Bilkent University

Department of Computer Engineering

Senior Design Project

Analisa

Project Specifications Report

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1. Introduction

The entrance of Covid19 into our lives, a lot of companies switched to online interviews [1] and even though the outbreak has diminished, the online interviews are still in use for the companies [2]. There are several advantages of online meetings such as easy access between the interviewee and the interviewer, or faster recruitment process. However, there are also some disadvantageous sides of online meetings. Since the meeting is not as strong as a face-to-face interview, interviewers might not analyze the personality of the interviewees well enough to make sure that s/he is the right person to employ.

Analisa aims to help human resources see the characteristic features of the applicants by providing a live video conference environment and analyzing their facial expressions, and gestures using visual data. The interviewee's personality, current mood, level of anxiety and self-confidence is presented to the interviewer's screen real-timely.

In this report, after a brief description, constraints and requirements of the project will be discussed.

1.1 Description

Analisa will be a web-based video conference application where both the interviewer and the interviewee will see each other with live stream. The interviewee side will not see anything other than a normal video conference app while the interviewer side sees the interviewee related information and an AI based analysis of his/her actions instantaneously besides the video call. Video chat part of the application will be implemented as a web app, whereas the analysis part of it will be on the interviewee's local machine as a desktop application. The interviewee will not have any use-case in this desktop application.

1.2 Constraints

1.2.1 Implementation Constraints

- The application consists of both desktop application and web application. Interviewees will use the desktop application and the companies will use the web application.
- Github will be used as the version control tool.
- Jitsi SDK will be used to develop the video chatting web application.
- ReactJS will be used as the front-end of the web application and Python will be used as the language of desktop application.
- The backend will be written with Java Spring Boot.
- The database will be MySQL.
- The application will be based on OOP principles.
- Pytorch will be used as the machine learning library on desktop applications.

1.2.2 Economic Constraints

- The application will have a monthly/yearly subscription price for companies.
- In order to use the application, the companies need to have an account on .

1.2.3 Maintainability Constraints

- Bugs will be solved with updates.
- Feedback system will be used to detect bugs and improve the user experience.

1.2.4 Reliability Constraints

- Since the project tries to predict the interviewee's emotional state, self-confidence and personality, the accuracy rate of these predictions must be high.

1.2.5 Ethical Constraints

- This project will be designed and implemented by strictly following the Code of Ethics by NSPE [3].

- Interviewees will always be notified about the status of their personal data and they will be asked for consent to gather and analyze their private information before the start of video call.
- The intention of use of personal data will be clearly stated on screen before the user's confirmation.
- The application will keep the personal data collection as minimum as possible.
- All the extra data that is not required for minimum functionality of the application will only be collected with the permission of users and users will have an option to choose to share extra data.
- Interviewee's video or picture will not be sent to the server. The application that interviewee will download to their local machines will make most of the processing. Only results of analyzed data will be sent to the cloud and thus the footage of users won't be saved on the cloud.

1.3 Professional and Ethical Issues

Coronavirus pandemic had huge impacts on how people communicate and the amount of calls over the internet, especially video calls, increased drastically. Transmission of people's video footage throughout these calls becomes a vulnerability against malicious people who can extract and abuse personal information from these transmissions. Thus these delicate data must be protected and encrypted as much as possible. Analisa's design and development plans try to exclude and hide all the personal information while processing user's videos and images as much as possible. There will be no personal data on the cloud unless it is required for the functionality. As stated in the 6th fundamental canons of code of ethics by NSPE [1], Analisa will execute lawfully, responsibly, honorably and especially ethically to benefit both applicants and employers efficiently.

2. Requirements

2.1 Functional Requirement

2.1.1 Company Specific Requirements

- A company can have a subscription on the website, by making monthly/yearly payments.
- A company can create accounts for the company interviewers who will arrange an interview with candidates applying for a job position for that company.
- A company can allow specific accounts, such as the account of its human resources manager, to access the interviews' data including interviewees' analysis and results so that these managers can inspect the recruitments.

2.1.2 Interviewer Specific Requirements

- Interviewer must be able to login to the website with his/her account information.
- Interviewer can create an interview analysis room for a specific interview. An analysis room is a page component where the interviewers can see the results of the interviewee's analyzed data and also the general information.
- Interviewer must be able to add the interviewee's general information to the analysis room so that s/he can see the analysis data specific to that interviewee.
- Interviewer can indicate the job position that the interview is arranged for when creating the analysis room.
- An interview can have more than one interviewer, therefore, all the interviewers will be able to access the interviewee data within this analysis room.
- Interviewer must be able to see the analysis of the interviewee in terms of the interviewee's personality, self-confidence, the level of anxiety, and the current mood with visualized graphics.
- Interviewer must be able to see the compared version of all the interviewees for a specific job position.

