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**Test Plan, Test Design Specifications and Test Cases**  
Version 1

**CENG 408**

Innovative System Design and Development II

**SPEECH EMOTION RECOGNITION**

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# 1. INTRODUCTION

## 1.1 Version Control

Version No	Description of Changes	Date
1.0	First Version	Apr 7, 2023

## 1.2 Overview

This test plan covers testing the features and functionality of the Speech Emotion Recognition system. The scope of testing includes verifying users' ability to upload audio files, recognize emotions from uploaded files, correctly handle errors, and respond to user inputs. In addition, the test will also test system performance under different load and usage scenarios. Testing will be performed on the latest version of the system using the most widely used web browsers on Windows, macOS and Linux operating systems. Compatibility of the system with various operating systems and web browsers will also be tested.

## 1.3 Scope

This test plan covers the testing of the Speech Emotion Recognition system's features and functionalities as well as the corresponding test cases. The scope of the testing includes verifying the system's ability to import audio files, recognize emotions from the uploaded files, handle errors appropriately, and maintain responsiveness to user inputs. Additionally, the testing scope will cover the system's performance under various loads and usage scenarios. The latest version of the system will be used for testing on Windows, macOS, and Linux operating systems using the most commonly used web browsers. Compatibility testing will also be performed to ensure that the system works on various operating systems and web browsers.

## 1.4 Terminology

Acronym	Definition
TDS	Test Design Specification
GUI	Graphical User Interface
HP	Home Page
SP	Speech Page
TP	Text Page
RP	Result Page

## Speech Emotion Recognition System

Acronym	Definition
SER	Speech Emotion Recognition
UAT	User Acceptance Test

## 2. FEATURES TO BE TESTED

This section lists and gives a brief description of all the major features to be tested. For each major feature there will be a Test Design Specification added at the end of this document.

### 2.1 Home Page

- **Speech Button Functionality:** The feature of this button tests whether the user has been successfully transferred to the "Speech Page".
- **Text Button Functionality:** The feature of this button tests whether the user has been successfully transferred to the "Text Page" section.
- **Speech and Text Emotion Recognition:** This button will redirect you to the homepage of the Speech Emotion Recognition system.
- **System Response:** This feature tests the responsiveness of the SER system to user actions and inputs.

### 2.2 Speech Page

- **Audio file import:** This feature ensures that the system successfully imports an audio file by loading it to the system.
- **Speech emotion recognition:** This feature tests the accuracy of the system's ability to recognize different emotions in a given audio file.
- **Submit button functionality:** This feature tests the functionality of the Submit button by verifying that it properly initiates the speech emotion recognition test.
- **Error handling:** This feature tests how the system handles errors, such as incorrect file format or upload failure.
- **System responsiveness:** This feature tests the responsiveness of the system to user actions and inputs.

### 2.3 Text Page

- **Upload Text:** This feature allows the system to successfully import a text by uploading it to the system.

- **Text Emotion Recognition:** This feature tests the accuracy of the system's ability to recognize different emotions in a given text.
- **Submit Button:** This feature tests the functionality of the Submit button by verifying that it properly initiates the text emotion recognition test.
- **System Response:** This feature tests the system's responsiveness to user actions and inputs.

## 2.4 Result Page

- **Select Button:** This feature allows the user to choose what type of evaluation (speech/text).
- **Evaluate Button:** This feature allows the user to evaluate the mood of the selected genre.
- **System Response:** This feature tests the system's responsiveness to user actions and inputs.

## 3. FEATURES NOT TO BE TESTED

- **User interface design and layout:** This includes the visual design of the application, such as the color scheme, layout, and placement of elements on the screen. It is not within the scope of this test plan to evaluate the design of the user interface.
- **Compatibility with specific devices or operating systems:** The application may not be tested on every possible device or operating system, and therefore it is not feasible to guarantee compatibility with all of them. The test plan will focus on testing the application on a representative set of devices and operating systems.
- **Network connectivity and speed:** The performance of the application may be affected by network connectivity and speed, but it is not within the scope of this test plan to evaluate these factors.
- **Security:** While the application may have security features, such as password protection, encryption, and access control, it is not within the scope of this test plan to evaluate these features. Security testing requires specialized skills and tools and should be conducted separately.

