SHOP

A smarter way to shop

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ABSTRACT

Nowadays there are a lot of trends to keep up with and brands to keep an eye out for. Many people have their differences when it comes to style and clothing. However, one thing for certain is that all people seek a good deal. Consumers may justify a great price at the sacrifice of quality or they may justify clothing quality at a great expense. Even worse, consumers may be led astray by dupes and knock-offs. Our application addresses these problems head-on by leveraging Artificial Intelligence and Machine Learning to provide clothing suggestions at a bargain. Furthermore, our application condenses all the online browsing in one place. Instead of having various tabs open shopping for the right fit, the correct material, or the preferred brand, our application gathers information from the internet, and based on the user's previous purchases or the user's feedback, will use AI/ML algorithms to offer what the user wants. The user can use customizable features in our application such as setting review-based or price-based suggestions. That way the application can cater to the user's

wants and needs and performs how the user intends it to perform.

Introduction

Many times individuals either struggle or spend an unnecessary amount of time deciding what to buy in terms of clothing. A lot of the time is spent figuring out sizes, colors, brands, fit, material, and other preferences within clothing. With our application, a lot of these problems would be resolved along with producing higher quality results and satisfaction in our users' clothes. When a user logs into the Shop application, they will be presented with a home page asking for personal information from the user. Name, height, weight, age, phone number, email, and address are all things included in the home page. After the user will be prompted to log in using their email address and new password. Afterward, the user will be prompted to set preferences to recommend specific clothing products using AI/ML-based techniques. Preferences that can be set include Color, type of clothing, brand, fit, and price range. When the user selects their preferences, our application will provide a few suggestions of potential products the user would like to purchase. From that point on, it is up to the user whether or not they would like to purchase the product or not. Therefore, our application can quickly recommend products based on user preferences and simultaneously eliminate the time wasted and frustration that comes with online shopping.

Motivating Example

An inspiration for our proposed solution came from the following scenario: Anurag who loves fashion and keeping up with the latest trends and brands find it challenging to shop because of his busy schedule and many commitments. He struggles to find products/brands that match his likeness and fit his price range. In this scenario, Anurag hears about an application called Team Shop - an AI/ML-powered application that provides a fully personalized shopping experience. Team Shop can accomplish this by asking Anurag to input his preferences within certain filters provided by the application, subsequently, the application is then able to give recommendations on products and brands that Anurag may be interested in. Anurag is then able to buy or deliver his product to his house by clicking on the product link and choosing his purchase option. As Anurag purchases products and adjusts his preferences based on his filters, the application can use AI/ML to then better the recommendations provided to Anurag. The Team Shop application is a perfect example of requiring software engineers to work together because of the various components required to make the application functional and user-friendly.

To begin with, the project requires a multitude of unique skill sets such as machine learning, front-end development, back-end development, security, and user interface design. All of these skill sets require multiple software engineers who specialize in their respective fields. Additionally, the development of this app requires agile methodologies to develop the app quickly and effectively which consists of iterative development, constant feedback, and ever-changing planning - requiring software engineers to maintain quick and effective communication with each other. With quick iterations, the software engineering team can test the application and quickly fix bugs/errors as well as refine any functionalities of the application.

Background

For our Team Shop application there are four main components/definitions to keep in mind: the pipe and filter architecture, scrum, event-based architecture, and artificial intelligence. Artificial intelligence is relevant to our application in terms of analyzing user behavior, automating customer service, and optimizing search functions. Pipe and filter is an architectural style that consists of breaking down a process into smaller, independent tasks that each transform data before going to the next step in the "pipeline". This structure is used in processing user data to better the product recommendation system. Our application also utilizes Scrum which is an agile development methodology that uses iterative and incremental progress to improve the work process. Scrum was helpful in terms of team collaboration as regular meetings helped to ensure that all team members were on page in terms of project progress, and were kept up to date on the changing progress requirements if needed. The last main component of our project was event-based architecture which is a design pattern where we were able to use its components for user interaction tracking and a system for sending notifications. This mostly helped with the production, detection, and execution of events.

