# [SkinFusion]

## Hybrid Skincare Product Recommendation System: A Multi-Criteria Approach with Aspect-Based Sentiment Analysis (ABSA)


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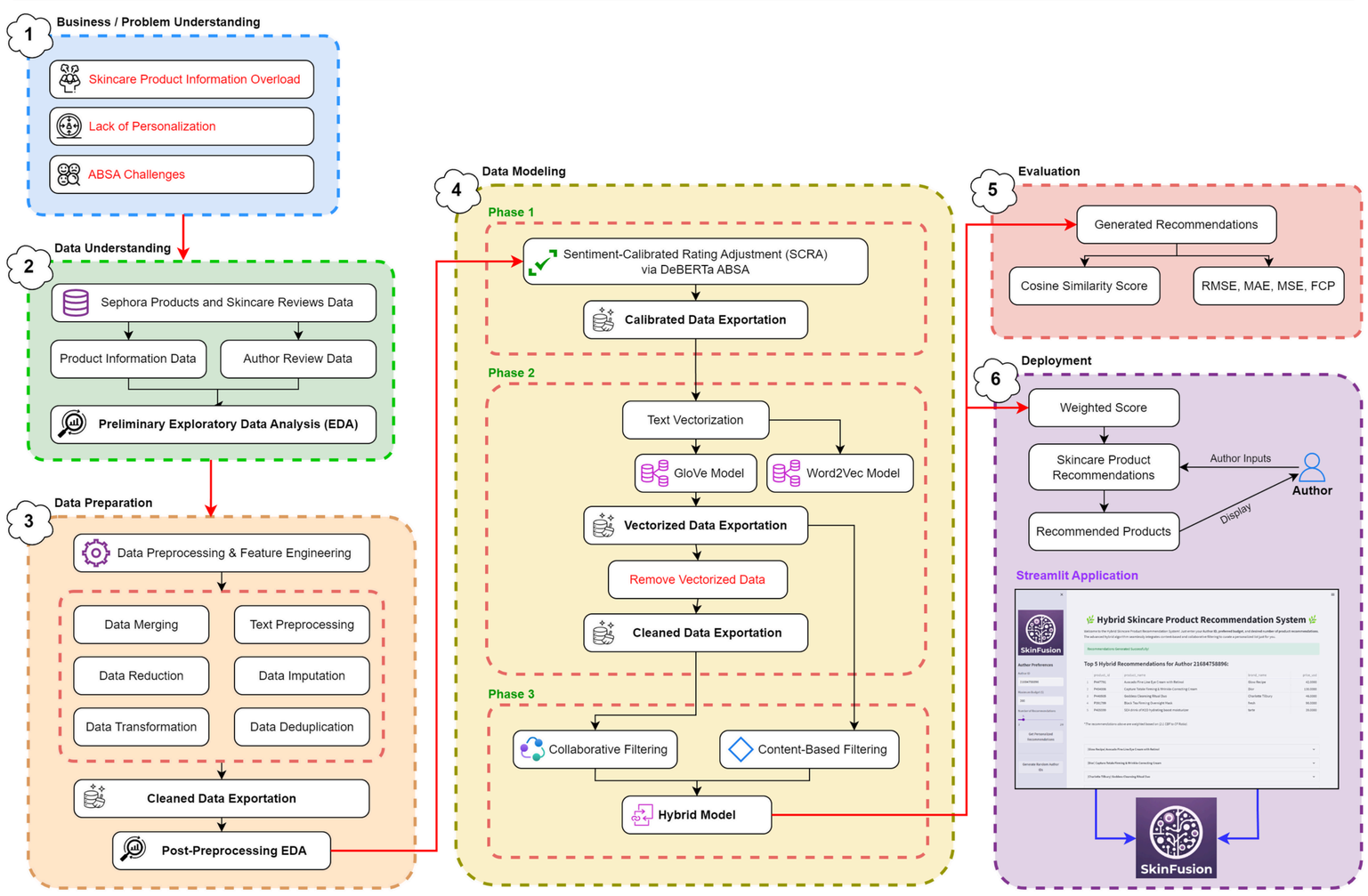
## Introduction

Due to the overwhelming amount of skincare product choices, the lack of accuracy and personalization, and the challenges faced in Aspect-Based Sentiment Analysis (ABSA) in skincare product recommendations, this project utilizes a hybrid approach. It aims to provide authors with personalized skincare product recommendations through a novel Sentiment-Calibrated Rating Adjustment (SCRA) approach. SCRA adjusts ratings to provide more accurate representations, eventually providing more tailored and personalized recommendations.