## 4. EXIT CRITERIA

- 95% of the test cases are executed.
- 95% of the test cases passed.
- All defects found during testing are fixed and verified by the development team.
- The system stability and performance meet the agreed-upon requirements.

- The user acceptance test (UAT) is successfully completed and approved by the client.

## 5. TEST DESIGN SPECIFICATIONS

### 5.1 Graphical User Interface (GUI)

Describe under what conditions the testing of the product is considered successful. Some examples are:

### 5.2 Home Page (HP)

The home page is the first page that the user encounters when accessing the emotion recognition system. This page offers the user 2 options. The user can go to the relevant page by selecting either the “Text” section or the “Speech” section.

- **Speech and Text Emotion Recognition:** This page serves as the first and home page of the SER system, where users initially land. As there is no login system assumed, users can directly access the main page. On this page, users can choose between the "Speech" or "Text" buttons. Selecting either option will direct the user to the corresponding page within the SER system, providing the relevant functionality based on their choice.
- **Speech Button Functionality:** This button should be selected by users who want to analyze emotion with speech file in the SER system. After the button is clicked by the user, the SER system shows a message that the user has been successfully redirected to the "Speech" page.
- **Text Button Functionality:** This button should be selected by the users who want to make emotion analysis with a text file in the SER system. After the button is clicked by the user, the SER system shows a message that the user has been successfully redirected to the "Text" page.
- **System Response:** The system should respond appropriately to user actions. After the user clicks the button, the system should respond in the appropriate time frame. The system will only rely on one click in case of multiple button clicks.

### 5.3 Speech Page (SP)

The Speech Upload Page is designed to allow users to upload audio files to be processed by an AI system. The page includes a "Submit" button that initiates the upload process.

- **Audio file import:**  
When the user clicks on the "Upload Audio" button on the main page of the system, he will be able to select an audio file to be uploaded by clicking on the "Choose File" button. Once the user selects the file and clicks on the "Open" button, the system should start uploading the file. Once the upload is complete, the system should display a success message. The user should then verify that the uploaded audio file is correct.
- **Speech emotion recognition:**

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The user will provide an appropriate audio file for the test and load it into the system. The user will then initiate the speech emotion recognition test by clicking on the Submit button. The system should process the audio file and display the recognized emotion. The user should verify that the recognized emotion is correct.

- **Submit button functionality:**

The user will provide an appropriate audio file for the test and load it into the system. The user will then click on the Submit button to initiate the speech emotion recognition test. The system should process the audio file and display the recognized emotion. The user should verify that the Submit button initiates the test as expected.

- **Error handling:**

The system will be tested for its ability to handle errors such as incorrect file format or upload failure. In case the user attempts to upload a file with an incorrect format, the system should display an error message and cancel the upload process. If the user interrupts the upload process before it is completed, the system should display an error message and cancel the upload process.

- **System responsiveness:**

The system will be tested for its responsiveness to user actions and inputs. The user will perform various actions on the system such as clicking buttons and entering text. The system should respond to the actions in a timely manner. The system's ability to handle multiple user inputs simultaneously will also be tested.

### 5.4 Text Page (TP)

The Text Upload Page allows users to enter text to be processed by an artificial intelligence system and detect their emotions. The page includes a "Submit" button that starts the upload process. Detailed explanation is given below.

- **Upload Text:** When the user comes to the Text Page, user must enter the text user wants to know the feeling in the relevant field.
- **Text Emotion Recognition:** The user will provide a suitable text input for the test. The user will then click the Submit button to initiate the emotion recognition test from the text. The system should process the text and show the recognized emotion. The user must verify that the recognized emotion is correct.
- **Submit Button:** The user will provide a suitable text input for the test. The user will then click the Submit button to initiate the emotion recognition test from the text. The system should process the text and show the recognized emotion. The user should verify that the Submit button initiates the test as expected.
- **System Response:** The system will be tested for its responsiveness to user actions and inputs. The user will perform various actions on the system, such as clicking buttons and entering text. The system is expected to respond to the actions in a timely and accurate manner as described above.

