# Speaker Recognition System

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# Speaker Recognition

→ It can be divided into two major sub-problems, Speaker identification and speaker verification

# Speaker Identification

→ Who is talking from a set of known voices of speakers

→ Giving correct utterance based on the information
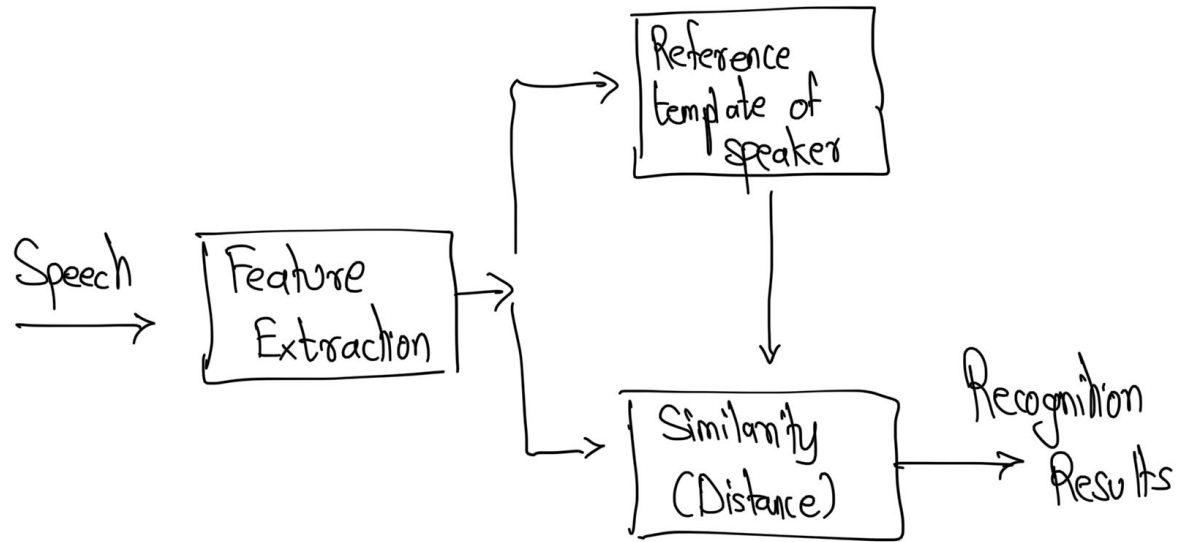
→ Errors: False identification of speaker

# Speaker Verification

→ Accepting or rejecting the speaker claiming to be actual one.

→ Imposters are not known to the system

→ Error: False rejection and False acceptance

# Speaker Recognition methods

→ Text dependent : Speaker required to utter a pre-determined set of words or sentences. Features of voices are extracted from the same utterance.

→ Text independent : No predetermined set of words, and may not even be aware that they are being tested
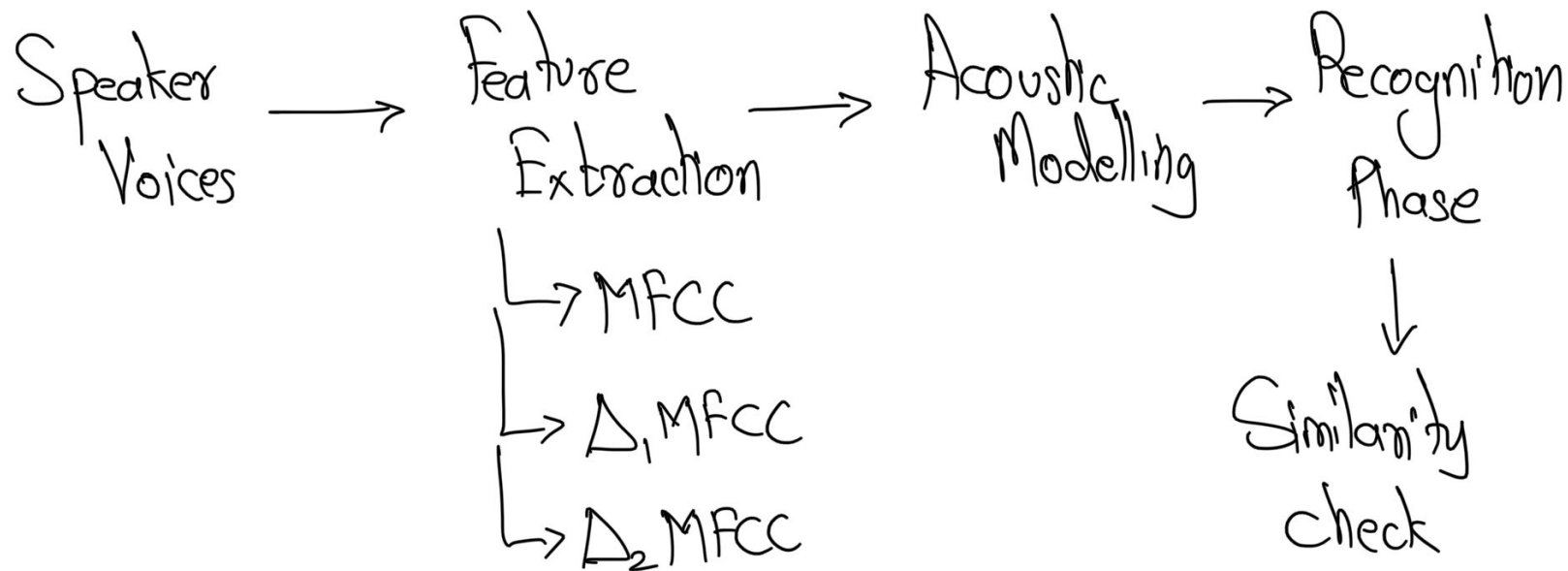
# Structure of Speaker Recognition System

```
                                    ┌──────────────┐
                                    │ Reference    │
                            ┌──────→│ template of  │
                            │       │      speaker │
                            │       └──────────────┘
                            │              │
                            │              ↓
Speech    ┌────────────┐    │       ┌──────────────┐
 ───────→ │ Feature    │────┤       │ Similarity   │    Recognition
          │ Extraction │    │       │ (Distance)   │ ──→  Results
          └────────────┘    └─────→ └──────────────┘
```

───→  Training Phase

───→  Recognition Phase

# Features of speaker voices

→ Frequency Band Analysis : Spectral Structure

→ Formant Frequencies : Production of speech and resonance

→ Pitch Contours : Utterances in speech through frequency

→ Coarticulation : Phonemic articulation of a feature.

# Training Phase

Speaker Voices $\rightarrow$ Feature Extraction $\rightarrow$ Acoustic Modelling $\rightarrow$ Recognition Phase

Feature Extraction:
- $\rightarrow$ MFCC
- $\rightarrow$ $\Delta_1$ MFCC
- $\rightarrow$ $\Delta_2$ MFCC

Recognition Phase $\downarrow$ Similarity Check

# References

- https://www.ee.iitb.ac.in/~esgroup/es_mtech03_sem/sem03_paper_03307409.pdf