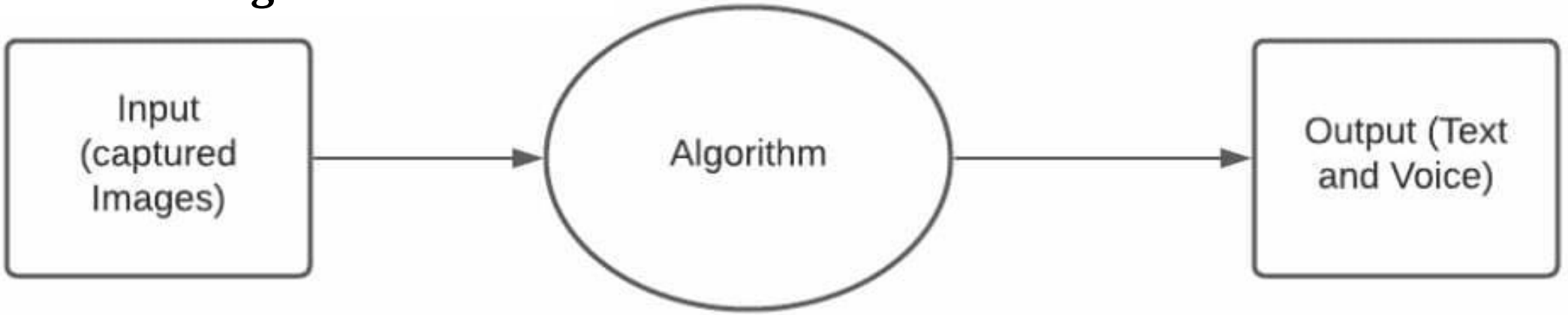
Here a translator API is used to convert original text into Regional Language. A translation API can dynamically translate text between language pairs. State-of-the-art text translation APIs support thousands of language pairs. These APIs are based on statistical machine translation and machine learning.

Text-to-Speech (TTS) refers to the ability of computers to read text aloud. A TTS Engine converts written text to a phonemic representation, and then converts the phonemic representation to waveforms that can be output as sound. Speech synthesis is the artificial production of human speech. A computer system used for this purpose is called a speech synthesizer, and can be implemented in software or hardware.

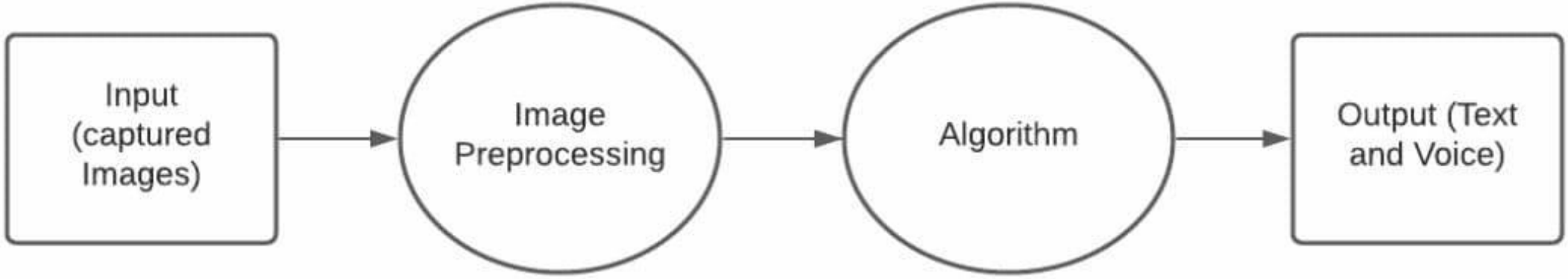
Architecture



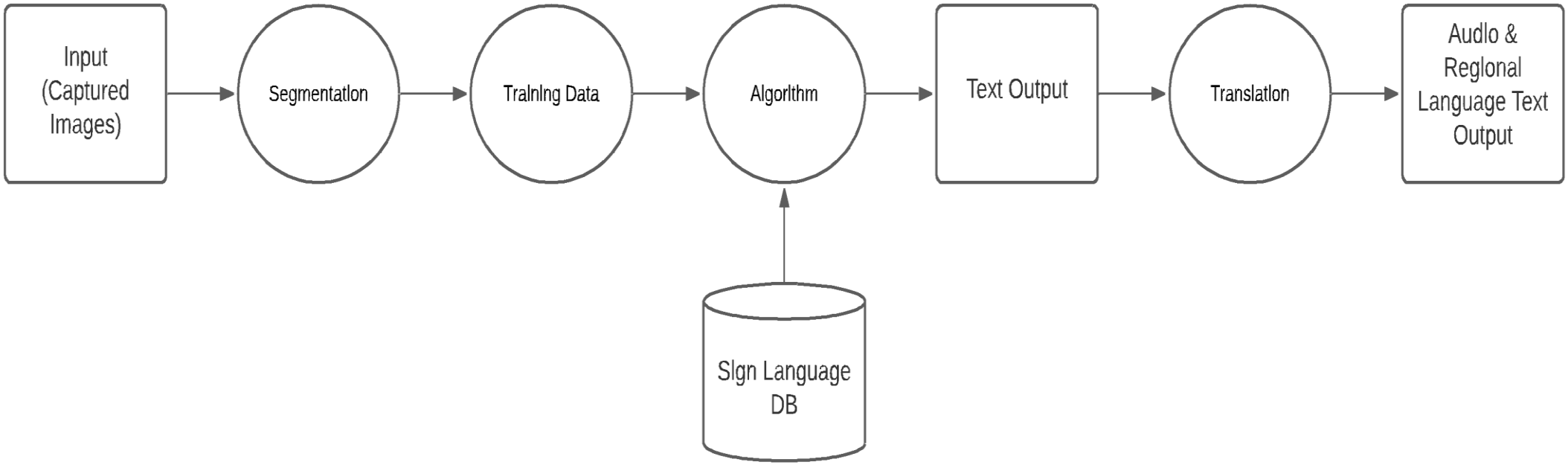
Data Flow Diagram Level 0



Data Flow Diagram Level 1



Data Flow Diagram Level 2



Use Case Diagram