

Project Documentation: Data-Driven Skincare Recommendation System

INTRODUCTION:

In a world where the skincare industry offers a multitude of products promising miraculous results, the challenge for consumers lies in identifying the most suitable products that align with their unique skincare needs and preferences. The Data-Driven Skincare Routine Recommendation System aims to simplify this challenge by utilising data analysis methods to provide skincare product recommendations and evaluate ingredients effectiveness based on previous user ratings. This comprehensive documentation outlines the project's aims and objectives, roadmap, background, specifications and design, implementation and execution, data collection, and conclusion.

Aims and Objectives:

- To evaluate the effectiveness of skincare products through data analysis of user reviews, ingredient profiles and product highlights.
- To develop a recommendation system that suggests evidence-based skincare products tailored to individual preferences and concerns.
- To develop a system that measures the perceived effectiveness of skincare ingredients based on previous user ratings.
- To empower users to make informed decisions about skincare products by providing the best suited products for their concerns.
- To bridge the gap between skincare users and the overwhelming array of skincare products available in the market.
- To compare the products available on the market (as represented in our products database), with the most searched for skin concerns and ingredients and highlight any product gaps.

Roadmap of the Report:

Introduction
Background
Specifications and Design
Implementation and Execution
Data Collection
Conclusion

BACKGROUND:

The skincare industry has undergone remarkable growth in recent times, resulting in an extensive array of products catering to diverse skincare concerns. However, this vast selection often leaves consumers bewildered when seeking the most effective

solutions tailored to their specific requirements. Acknowledging the intricacies of the skincare world, this project strives to introduce a data-driven remedy that empowers users with the knowledge to make well-informed choices surrounding their skincare.

This directly tackles the challenges individuals face in discovering tailored skincare routines that address their unique needs. Many individuals grapple with the daunting task of selecting appropriate products, understanding their skin's distinct requirements, and formulating routines that combat issues like acne, dryness, ageing, or sensitivity. Additionally, considerations about preferred brands come into play. For instance, individuals with acne-prone skin are advised to avoid potentially aggravating ingredients, those with sensitive skin might opt for fragrance-free options, and those adhering to a vegan lifestyle might seek out products aligned with their values.

Central to our project's objective is the creation of a data-driven solution to generate skincare recommendations for the most highly rated products based on skin concern/product highlight.. By offering evidence-based suggestions, we aim to empower individuals in making informed choices about their skincare regimen, ultimately contributing to the attainment of healthier skin.

SPECIFICATIONS AND DESIGN:

Requirements technical and non-technical:

The project merges technical abilities like data work and system development with a strong grasp of skincare needs and user habits. This mix aims to transform how people pick skincare products.

Technical Requirements:

The project entails a comprehensive set of technical requirements, spanning various stages of data-driven solution development

- **Data Collection:** The initial step involves sourcing diverse skincare-related data, including user reviews, product details, pricing and ingredients. This involves extracting data from e-commerce platforms, skincare websites, and social media platforms.
- **Data Preprocessing:** Raw data is often fragmented and inconsistent. Preprocessing involves cleaning, organising, and structuring the collected data to ensure uniformity. This step also includes dealing with missing values, outliers, and data normalisation.
- **Data Analysis:** The collected and preprocessed data goes through in depth analysis. This involves correlation identification, and identification of trends and patterns within the data.
- **Visualisation:** The insights retrieved from data analysis are translated into visualisations. This includes creating graphs, charts, and visual representations that effectively convey ingredient effectiveness, and other relevant information to users.
- **Recommendation System Development:** The core of the project is the creation of a recommendation system. The recommendation system should provide users with

product suggestions based on their skincare needs as well as an evaluation of inputted skincare ingredients based on previous user reviews.

Non-Technical Requirements:

In addition to technical expertise, a profound understanding of skincare concerns, user behaviour, and preferences is essential for facilitating effective recommendations:

- **Understanding Skincare Concerns:** Knowledge about common skincare concerns such as acne, ageing, dryness, and sensitivity is vital. The team should comprehend the varying needs of different skin types and the ingredients known to address these concerns effectively.
- **User Behaviour Analysis:** Analysing user behaviour patterns, including the products they frequently purchase, the reviews they leave, and their expressed preferences, helps build a comprehensive user profile. This insight enhances the accuracy of personalised recommendations.
- **Effective Communication:** The team must be able to translate technical findings and insights into user-friendly language. The ability to convey the significance of ingredient efficacy, sentiment analysis, and recommendation system functionality to non-technical users is crucial.
- **Continuous Learning:** The skincare industry is dynamic, with new products and ingredients frequently emerging. The team should be staying updated on industry trends, ingredient research, and evolving skincare concerns.

Design and Architecture:

The system's architecture encompasses several modules:

- **Data Collection:** Involves gathering diverse skincare product information, including user reviews, pricing, ingredient details, and sentiment scores.
- **Data Preprocessing:** Focuses on cleansing and structuring the collected data to ensure uniformity and consistency.
- **Ingredient Analysis:** Identifies key ingredients associated with positive outcomes for various skincare concerns, enabling the formulation of evidence-based recommendations.
- **Visualisation:** Produces visual representations of ingredient effectiveness, and personalised product recommendations.
- **Recommendation System:** Develops a recommendation system that generates skincare product recommendations and a predicted product rating based on inputted skincare ingredients.

