Bilkent University

Department of Computer Engineering

Senior Design Project I

Project Specifications Report

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Project short-name: CSION

1. Introduction

1.1 Description

Throughout life, people are bound to experience some ups and downs, as such is life. In several cases, we come across a type of crossroads, in which we try to find the optimum outcome. However, it is not always easy to take every aspect of the problem into account and make a rational decision. In such cases, the advice of a friend is always welcome as it provides a different view. However, the advice you get is not exactly bias-free let alone optimal for the situation you are in. *Csion* however, relies on your inner self, as well as your current mindset and as such, is a reflection of yourself, giving you advice in an objective, rational and personalized manner.

Csion aims to optimize people's decisions about any subject based on their characteristic behaviours within a short amount of time. We are planning to use Myers-Briggs Personality types to have an initial categorization of the users' characters **[1]**. This test is highly standardized and is esteemed in the field of psychology. There are 16 unique personalities and each person can find their personality type by solving simple and quick test question. These types have certain borderline character traits that generally conform to the way people behave. We will use the "Crystal Know" API to implement this test and get the results to use inside our application. Crystal Knows will also provide us data of over 6 million individuals who have done this test.

Although it is a deciding factor, personality alone is not the only variable when a person makes a decision. The other circumstantial factors such as users' preferences and current mood will also be constantly updated via random questions throughout the day, to be able to give a more personalized result. We will try to identify the problem at hand by asking several questions to the user. For relatively ordinary questions the user will be able to find the question in predefined categories such as "work"," relationship", "friendship" etc. where several of them are already present. If a problem is complex which means it is not categorized, then the number of asked questions will increase to get a better grasp on the subject, but

we aim to minimize the number of these questions. According to the given choices, the app will ask the users to indicate the pros and cons of that problem and give a rating for each pro/con where users will also indicate their current mood. Each answer will be labelled as a variable and the result of the pros and cons section will be analysed. After collecting every necessary input, the algorithm will compare the labelled variables with personality variables and it will create an output. The output will be a detailed analysis of the decision at hand, with sections such as emotional and rational aspects of the problem and coherence between the user's personality traits and the problem itself. The output will show the percentages of people who have the same type of personality who inquired a similar problem as well as whether or not they were happy with the outcome of the decision. This information will be gathered from users by collecting feedback after a certain amount of time has passed since their decision. Finally, the output will indicate a reasonable decision for users. We are planning on adding extra features such as quitting a bad habit or creating a daily challenge by considering the user's personality which will be used for adjusting a schedule and evaluate the applicability of the desired challenge.

1.1.1 Example Case

When the user uses the app for the first time, there will be a set of short questions to get to know the user. Then the user will have a Myers-Briggs test which lasts at most 10 minutes. After identifying the user's personality type, the user will see a menu from which it is possible to make inquiries. For instance, if a problem is "Job opportunity from abroad country", the user will select the "work" category. Since this problem is specific and direct we can detect the problem by asking fewer questions to the user. After the user is content with the detected problem, s/he continues to the questions about the current situation of their life and the problem's different aspects. The user can finish the questions and see the output at any time, however, this would result in a relatively low accuracy output. After finishing the questions, the output will be shown as described above. Users can come back to their problems at a later time to indicate their decision and consequences. Alternatively, the app will inquire about the user's experience at a later time if they haven't indicated it yet. For instance, if an output shows a positive result for "Job opportunity from abroad country" and the user decides on not doing it, the user will be able to share his/her experiences and whether they are happy with their outcome or not. The user may also see his/her personality type's detailed attributes and certain general cases/decisions that other people of the same type have made from the main menu. Also, the user can choose to share their social media accounts or solve more tests such as career, business or ethical dilemma tests to increase their involvement as well as the accuracy of the app's output.

1.2 Constraints

In this section of the document, project constraints will be discussed in seven subcategories such as data collection constraints, development constraints, economic constraints, social constraints, ethical constraints, health constraints, and political constraints.

1.2.1 Data Collection Constraints

- For personality assessments, Crystal API is planned to use **[2]**. In that way, millions of data which are obtained by previous personality test results will be reached.

- User's data will be held with API, can be displayed in a section in the application **[2]**.

- Questions to get data will be prepared with Psychology experts. For creating the dataset, additional psychological questions will be asked and answers will be added to the dataset.

