K.K.WAGH INSTITUTE OF ENGINEERING EDUCATION & RESEARCH

PROJECT STAGE -II

Depression Classification Model using Machine Learning

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K. K. WAGH EDUCATION SOCIETY

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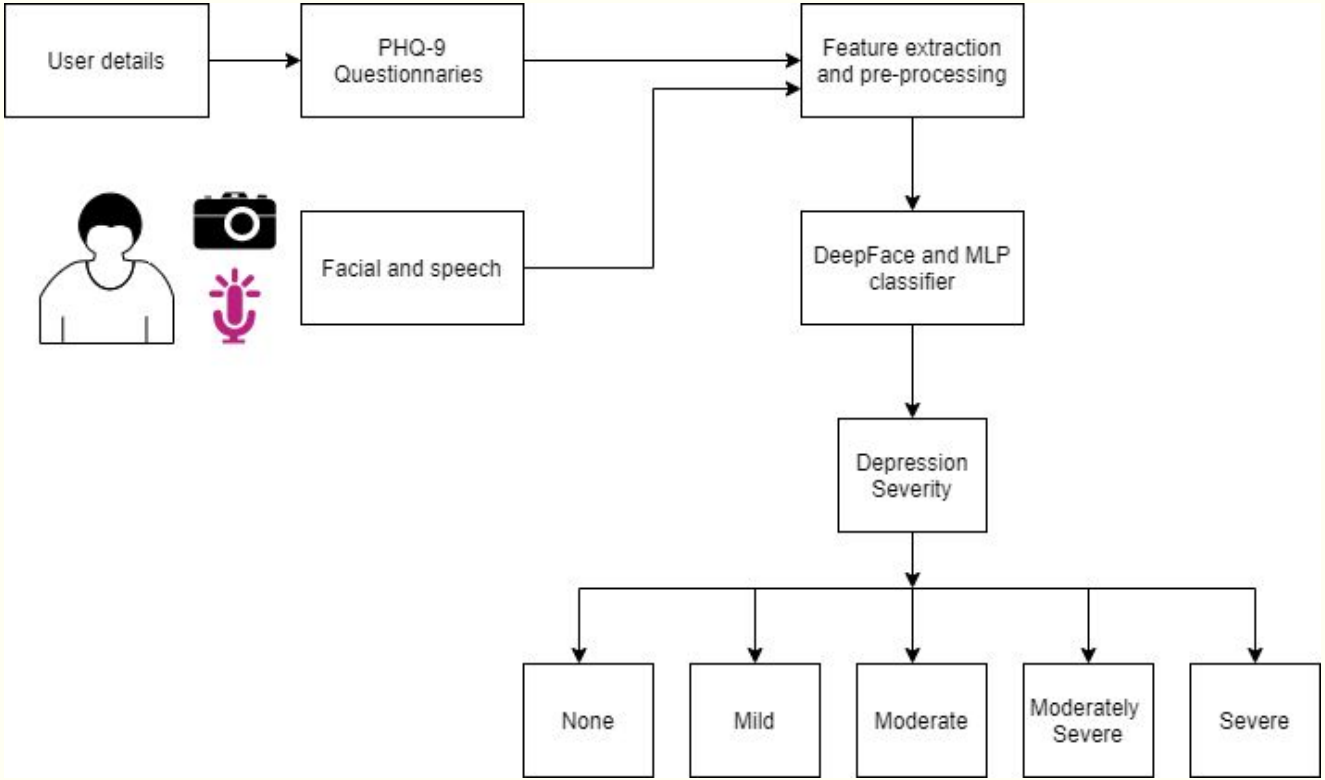
Problem Definition

- To develop an automated depression detection system using machine learning
- Technical Keywords: Speech processing, PHQ-9, RAVDESS, TESS, SFC, LFW, DeepFace and MLP Classifier

Objectives

- To build a system based on machine learning for predicting the depression severity levels in people
- To reduce the time required for diagnosis by automating the diagnosis procedure

Revised Final Design



Depression Classification Model using Machine Learning

Tools and Techniques Used

- Tools: VSCode , Jupyter Notebook and MongoDB compass
- Technologies: Vue.js, Flask, MongoDB and Heroku
- Languages: JavaScript, HTML and Python
- Techniques: MLP Classifier, CNN, DeepFace Architecture and Rule based learning

Implementation Status

- There are 4 modules
  - PHQ-9 questionnaire
  - Facial and speech input
  - Feature extraction and pre-processing
  - DeepFace and MLP classifier

Algorithms

Algorithms used in implementation:

- DeepFace- Facial feature extraction and classification
- MLP Classifier- Speech feature extraction and classification

Modular Testing

Functional Testing

- PHQ-9 Questionnaire Module:
  - Test Case 1: Output Changes dynamically after changing the input
  - Test Case 2: All the options and their associated values of outputs were compared
  - Test Case 3: Responses getting submitted
- Facial Feature Module:
  - Test case 1: Classified emotion as the output
  - Test case 2: No output for improper lightning conditions
  - Test case 3: No output if there is no person in the frame or bad angle

