National AI Institute

Web Tool for Phonemes Requirements Document

1. Introduction

1.1 Overview

The project aims to create a word database with metadata and phoneme information, offering an API for querying this database and a user-friendly web interface. It will include features such as scoring words based on popularity, complexity, readability, and sound, storing metadata like categories and semantics. displaying words based on specific phonetic queries, and presenting statistics on phonemes. The tool is used to assist speech-language pathologists and can be used to help children with pronunciation problems, teachers for educational purposes, and general users looking to query and explore word-related data.

1.2 Scope of the Product

Our vision is to develop an innovative web tool focused on phonemes, primarily for children. This tool will serve as an engaging and educational resource to help children understand and work with phonemes, which are fundamental building blocks of language. This is a web application which supports API. As we have the SDKs and APIs that allows developers to integrate the tool into various other applications in the later stage. This way we can extend our reach to adults and other specific user groups in future.

1.3 Business Case for the Product

This product is required to enhance speech development, serve as a versatile resource for speech pathologists, and engage children in learning. By offering the product as an API it facilitates effortless integration into diverse projects, benefiting researchers, developers, and educators.

Why is this product required :

1. Simplifies speech development, aiding children's educational progress.
2. Essential tool for speech pathologists, streamlining therapy.
3. Makes integration into projects effortless, saving developers time.
4. Empowers researchers, developers, and educators for impact.

2. General Description

This project is designed to connect the gap between written language and its phonemic representation, enhancing linguistic understanding through categorization, grapheme mapping, and score words based on the popularity, complexity, readability and sounding property. This project aims to assist researchers, educators, students, and technology developers by providing a comprehensive web tool that not only connects words with phonemes but also categorizes words and maps graphemes, assisting in deep linguistic analysis and education.

2.2 Product Functions

This project aims to create a comprehensive system of words, metadata, and phonemes, with associated APIs and a user interface. Here are the main functions and features of your product:

1. **Word Scoring**: The system will score words based on factors such as popularity, complexity, readability, and sounding properties. This feature will help users assess the suitability of words for various purposes.
2. **Metadata Storage**: Users will be able to store metadata information for each word, including categories, semantics, or any other relevant data. This metadata can assist in organizing and categorizing words effectively.
3. **Query and Display**: The user interface will allow users to query the database and display results based on various criteria, such as finding words that contain specific phonemes or belong to certain categories. This querying capability enhances the usability of the product.
4. **Phoneme-to-Grapheme Mapping**: Users will have access to phoneme-to-grapheme mapping, helping them understand the pronunciation and spelling of words based on phonetic information. This can be valuable for language learners and linguists.
5. **Phoneme Statistics**: The product will provide statistics on phonemes, allowing users to analyze the frequency and distribution of phonemes in the database. This feature can be valuable for linguistic research and language analysis.
6. **Phoneme Queries** : Using this project you can query the phonemes that differ by just one phenome like minimally and maximally opposing pairs that will help kids with fewer/higher speech production difficulties

In summary, we aim to create a system that includes word data, metadata, and phoneme information, with API support where users can query phoneme related queries and a user-friendly interface.

2.3 User Characteristics

Users: Children, Speech Pathologists, Teachers, People with speech issues requiring development, and Software Developers.

Technical Background:

1. Children: Minimal technical knowledge or training.
2. Speech Pathologists: Professional background with expertise in speech therapy.
3. Teachers: Varying levels of technical proficiency, but no specialized skills needed for basic usage.
4. People with Speech Issues: No specialized skills required for basic usage.
5. Software Developers: Technical expertise in software development, including knowledge of APIs and programming languages.

Motivation to Use:

1. Children: Improving speech and language is interesting way
2. Speech Pathologists: Enhancing therapy sessions and providing tailored exercises.
3. Teachers: Supplementing education to help children improve speech and language skills.
4. People with Speech Issues: Enhancing speech, confidence and communication abilities.
5. Software Developers: Integrating the API into their projects or applications to enhance functionality and features.

Obstacles:

1. Children: Usability and age-appropriate content.
2. Speech Pathologists: Integration of the API into existing tools.
3. Teachers: Limited access to technology in certain educational settings.
4. People with Speech Issues: Usability issues and difficulties without guidance.
5. Software Developers: Learning curve for API integration and potential challenges in adapting the API to specific project requirements.

2.4 General Constraints

- Users should be able to access the application using the network

2.5 Assumptions and Dependencies

1. **Internet Connectivity**: It is assumed that users will have internet access to use the web-based interface and access the APIs.
2. **Data Availability:** The project relies on the availability of a database of words, metadata, and phonemes. We club the data that is available from all the datasets and data sources.
3. Data Quality: The quality of data from different sources may vary. We assume that data is clean and error free
4. **Technical Infrastructure:** The project depends on a technical infrastructure like including servers and databases, to store and manage the word, phoneme data and retrive the data efficiently.
5. **API Dependencies:** users need specific tools or software to make API calls and interact with the API and need to know basic information like adding queries to Http requests etc.
6. **User Skills:** The usability of your user interface assumes that users have basic computer literacy skills. If the target audience lacks these skills, you may need to provide additional user training or support and need a browser to interact with the User Interface.
7. **Access Control:** When using the API or web interface, users should be granted read-only access. They must not have the capability to make changes to the existing data.

3. Specific Requirements

3.1 User Requirements

A generic User should be able :

- Search for the phoneme and find the corresponding words.
- Query the minimally and maximally opposing pairs based on the categories

- Search for phonemes based on the popularity

A software user in future should be able to know how to use an API for querying.

3.2 System Requirements

The system should handle large numbers of simultaneous users.
A spell check feature to identify and correct typographical errors in the inputs.
The system should be updated with the new words, or else should return no words found.

3.3 Interface Requirements

1. Prominent search bar for quick input.
2. Clear results display for easy access.
3. Stats section: Most Occurred & searched phonemes.
4. Accessibility for all users.
5. Engaging, user-friendly visual design.
6. Swift loading speed for efficiency.

4. Appendices

5. Glossary

API - Application Programming Interface
IPA - International Phonetic Alphabet
SDK - Software Development Kit

6. References

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