- The answers which will not help to make a decision will be ignored and will be dropped from the dataset.

- When there is a change or update made in API, developers will be alerted to modify and fix the program.

- With automated tests on data, the dataset will be modified.

1.2.2 Development Constraints

- Github will be used as a base of source codes and reports of the project. When a change is made in the source code, developers will commit it with a brief explanation, simultaneously.

- Python programming language is planned to use since some parts of the project requires machine learning and deep learning. Also, data analysis part can be performed in Python easily.

- For automated tests, Appium is planned to use since the application will be served in mobile platforms.

- Incremental Model will be used to handle and fix any problems which can be encountered by the developers and users **[3]**.

1.2.3 Economic Constraints

- For using API with full access, premium subscription from CrystalKnows will be bought. In that way, other people's test results can be obtained.

- Application is planned to be served as free in marketspace.

- There will be a premium plan in application which allows premium users to ask more complex questions, reach more tests. In that way, user can personalize application more and can reach more accurate answers.

1.2.4 Social Constraints

- Application is planned to meet people's needs in decision making when they are irresolute between different options. While the application will represent the results of the decisions and satisfaction rate of options, it is aiming to broaden users' horizons.

- According to the market research, people tend to get advice via applications such as Onedio and BuzzFeed personality quizzes, our application plans to advise its users more precisely, more accurately since users' personality data will be collected when the user entered the application.

1.2.5 Ethical Constraints

- For the beginning dataset, personality test data for training will be taken from the CrystalKnows. These data contain choices and personality types yet, not personal data **[2]**.

- Since the application needs to collect data from its users, we will keep personal information, connected accounts, and publicly available information. Hence, there will be a Terms and Conditions report for the user to accept collecting these data.

- Users may opt-in for sharing their data with 3rd party applications yet, the default setting will be opt-out.

- The application is planned to collect its users' decisions and results then in a similar situation, it gives other users the satisfaction rate of options. Even though the application compares and gives satisfaction rates by former decisions, it will not share any name, identification number, location data, online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of its users.

1.2.6 Health Constraints

- The application might not be allowed to usage of every person according to the degree of mental and psychological health of the person.

- Questions which are related to sucide or violence will be precluded. If algorithm recognize the word in given text about suicide or violence, the application provides user the complete list of local organizations or professionals who can help.

1.2.7 Political Constraints

- Questions which are related to politics, and religions will be precluded. If user asks or talks about religion or politics, the application will not add this information to its dataset. Hence, this opinion will not be shown to other users of the application; it will not affect the decision algorithm.

1.3 Professional and Ethical Issues

- All collected sensitive user data from questionnaires and personality tests should be used and stored according to General Data Protection Regulation (GDPR) by following their guidelines **[4]**.

- All collected sensitive user data should be transferred using encrypted protocols like HTTPS.

- User passwords should be stored as salted hash.

- All sensitive user data should be encrypted with a symmetric key.

- We should be transparent about data collection, data processing and we should inform our users about it.

- Consent of users should be taken before processing their data to improve our application.

- To make sure that users' data are safe, we should take database backups frequently and store those backups in different locations.

- We should respect our users' right to be forgotten and we should be able to clear their sensitive data without any problem.

- We should store and transfer third party data coming from CrystalKnows API in a safe environment to be able to protect their proprietary data.

- Our suggested decisions should follow our ethical, health and political constraints. For further information please refer to sections 1.2.5, 1.2.6 and 1.2.7.

2. Requirements

Here, we described the functional and non-functional requirements of the project.

2.1 Functional Requirements

This part is about the functions of the application that affects user experience.

2.1.1 Sign-Up Process

When users open the application for the first time after downloading, they will encounter a page with two options: Login and Register. Users have to register to use the application, but if they are already registered, they can just click "Login" button and login by typing the required information and clicking "Login" button.

To sign-up the application, users need to click "Register" and fill the boxes that requires some information. For more accurate results, users can link their social media accounts at this page too. After completing the registration form, as the last step of registration, users should solve a personality test. Afterwards, the system will automatically login the user to application.