### 5.5 Result Page (RP)

The result page, which is the last part of the project, consists of three parts.

## Speech Emotion Recognition System

- **Select Box:** First of all, user tick the box according to whether you want to know the mood in the speech or in the text. then user press the evaluate button to see the result.
- **Result Table:** Secondly, in the result table, the intensity of emotion in the voice or text selected as a result of the evaluation is shown to the user as a percentage.
- **Result:** Finally, the mood with the highest percentage is selected and displayed to the user on the result screen along with the emoji.



## 6. DETAILED TEST CASES

### 6.1 Home Page

<b>Test Scenario</b>	Speech and Text Button Functionality
<b>Purpose</b>	To direct the user to the relevant page when the "Speech" or "Text" button is selected.
<b>Requirements</b>	None.
<b>Priority</b>	Medium.
<b>Estimated Time Needed</b>	1 Minutes
<b>Dependency</b>	Have a user created before and registered in the SER system.
<b>Setup</b>	Open the SER system website.
<b>Procedure</b>	Go to Home page.
	Select one of the "Text" or "Speech" buttons and click
	Wait for the SER system to redirect to the relevant page and observe.
<b>Cleanup</b>	Out of the SER system.

### 6.2 Speech Page

<b>Test Scenario</b>	Audio File Import
<b>Purpose</b>	To verify that the system successfully imports an audio file by loading it to the system.
<b>Requirements</b>	An operational system.
	An appropriate audio file for the test.
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	5 Minutes
<b>Dependency</b>	None
<b>Setup</b>	Open the system.
<b>Procedure</b>	Click on the "Upload Audio" button on the main page of the system.
	Click on the "Choose File" button to select the audio file to be uploaded.

## Speech Emotion Recognition System

	Select the audio file and click on the "Open" button.
	The system will wait for a while to upload the file. Wait for the process to complete.
	When the upload is complete, the system will display a success message. Make sure the message is displayed.
	Check that the uploaded audio file is correct.
	If the uploaded audio file is correct, click the submit button.
<b>Cleanup</b>	Delete any temporary files generated during the upload process. This will help free up disk space and keep the file system clean.
	Close the system.

### 6.3 Speech Page

<b>Test Scenario</b>	Audio File Deletion
<b>Purpose</b>	To verify that the system can successfully delete an audio file that has been uploaded to the system.
<b>Requirements</b>	An operational system. An audio file uploaded to the system for testing purposes.
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	3 Minutes
<b>Dependency</b>	Audio File Import test scenario must be completed successfully.
<b>Setup</b>	Access the SER system website.
<b>Procedure</b>	Navigate to the page that displays the uploaded audio files.
	Locate the audio file that was uploaded during the Audio File Import test scenario.
	Click on the "Delete" button next to the audio file.
	The system will ask for confirmation before deleting the file. Click on the "OK" button to confirm.
	Wait for the system to complete the deletion process.
	Verify that the audio file has been successfully deleted from the system.
<b>Cleanup</b>	If the audio file has been successfully deleted, close the system.
	Delete the audio file from the system after verifying the successful.

## Speech Emotion Recognition System

	Clear the cache and browser history to ensure the test does not interfere with future tests.

### 6.4 Speech Page

<b>Test Scenario</b>	Submit Button Functionality
<b>Purpose</b>	To verify that the system successfully submits the form data when the Submit button is clicked.
<b>Requirements</b>	An operational system with a form that includes a Submit button. Test data to be submitted with the form.
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	5 Minutes
<b>Dependency</b>	Audio File Import test scenario must be completed successfully.
<b>Setup</b>	Open the system. Successful completion of the Audio File Import test scenario.
<b>Procedure</b>	Click on the "Submit" button on the emotion recognition page of the system. The system will perform emotion recognition on the uploaded audio file. Wait for the process to complete. When the process is complete, the system will display the recognized emotion. Make sure the emotion is displayed. Check that the recognized emotion is correct. If the recognized emotion is correct, close the system.
<b>Cleanup</b>	After submitting the speech sample, provide clear feedback indicating that the sample has been received by the system. If an error occurs during the processing stage, provide a clear error message indicating the issue and potential solutions.