- Speech Feature Module:
  - Test case 1: Classified emotion as the output of the speech
  - Test case 2: No output if the mic is being accessed somewhere else
  - Test case 3: No output if there is lot of noise

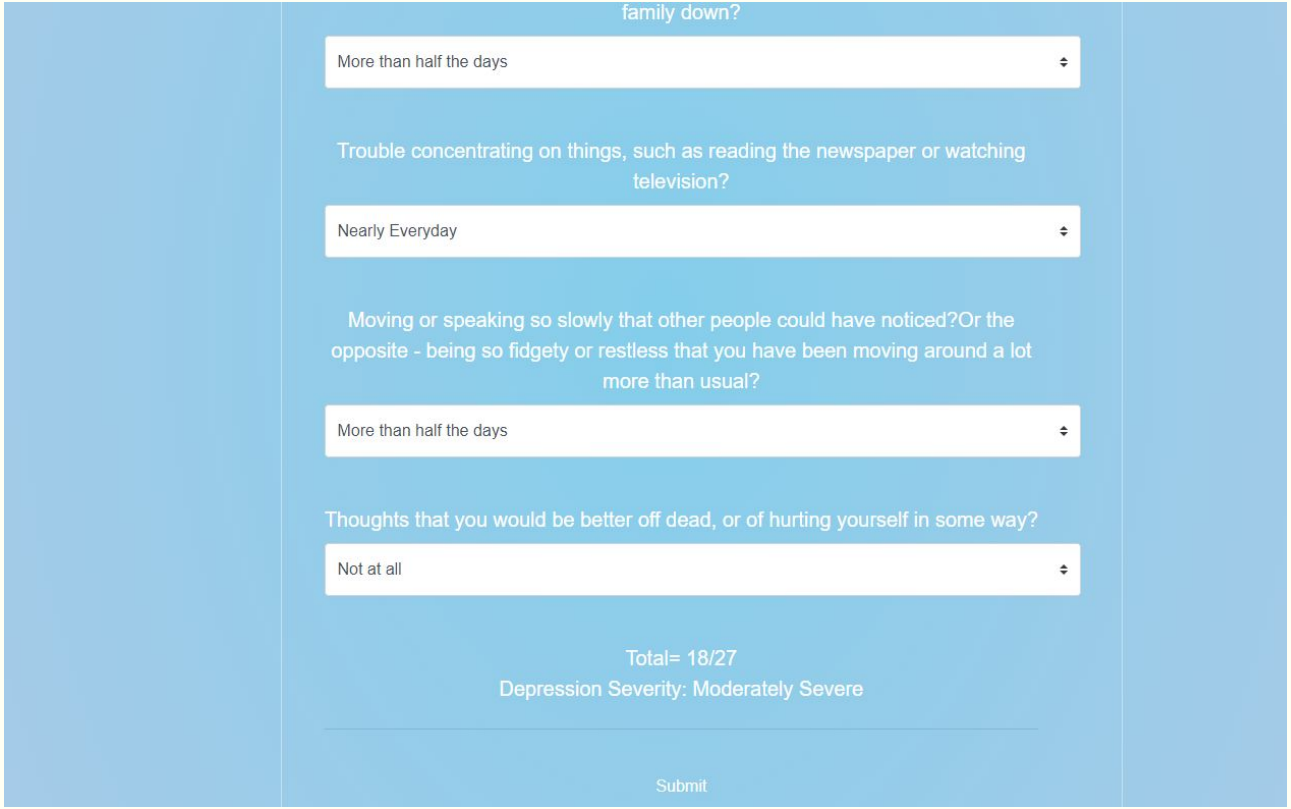
GUI Testing

- Authentication:
    - Test case 1: Prompts invalid details(invalid phone number digits and password validation in registration page)
    - Test case 2: Prompts successful registration and redirects to login page(after registration)
    - Test case 3: Prompts invalid password(when user enters a wrong password in login page)
    - Test case 4: Successful login and redirects to home page(when user enters correct credentials)

Results

- Following are the screenshots:
  - PHQ-9 Questionnaire
  - Facial Features Classification
  - Speech Features Classification
  - CSV File

