Bilkent University

Department of Computer Engineering

Senior Design Project

Project name: Dressy

Project Specification Report

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May 3, 2010

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Senior Design Project course CS491/2.

Website Link: https://dress-y.github.io/

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1. Introduction

The preference of online shopping is a huge trend in today's digital world because of the lack of time, the convenience of online shopping, the advantage to have access to other users' experiences, the existence of cost choices and richness in the product variety. By the beginning of 2020, 69% of Americans had an online shopping experience. Also, 25% of them were regular online shoppers who bought at least one item each month. Statistics also demonstrate that 47% of online shoppers buy clothing items. The online shopping trend is not limited to America. If we look at the worldwide statistics, the rate of online shopping in 2018 is 47.3%. While 72% of women had preferred to shop items online while 40% of these items, the largest percentage, were clothing [1]. With the effect of the coronavirus, this preference has become even clearer. People have begun to prefer to buy most of their needs online rather than visiting crowded shopping malls and trying out clothes that they do not know who had worn previously. However, shopping for clothes online has a downside. Shoppers do not have the advantage of trying clothes and therefore, it is difficult to make good choices in terms of looks and size of clothing.

The purpose of our senior design project is to assist people who choose to buy their clothes online. We want to create an application that provides a virtual fitting room for them. Thereby, they can try the clothes they have chosen and see the clothes on themselves.

With this project specifications report, we aim to explain the description of our application, constraints, requirements, professional and ethical issues about our senior project, Dressy.

1.1. Description

Dressy is a mobile application which provides a simulation of fitting rooms. Users register and their 3D model is created by detecting their body measurements using a camera. After creating a model, users can observe their model in different clothes from different angles and add the clothes into their virtual wardrobe by liking the clothes. The main advantage of the application is its similarity to a real fitting room. Using human pose estimation technologies, when the user moves, the model also moves like the user. In this way, people are able to see how the clothes fit on themselves just like they are in a real fitting room.

There is also a size recommendation system in the application, which makes our application different from similar 3D applications. A detailed size recommendation is given according to the body measurements and the preference of the user.

In addition, the application has a feature that detects pre-defined body movements and enables users to like and change the clothes from a certain distance to the camera.

1.2. Constraints

In this section, we specify constraints about the Dressy application.

1.2.1. Implementation Constraints

- Application will be web-based application with combination of mobile app for android and ios users.
- Github will be used for project management and collaboration.
- The client side of the application will be implemented in React Native.
- Unity will be used for developing models and then, will be connected to React Native.
- The server side of the application will be implemented with Java Spring.
- Java 11 will be used in the project.
- MongoDB will be used for the database.
- Computer Vision will be used for cloth fitting in the application.

1.2.2. Economic Constraints

- All users must have an Android smartphone or tablet because the app will be mobile and developed for Android OS.
- We are planning to use free libraries and APIs.
- The only cost might be the server because we need a database server and a remote server that processes cloth fitting.

1.2.3. Security Constraints

- Our app will include an authentication system to store the user personal data.
- In our app, the users need to take their photos and these photos will be private, nobody can access the user's private photos even the creators of the app. The photos will not be shared with any third party individual or institution.
- The data we will obtain from the user will be secured with React Native Encryption Libraries. Also the database connection will be secured with a bridge encryption application between the app and the database.

1.2.4. Social Constraints

- The users will share their gender and body sizes with the app to work properly and for suggestions.
- The users will share their choice on the dress types such as baggy clothes, tight clothes etc.

1.2.5. Technological Constraints

- All users must have an Android smartphone or tablet to use the application.
- All users must have internet connection to be able to use the application.

1.2.6. Language Constraints

- The app will support only English language at the beginning. Other languages can be added depending on the demands. The app’s design will be suitable to put in additional language.

1.2.7. Sustainability Constraints

- Our application will be free to download, register and use. Also, there will not be any in-app purchase.
- In order to get better results our model will collect the data and train itself continuously.
- User feedback will be collected and the app will be updated according to these feedback.
- The range of clothes will be expanded. The app will be designed to add a new product database.

1.2.8. Usability Constraints

- The app will have a user friendly UI. Smartphone users will be able to use the app without extra effort.
- The app will include a website to demonstrate the features and how to use it.
- The app will have a support channel which leads to the developer mails.

1.3. Professional and Ethical Issues

The application will not get any data without permission of the user. Also, only required permissions will be obtained from the user. Since the application will store private photos of the user securely, these photos cannot be accessible to anyone other than the user. Even creators of the app cannot see the user's photos. The photos will not be shared with any third party individual or institution.

