

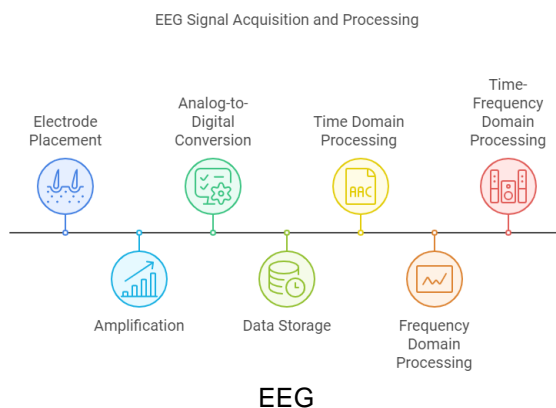
Bachelorarbeit, Masterarbeit

Brain Signal Data Collection and Preprocessing of Speech Decoding

Motivation

Communication is a fundamental human ability, and losing this capacity due to conditions like stroke or neurological disorders can severely impact a person's quality of life. For individuals who can no longer speak, Brain-Computer Interfaces (BCIs) offer a promising solution by enabling direct communication between the brain and external devices. However, the challenge lies in accurately decoding brain signals into coherent speech, especially when the data is noisy and complex.

This project aims to use advanced deep learning models to decode speech from brain signals, providing a natural and effective means of communication for those with speech impairments. Beyond just restoring the ability to speak, integrating emotional recognition will help users express their emotions, making the communication more humane and complete. By addressing these challenges, this research can significantly improve the quality of life for people with speech impairments and open new doors for broader applications in healthcare and human-computer interaction.



Key Concept

The key goals of this project involve gathering brain signals EEG, with a focus on areas related to speech processing. Data will be collected from healthy individuals. Preprocessing steps will remove noise and extract relevant features using methods like PCA, ICA, and Advanced time-Frequency analysis (Master Only), converting the data into formats suitable for deep learning models. Additionally, data augmentation techniques, such as signal transformations and noise injection, will be applied to enhance the dataset and compensate for limited training samples.

Prior knowledge

- Experiences with Python programming
- Basic knowledge of signal processing techniques

Research area

- Signal processing
- Neuroscience

Studiengang

- Elektro- und Informationstechnik
- Informatik
- Mechatronik
- Medizintechnik

Alignment

- Method development
- Research
- Implementation
- Modelling

Start

Immediately

Links

[Mitarbeiter](#)

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