Project Number: 24

Project Title: Online Audio Quality Rating System

Project Clients: Helen Paik, Lina Yao, Haowei Lou

Project specializations: Software Development;Web Application Development;Mobile Application Development;Computer Science and Algorithms;Artificial Intelligence (Machine/Deep Learning, NLP);Big data Analytics and Visualization;

Number of groups: 3 groups

Main contact: Helen Paik, Lina Yao, Haowei Lou

Background:

Unlike deep learning tasks such as classification and image generation, audio-related research—particularly in speech and music—relies heavily on human subjective assessment. Listeners evaluate audio clips based on predefined metrics like naturalness, intelligibility, and quality, but current methods face limitations: limited listener pools, subjective variability, and inconsistent assessments, impacting research reliability.

To address these challenges, we propose an online speech rating system that connects researchers with diverse, skill-matched listeners. This scalable platform enables researchers to upload audio samples for evaluation using standardized metrics, reducing bias and improving efficiency in subjective speech assessment.

Requirements and Scope:

The project aims to develop an online speech rating system that enables researchers to upload audio samples and obtain structured, large-scale evaluations from skill-matched listeners. The system seeks to reduce subjective biases, improve evaluation efficiency, and ensure more reliable and diverse assessments compared to traditional methods.

Required Knowledge and skills:

1. Account Management

- Users can register and manage their accounts.
- Researchers gain access to project management and data analysis tools.
- Listeners can create and update their profiles for participation in evaluations.

2. Project Management

- Researchers can create and manage projects.

- Ability to upload audio clips in various formats.
- Assign tags to audio files for evaluation purposes (tags remain hidden from listeners but are used for result aggregation).
- Define evaluation metrics such as naturalness, intelligibility, and clarity for listeners to assess.

3. Listener Profile Management

- Listeners can maintain a detailed profile, including:
  - Background information (e.g., academic or professional expertise)
  - Native language and additional language proficiency
  - Experience in speech evaluation
  - Demographics (age, gender, country of residence, etc.)
- Profiles help optimize listener selection for fair and diverse evaluations.

4. Audio Rating System

- User-friendly rating interface with:
  - Mean Opinion Score (MOS) scale (1-5)
  - Custom researcher-defined evaluation metrics
  - Optional textual feedback submission
- Built-in validation mechanisms to ensure high-quality and unbiased ratings.

5. Reward System

- Encourages listener engagement through a point-based reward system.
- Listeners earn points based on:
  - Participation (number of valid evaluations completed)
  - Consistency (alignment with expert assessments)
  - Accuracy (ratings matching expected trends)
- Rewards can be redeemed for gift cards, discount codes, premium research access, or monetary incentives.

6. Smart Audio Allocation System

- An AI-powered automatic allocation system assigns audio clips to the most suitable listeners.
- Ensures fair and balanced evaluations by:
  - Matching audio to listeners based on profile data (e.g., language proficiency, demographics).
  - Preventing subjective bias by distributing clips across diverse listener groups.
- Aggregates and presents listener demographics after evaluation completion:
  - Example: "This project was rated by 100 listeners from 10 countries: 90 native speakers, 10 fluent non-native speakers, 50 male, 50 female."

7. Data Analysis & Reporting

- Comprehensive analytics dashboard for researchers.
- Aggregated rating data visualization for easy interpretation.
- Exportable reports in multiple formats: CSV, JSON, PDF.
- Statistical insights such as:
  - Mean, standard deviation, and confidence intervals of ratings.
  - Rating distribution across different listener demographics.
  - Comparative analysis across evaluation criteria.

8. Anomaly Detection System

- Detects and removes outliers and unreliable ratings to maintain data integrity.

Expected outcomes/deliverables:

source code, hosting, user guide