2.1.2 Asking for a Decision

Users will be able to choose between different categories at the main page. To ask for a decision, users should select the category that is related with their doubts, and they will see popular questions in that category as a list. Users will be able to type their issues to the search-box above the page to find the most related question. After selecting the desired question, a deadline should be selected for the decision -a way of saying "I should decide this until … date", and the system will start to ask users several questions related to the topic to increase the accuracy of the final decision, but users will always be able to skip to the final decision by clicking the "Skip Questions" button. After clicking the button or completing the questions, the final decision that arranged specifically for the user will be presented.

2.1.3 Profile

Each user will have a profile that having their personal information, personality types that is obtained from tests, a "Former Decisions" section, and finally the buttons to connect their social media accounts. By clicking "Former Decisions" section, users will be able to see their former issues, the advice they took from the application, the decision they made and how content they were with this decision. They will also be able to give feedback about their decisions through this page.

2.1.4 Giving Feedback

When the selected deadline comes, the application will send the user a notification that is asking what did they decide to do, and after clicking to notification or opening the application, users should select what did they choose to do from a list that will be opened at "Former Decisions" section at profile page.

After some time after the deadline, that is established differently for each question, user will receive another notification that is asking how much they are content with their decision. By opening the application user will be redirected to "Former Decisions" section again, and will be able to rate their decision through a scale from 1 to 10 to give the system a feedback.

2.1.5 Additional Tests

Users will be able to find many optional tests about each category at main page, under the button "Additional Tests", and they will be able to solve them to increase the accuracy of the decision they acquire. Their results will also be shown at "Profile" page.

2.1.6 Settings

Users will be able to reach the settings page through a button that is represented with a cogwheel icon that remains at the main page. Settings page will include account settings, like removing or suspending the account or removing a link to a social media account, visual settings like themes and fonts, notification settings, and an "About Us" section for users to have knowledge about the contributors of the application.

2.2 Non-Functional Requirements

2.2.1 Usability

- Application should be understandable for every user. User interface will provide every information that user can access.

- Menus and sub-menus should be usable for every portion of the application. Also menus should be easy to tap and easy to read since users can have difficulties for reading.

- Application should provide information such as tips and manuals for users when they first login to the system.

2.2.2 Efficiency

- Number of questions should not exceed 5 for categorized problems.

- If problem is complex, the number of questions can increase upto 10.

- Analized output should be direct and should give only necessary percentages.

2.2.3 Response Time

- Answers of the questions and any inputs of user should be processed less than 1 second.

- Application should create a final analyzed output less than 10 seconds.

2.2.4 Reliability

- Application should provide exact results of personality tests without any errors.

- Application should label each answer of questions correctly and their value as a variable for algorithm. Algorithm must work coherent for same inputs.

2.2.5 Security

- The answers of questions should be accessible by only user itself if user decides not to give feedback.

- Outside of the application, the result of personality tests should be only accessible by Crystal Knows since Crystal Knows has right to keep the results of tests.

- Any given personal information such as passwords and social platform information should be encrypted and protected that only user and application developers can access.

2.2.6 Maintainability

- Application should be fixable for less than an hour in case of any wrong output.
- Application should be updatable for future implementations for less than 3 hours.

2.2.7 Scalability

- Application should process more than 6 million personal data.

- Application should answer more than 100 thousand users simultaneously.

2.2.8 Recoverability

- In case of system shutdown or unexpected failure, application should return a functioning state and remember the questions that user has already answered.

3. References

[1] "The purpose of the Myers-Briggs Type Indicator® (MBTI®) ," *The Myers & Briggs Foundation - MBTI® Basics*. [Online]. Available: https://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/home.htm?bhcp=1. [Accessed: 13-Oct-2019].

[2] "Personality Assessments - Crystal API," *Personality Assessments - Crystal API*. [Online]. Available: https://www.crystalknows.com/developers/personality-assessments. [Accessed: 13-Oct-2019].

[3] A. Cockburn, "Using Both Incremental and Iterative Development,"*Golisano College of Computing and Information Sciences.* [Online]. Available: http://www.se.rit.edu/~swen-256/resources/UsingBothIncrementalandIterativeDevelopment-AlistairCockburn.pdf. [Accessed: 13-Oct-2019].

[4] "General Data Protection Regulation (GDPR) Compliance Guidelines." *GDPR.eu*. [Online]. Available: https://gdpr.eu/. [Accessed: 13-Oct-2019].