## Objective

- To **utilize aspect-based sentiment analysis (ABSA)** for **refining product ratings** by analyzing the sentiment expressed in skincare product reviews.
- To **identify the best machine learning algorithms** for recommending skincare products.
- To **develop a hybrid recommendation system** that combines collaborative filtering, content-based filtering, and sentiment insights obtained from ABSA techniques.
- To **deploy the hybrid recommendation system** on a website.

## CRISP-DM Methodology




## Problems

- **Information Overload** in Skincare Product Choices
- **Lack of Accurate and Personalized** Product Recommendations
- **ABSA Challenges** in Skincare Products

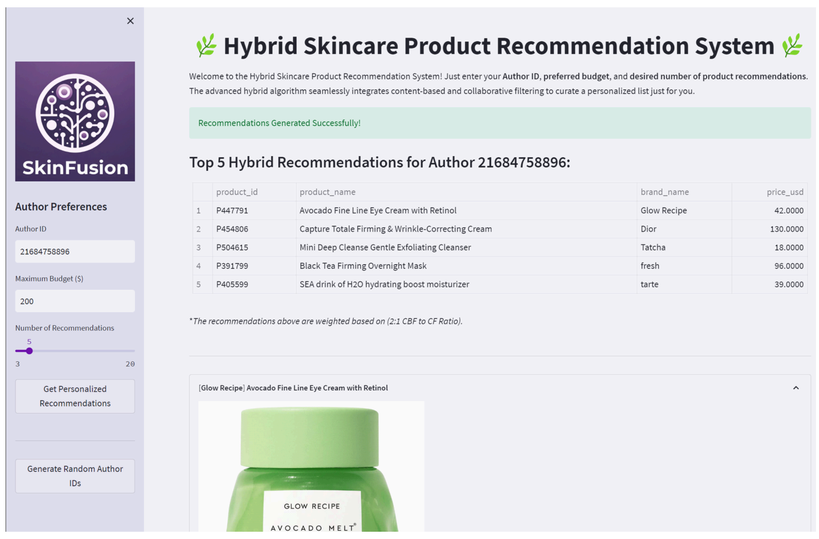
## Results

| Metrics | RMSE | MAE | MSE | FCP |
|---|---|---|---|---|
| Initial SVD Model | 0.5565 | 0.3071 | 0.3096 | 0.5244 |
| Optimized SVD Model | 0.5332 | 0.2844 | 0.2843 | 0.5689 |
| Initial KNN Model | 0.6223 | 0.3076 | 0.3872 | 0.5576 |
| Optimized KNN Model | 0.5739 | 0.2868 | 0.3293 | 0.5110 |

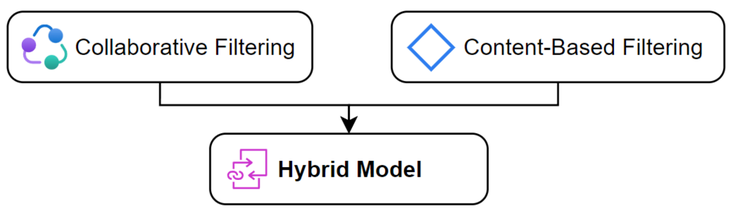
**For Collaborative Filtering:**

The **hyperparameter-tuned SVD Model** has achieved a **RMSE** as low as **0.5332**.

## Solution - SkinFusion




## Hybrid Model (Weighted)




Hybrid Recommendation is displayed as CBF to CF recommendations (**2:1 ratio by default**):

- **Reduce the author's cold start problem.**
- **Align more with the author's personal preferences.**

## Conclusion

The successful deployment of SkinFusion using a **weighted hybrid approach** successfully **integrates ABSA** to enhance skincare product recommendations. Ultimately, SkinFusion aims to **revolutionize the skincare industry** by providing a technologically advanced solution that not only meets but anticipates user needs, thereby greatly **enhancing customer satisfaction**.