### 6.5 Text Page

<b>Test Scenario</b>	Upload Text
<b>Purpose</b>	To verify that the system successfully upload a text by loading it to the system.

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<b>Requirements</b>	An appropriate text for the test.
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	5 Minutes
<b>Dependency</b>	No dependency
<b>Setup</b>	Open the system.
<b>Procedure</b>	Go to Text Upload Page.
	Enter a text.
	Click on the “Submit” button.
<b>Cleanup</b>	Delete the text.

### 6.6 Text Page

<b>Test Scenario</b>	Submit Button
<b>Purpose</b>	To verify that the system successfully submits the form data when the Submit button is clicked.
<b>Requirements</b>	Test data to be submitted with the form.
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	5 Minutes
<b>Dependency</b>	Text Page test cases should pass
<b>Setup</b>	Open the system.
<b>Procedure</b>	Go to Text Upload Page.
	Enter a text.
	Click on the “Submit” button.
	The system will perform emotion recognition on the uploaded text. Wait for the process to complete.
	Check that the recognized emotion is correct.
<b>Cleanup</b>	After submitting the text sample, provide clear feedback indicating that the sample has been received by the system.

## 6.7 Result Page

<b>Test Scenario</b>	Result Page
<b>Purpose</b>	Learn the result of emotion
<b>Requirements</b>	Select text or speech
<b>Priority</b>	High.
<b>Estimated Time Needed</b>	5 Minutes
<b>Dependency</b>	Add User test cases should pass
<b>Setup</b>	Open the system. Successful completion of the Audio File Import test scenario.
<b>Procedure</b>	1- Go to result page.
	2- Select the speech or text.
	3- Enter evaluate button.
	4- See percentiles of all emotions.
	5- See real emotion and emoji
<b>Cleanup</b>	Delete any temporary files generated during the upload process. This will help free up disk space and keep the file system clean.

## 7. RESULTS

<b>METHOD</b>	<b>DATASET</b>	<b>EMOTIONS</b>	<b>TECHNIQUE</b>	<b>ACCURACY</b>
Emotion Recognition with Speech	RAVDEES	Angry – Disgust – Fear – Happy – Neutral – Sad	SVM + ANN	% 99
Emotion Recognition with Speech	IEMOCAP	Angry – Excited – Frustration – Happy – Neutral – Sad	SVM + ANN	% 42
Emotion Recognition with Speech	IEMOCAP + RAVDEES	Angry – Excited – Frustration – Happy – Neutral – Sad	SVM + ANN	% 54
Emotion Recognition with Speech	IEMOCAP	Angry – Excited – Frustration – Happy – Neutral – Sad	ANN	% 33
Emotion Recognition with Speech	IEMOCAP	Angry – Disgust – Fear – Happy – Neutral – Sad	CNN + RESNET	% 30
Emotion Recognition with Speech	IEMOCAP	Angry – Disgust – Fear – Happy – Neutral – Sad	CNN + RESNET + ALEXNET	% 24
Emotion Recognition with Speech	IEMOCAP	Angry – Disgust – Fear – Happy – Neutral – Sad	DNN + CRNN	% 32
Emotion Recognition with Text	IEMOCAP	Angry – Excited – Frustration – Happy – Neutral – Sad – Fear - Disgust	BERT + ANN	% 26
Emotion Recognition with Text	IEMOCAP	Angry – Excited – Frustration – Happy – Neutral – Sad	BERT + ANN	% 82

## 8. REFERENCES

[1] CENG407\_GroupXX\_SRS\_V1.0, December, 2022

[2] CENG407\_GroupXX\_SDD\_V1.0, December, 2022