2. Requirements

2.1. Functional Requirements

2.1.1. Authentication

- There will be register and login features to have authentication. With this authentication each user can customize his/her own experience and sensitive data of the users will be safe.
- In order to use the application features the user needs to be authenticated.
- There will be a remember me option to increase usability.

- Users should have a valid e-mail address to register properly. Given e-mail will be used to activate the profile.

2.1.2. Virtual Fitting Room

- The virtual fitting room will be the main functionality of our application. In order to use our virtual cloth fitting feature the user needs to have a virtual 3D model. This will be asked when registered for the first time and can be added later on as well.
- Users will be able to manage virtual models through this studio. Virtual fitting rooms will have two options.
- First one is real time virtual modeling of the user. Users will be captured by the camera and will be presented to the application real time as a 3D model.
- Second option is modeling users for the database of this application in order to use later. Users can upload their virtual 3D model by following the instructions and try clothes on this model when they want.
- Users can have multiple uploaded 3D models in their profile.
- Users will have to input their body measurements in order to have better results.
- The users will be able to see chosen clothes on themselves virtually via virtual fitting room feature.
- The users can try different combinations of already chosen clothes virtually. They can like the combinations to make them available to reach afterwards and to improve our recommendation system.
- For real time usage, users will be able to navigate through applications by pre-defined motions without using their devices manually.

2.1.3. Available Clothes

- On the main page users will be able to see clothes available for our application.

- The application will provide an interface to upload 3D models of the clothes to our application by using cameras. Our application will have predefined templates of the clothes and this interface will integrate the models of the clothes with templates for better accuracy.
- Brand owners, e-commerce sources, cloth sellers will be available to add their products using this interface and the templates to our database.
- Users can select multiple clothes to try them on virtually at the studio later on.
- Users can like items and can reach to the liked items when they want.
- Users can filter available clothes considering price, color, size, sex, material, type, brand, e-commerce source. Users can save multiple filters to use later on.
- Users can see the item page for detailed information about selected items.

2.1.4. User Profile

- Users will have their own profile including information about them such as registration information, liked clothes, liked combinations, profile photograph, virtual 3D models.
- Users can modify their registration information such as username, e-mail, password.
- Users can access their listed liked clothes, liked combinations.

2.1.5. Size Recommendation

- With this functionality users will be able to get size suggestions for the outfits they have chosen in the virtual fitting room.
- Size recommendations are compatible with the body measurements of the user.
- European, American, and British sizes are used for the size recommendation.
- Detailed size information such as waist and height size for trousers will be given while recommending.

- The preferences of the user will be taken into consideration while recommending the size. For example, a user who likes loose clothes will be recommended to wear larger sizes.

2.2. Non-functional Requirements

2.2.1. Scalability

- Up to 1000 users can use the virtual dressing feature of the application simultaneously.
- Up to 100000 users can sign up to use this application.

2.2.2. Usability

- Users should be able to add a virtual 3D model to the database to be used in this application in less than 3 minutes by following the instructions.
- Users should be able to use this application in less than 10 minutes after they download the app, considering they need to sign up and add a virtual 3D model to the database.

2.2.3. Reliability

- More than %85 of the items in application should be able to fit accurately to the virtual models of the user.
- More than %70 of the virtual models that are added by following the instructions should be acceptable to use in the application.
- The users who want to access the virtual dressing room will be successful in more than %90 of the tries.

2.2.4. Security

- The application will be used by an authentication system. Therefore, sensitive data of the user is not available to other users.
- The system will store passwords and other sensitive data in an encrypted format.

- The data of the user will not be shared with any third party individual or institution.

2.2.5. Availability

- The server maintenance should be scheduled on off-peak times, mostly at 1-2 AM for different region time zones such as Europe or Asia.
- The system should be available at least %95 of the working time.

2.2.6. Performance

- Backend response time of the website (the time starting when an HTTP request is taken and ending when the server starts to send frontend data) should not exceed 200 milliseconds.
- The virtual fitting room should be available to use in less than 10 seconds when it is requested.
- Process of virtually fitting a cloth on a model should not take less than 30 seconds.

2.2.7. Legal and Regulatory Requirements

- The application shouldn't allow users to take virtual photographs without their permission to the terms of service and privacy policy.

3. References

1. Ouellette, C. (2020, January 03). Online Shopping Statistics You Need to Know in 2020. Retrieved October 05, 2020, from https://optinmonster.com/online-shopping-statistics/