Related Work

There are many similar applications compared to Team Shop. Applications such as Zalando, Stitch Fix, The Yes, and Thread all use machine learning and AI algorithms to improve the user shopping experience. However Team shop differs from these applications because of our high level filtration system along with it being a singular platform that allows the user to purchase and deliver desired products straight from the platform itself. H&M's AI based fashion assistant is also eirly simmilar to the Team Shop

application. Through research we were able to determine three vital tools and technologies relating to our application: TensorFlow, Elasticsearch, and RabbitMQ. TensorFlow is a well known framework for building machine learning models that can predict user preferences and suggest products which is vital in our application. To help aid that Elasticseach is used to build search engines that can go through inventories to find products that match the users preferences - again something that is needed in our application. Finally, RabbitMQ is a tool used to handle real time data processing which is useful when trying to provide recommendations to user's after they have inputted their preferences.

Description

The Team Shop application used event - based architecture to structure the system. This was helpful in our application because its was highly efficient in its asynchronous updates we could get from user specifications. With multiple group members, it was easier for us to adapt under an event-based architecture and be more flexible if a member was unable to fulfill a requirement so it needed the assistance of another member. As well, when an event was published it was easier to be scaled, updated, and deployed independently into our application. Our application also uses the pipe and filter design pattern. The pipe and filter design pattern

essentially takes a task and breaks it down into smaller steps that pass data from one step to the next. For our application, the pipe and filter design pattern works perfectly because it provides user input filters and is able to process the data derived from the input filters to determine the user's preferences. This is able to give the user clothing and brand recommendations based on their preferences. This design pattern is also helpful in terms of the application development process as each component of the application can be independently developed and altered without affecting other components. To test the Team Shop application we used unit testing as it allowed for us to test each individual component of the application and gave us the opportunity to quickly fix errors and bugs within our application.

Deployment Plan

Deployment typically is the complex part of churning ideas into existence, which is why our group will follow and simplify our deployment plans to the best of our ability to avoid as many roadblocks along the way. Our first step would be to choose a coding language. When it comes to coding the application, our language of choice would either be Swift or NodeJS. Swift is a great option to code applications in the iOS environment and NodeJS provides many different libraries to work with. Our second step involves

the set-up of our version-controlled environment using Git to manage code updates and maintain consistency across the development process of our team. Once our Git repository is set up, our third step will be to implement data pipelines that way there is a controlled method to have preprocessed data and in the future, clean data. Our data would be processed through AWS step functions and stored in enterprise AWS S3 buckets. Our fourth step is to select and train the AI/ML models using the prepared datasets. Because we want to focus on implementing robust AI/ML algorithms within our application, we will regularly test and validate the models against a training dataset to ensure accuracy and performance. Our fifth step is to apply our black-box testing techniques to assess the application's functionality. When it comes to our deployment infrastructure, we would like to utilize cloud services such as Amazon Personalize to leverage our ML model and to ensure the infrastructure can handle large volumes of data and scale accordingly, this will be our sixth step. Our seventh step involves implementing continuous integration/continuous deployment (CI/CD) pipelines to automate the testing, and validation of processes of our model within our application. Furthermore, we will use CI/CD to facilitate regular version updates and improvements to our application. Our eighth step in our deployment plan would be the continuous monitoring of our application and its performance to identify any issues and areas of improvement. Lastly, our ninth step would be to collect user feedback to suit their needs and preferences with our application. Based on this we can iterate versions of our application. This is our nine-step deployment process for our application.

Discussion - Future Extensions

Some future extensions relating to the Team Shop application includes allowing users to leave reviews and ratings on items they purchase - Users would be allowed to rate items out of 5 stars and the data would also assist in getting user feedback for app development. Letting them leave reviews would add a social aspect to the app and allow other users to make decisions based on these reviews. Another addition to our application would be a " add a picture feature" - Which users could upload a picture of an article of clothing they like. The app would then recommend similar articles of clothing. This way, users wouldn't need to fill in filters for color or clothing type and be able to get their recommendations quicker. Limitations regarding the application include data and user privacy, and too high of a dependence on our algorithms. Limitations regarding privacy are a huge concern for our application as that can lead to legal issues as well as loosing trust from our users leading to a decrease of active users. This is why it is

essential to manage our data safely and have regular checks.

Conclusion

In conclusion, the Team Shop application can provide customers/users with a single platform that allows them to efficiently shop for their favorite brands and clothing while saving both time and money. With our application, consumers can also keep up with the latest trends and fashions and find clothing that is a perfect fit for them. Thanks to the personalization provided by filters that are backed by AI/ML algorithms. These filters allow a unique shopping experience for each user while asking them critical information such as style, brand, size, price, fit, and type. Taking this into consideration, our application not only simplifies the shopping process for our users but also lets them make more informed and confident decisions because of our machine learning-backed application.

Works Cited

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