PHQ-9 Questionnaire

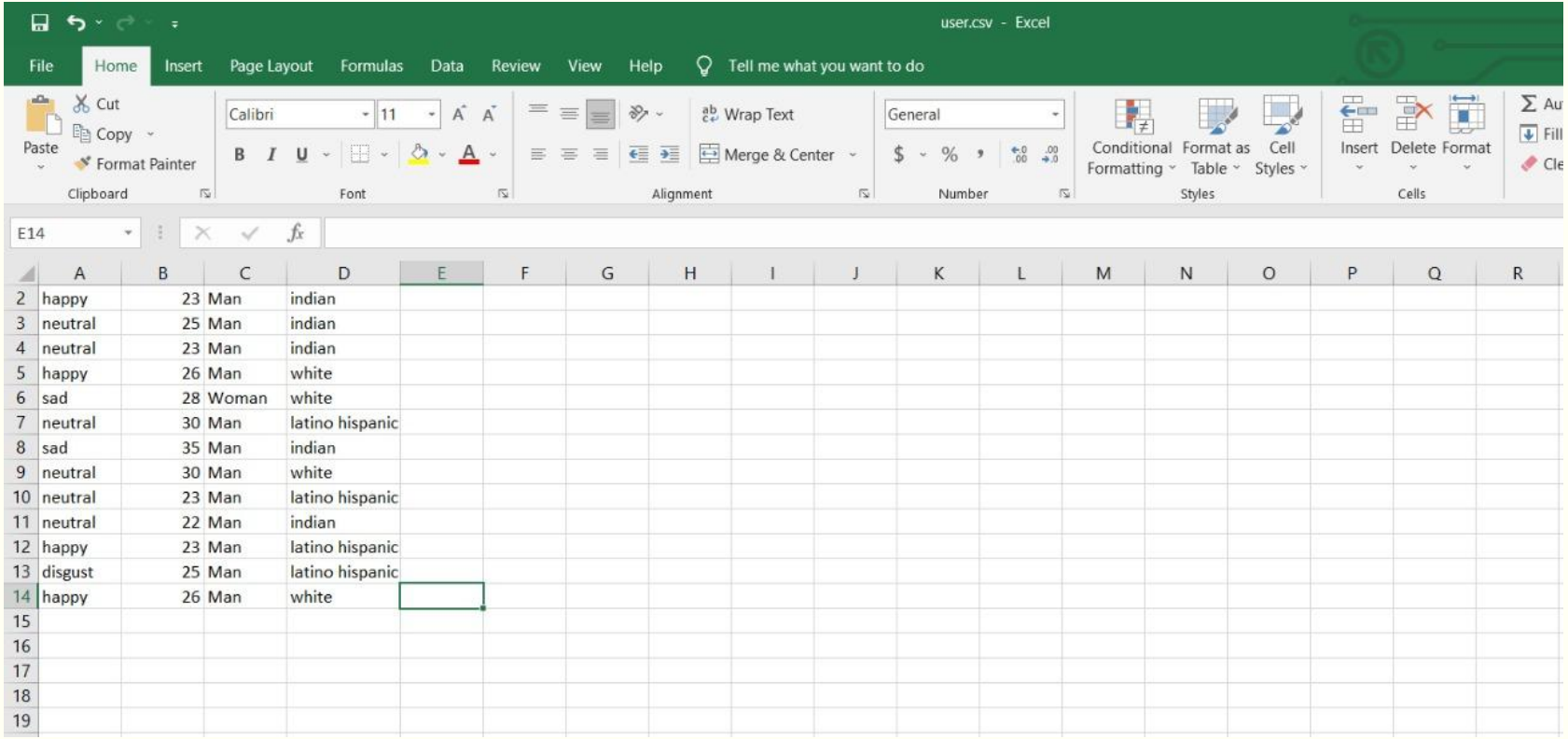


Facial Features Classification

```
(venv) F:\FA>flask run
 * Serving Flask app 'app.py' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
127.0.0.1 - - [20/Jun/2021 17:59:14] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Jun/2021 17:59:16] "GET /video HTTP/1.1" 200 -
Action: race: 100%|                                                                                | 4/4 [00:17<00:00,  4.36s/it]
dominant_emotion : happy
age : 26
gender : Man
race : indian
```

Speech Features Classification

CSV File



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
2	happy	23	Man	indian														
3	neutral	25	Man	indian														
4	neutral	23	Man	indian														
5	happy	26	Man	white														
6	sad	28	Woman	white														
7	neutral	30	Man	latino hispanic														
8	sad	35	Man	indian														
9	neutral	30	Man	white														
10	neutral	23	Man	latino hispanic														
11	neutral	22	Man	indian														
12	happy	23	Man	latino hispanic														
13	disgust	25	Man	latino hispanic														
14	happy	26	Man	white														
15																		
16																		
17																		
18																		
19																		

Conclusion

- PHQ-9 Questionnaire provides with the predicted results having an accuracy of 89%
- To make the predictions more accurate facial features as well as acoustic features are taken
- Overall accuracy of the system is 93%

Future Scope

- Building an android application of the system
- Improving the efficiency and reliability of the system
- Making the system more stable with each update possible
- Adding new features to visualise data

Efficiency Issues

- Misclassification of facial and speech features because of noise
- Large execution time
- Internet connectivity and hardware availability

Cost Analysis

- Will only require cost for deploying the server on cloud
- Cost required for domain name
- Estimated lines of code, LOC = 2000
- Duration of project = 5 Months
- Efforts = 4.5 person-month

References

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Published 09 April 2019.

THANK YOU !!

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