IMPLEMENTATION AND EXECUTION:

Development Approach and Team Member Roles:

Collaboration is key to the project's success, with each team member assigned tasks aligned with their strengths:

Our team will adopt a collaborative approach to ensure the successful execution of our tech-based project on skincare routines and budgets. We'll distribute the workload

based on each team member's strengths and expertise. We'll assign tasks that align with individual skills to maximise efficiency and produce high-quality outcomes. We'll follow a step by step approach, breaking the project into manageable tasks, using the help of Trello.

Regular communication will be key to track progress, address challenges, and make necessary adjustments. We'll schedule weekly meetings to discuss progress, address challenges, and plan the upcoming tasks. These catch-ups will help us stay aligned and ensure smooth coordination. In between, we also maintain constant communication through our slack channel to make sure we keep each other updated.

- Sandeep Kaur - Preprocessing and cleaning data
- Jennifer Hutchinson - undertaking analysis on the Sephora database and online reports using SQL and working on an product rating prediction system based on user ingredient input.
- Akwanwi Ndefru - creating project documentation
- Bisharo Hasan - Powerpoint and visualisations
- Shade Fadojutmi - Content based filteriing

Tools and Libraries:

An array of tools and libraries are employed:

- Database: SQL is utilised to organise the collected data in an efficient manner.
- Code Development: Jupyter Notebook serves as the platform for developing and testing Python code.
- Version Control: Git enables seamless collaboration and code management.
- Visualisation: Matplotlib plays a pivotal role in generating insightful visualisations that enhance data comprehension.

Implementation Process:

- Week 1: Gather and clean data from various sources.
- Week 1: Data preprocessing encompassing data cleansing, structuring, and standardisation.
- Week 2 :Development of a recommendation system.
- Week 2: Refine the user interface, integrate data analysis findings, and perform testing.
- Week 3: Finalise the project, create documentation and submit on the 27th of August.
- Week 4: prepare for presentation on the 1st of September.

Agile Development:

- Iterative Approach:
The project is divided into smaller stages, allowing steady progress and the chance to make improvements along the way.
- Constant Communication:
Regular communication among team members keeps everyone on the same page. This helps solve problems quickly and keeps the project moving smoothly.

- **Regular Reviews:**
At the end of each step, the team reviews what's been done. This helps assess achievements, gather feedback, and adjust plans as needed.
- **Flexibility to Adapt:**
Agile allows the team to adjust plans when things don't go as expected. This flexibility is vital to handle unexpected challenges.
- **Responding to Unexpected Challenges:**
If new information comes up, the team can quickly make changes without disrupting the entire project.
- **Enhanced Collaboration:**
Team members collaborate closely, sharing ideas and knowledge to overcome challenges.
- **Continuous Improvement:**
The team keeps looking for ways to do things better, making the project more efficient and effective over time.



Diagram showing the agile approach

In essence, the project's adoption of agile principles serves as a guiding light, enabling the team to navigate the complexities of development with agility, responsiveness, and a commitment to delivering a successful and impactful Data-Driven Skincare product recommendation System.

Implementation Challenges:

Several challenges might arise during the implementation phase:

- **Data Bias:** Acknowledging and mitigating potential biases in user-generated content.
- **Data Accuracy:** Ensuring the accuracy of data cleansing techniques.
- **Data Integration Complexity:** Overcoming the challenges of integrating diverse data sources through preprocessing and transformation.
- **Dynamic Market:** Navigating the rapidly evolving skincare market
- **DATA COLLECTION:**

Information Needed:

- The project requires an assortment of data to be collected:
- Skincare product information, including ingredients, pricing, and brands.
- User reviews
- Ingredient details and their efficacy in addressing specific skincare concerns.
- Most commonly searched skin concerns and skincare ingredients.

Available Information and data sources:

- The data is sourced from a variety of platforms:
- E-commerce platforms and online retailers.
- Skincare-specific websites offering detailed product information.
- Data from the kaggle site

Data Collection Process:

Data collection involves multiple approaches:

- API Usage: Leveraging APIs to retrieve specific data points.
- Manual Extraction: Manually collecting data from sources that do not offer automated access.

CONCLUSION:

The Data-Driven Skincare Routine Recommendation System embodies a varied approach aimed at streamlining the way skincare users approach product selection. By harnessing data analysis techniques, ingredient efficacy, and visualisation, the project empowers users to make well-informed skincare decisions. The collaborative efforts of a diverse team, coupled with agile methodologies and a clear roadmap, culminate in the creation of a tool capable of bridging the gap between skincare concerns and effective product choices. As the skincare industry continues to evolve, this recommendation system aims to continue guiding users toward skincare products that cater to their concerns that deliver tangible results.