- Interviewer must be able to enter the interview with a link shared by the analysis room or directly enter with a button.
- Interviewer can allow/disallow the person trying to attend the interview.
- Interviewer must be able to indicate the result of the interviewer in the analysis room in terms of at what stage the interviewee is in his/her application.
- The interviewer will be able to do basic tasks such as screen sharing, enlarging the participant's display panel, turning the microphone on and off, removing any participant from the room, and muting during the interview.

2.1.3 Human Resources Manager Specific Requirements

- A Human Resources manager can do all the tasks that an interviewer can do.
- In addition to the interviewer role, a Human Resources manager will be able to inspect recruitments through accessing not only the interviews s/he attends, but also all the interviews' data.
- Thus, Human Resources Managers will be able to analyze the recruitment process and evaluate individual interviewers' performances for a period of time.

2.1.4 Interviewee Specific Requirements

- An interviewee must be able to allow the camera and microphone access so that the application can process his/her data in analysis.
- An interviewee must be able to enter the interview room with a link shared by the interviewer.
- An interviewee must be able to accept the usage of his/her personal data at the beginning of the interview.
- An interviewee will be able to do basic tasks such as turning on and off the microphone and video, and screen sharing during the interview.

2.2 Non-Functional Requirement

2.2.1 Reliability

- The application should give analysis data of the interviewee with the highest possible accuracy.

2.2.2 Privacy

- Interviewee’s analysis will be stored in a database to make it available to the interviewer should they want to see it again in the future. Hence, this data should be secured by hashing the data.
- Face data of interviewees will be processed by the application. This data should be processed on interviewees' computers before uploading it to the server in order to prevent uploading pure face data.

2.2.3 Efficiency

- The application should analyze the personality of the interviewee in real time. Hence, most of the processing should be done at the server side to be able to make it possible.

2.2.4 Usability

- The application should be easy to use for both interviewee and interviewer. It should be seen by users as a very basic meeting application without complex functionalities to use.
- The application should give analysis data of interviewees with an understandable and easy to read GUI to the interviewers.

2.2.5 Scalability

- As the number of users increase, the more companies utilize Analisa, more data will be sent to servers and their final process will happen here. Thus, workload on central servers will increase drastically. Servers should be able to handle these kinds of situations.
- The application should keep the delay as little as possible even when more users are on the calls and should try to provide real-time analysis all the time.

3. Ongoing Discussions

- Main focus of the project is to analyze interviewee's facial expression and body language. If we can manage to analyze these visual data, the voice tone and the transcription of the interviewee's speech will also be analyzed for the rest of the semester.
- An interviewee will be analyzed in terms of the personality, mood, anxiety level, and self-confidence. In addition, the interviewees will be examined in order to check whether they are cheating or not during the interview, if a related dataset can be found in the remaining time. However, this is not the main purpose of the project at the moment.

4. Innovation Side of Project

Analisa brings innovation to the market in various ways with its design and implementation. People that use Analisa will have a different experience from other video call apps that could be used for the hiring processes of companies. This project will increase the user experience for both sides via having more automated and real-time analysis since interviewers will get guidance when evaluating candidates and candidates will be more relieved since their hiring process will happen in a more fair and less error-prone way.

Service is the type of innovation this project aims to achieve because it enables interviewers to evaluate the candidates in a better way by benefitting from the real-time analysis, which makes this product a better service than current video-conferencing applications. This will be an improvement over the products that exist in the market currently so Analisa can be considered as an incremental innovation. Also that could be seen as an optimization of the hiring system over video calls that is widely used in the market right now since the automatization of the process will provide a better analysis of the candidates and thus an optimized system.

5. References

[1] “How COVID-19 has fundamentally changed recruitment,” *eures.ec.europa.eu*. https://eures.ec.europa.eu/how-covid-19-has-fundamentally-changed-recruitment-2021-10-13_en

[2] “Bloomberg - Are you a robot?,” *www.bloomberg.com*. https://www.bloomberg.com/opinion/articles/2021-04-07/job-interviews-should-stay-online-after-covid

[3] Code of Ethics National Society of Professional Engineers, nspe,org, 2016. https://www.nspe.org/resources/ethics/code-ethics/. Accessed: 2018-10-14.