A Machine Learning Approach to Nutritional Analysis

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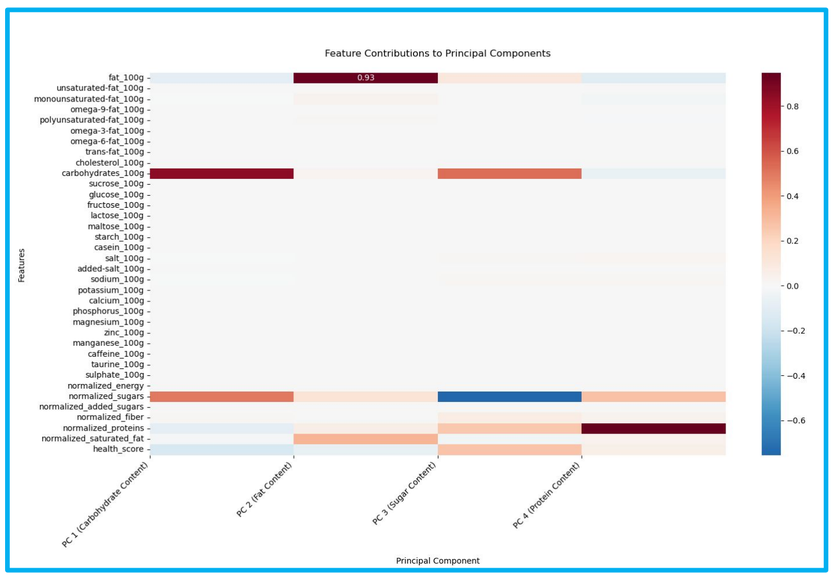
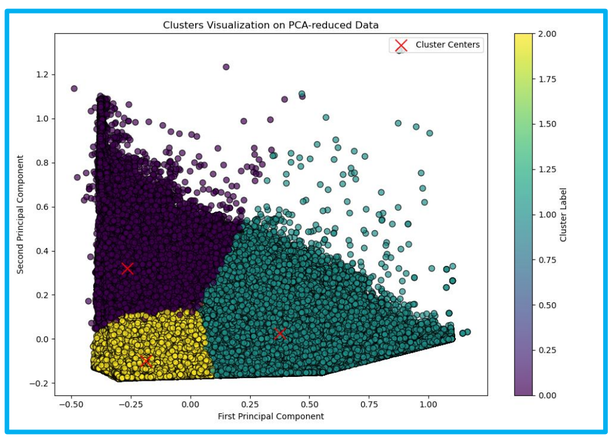
Introduction

To meet the growing need for educated dietary decisions in the era of convenience, the project uses mobile and machine learning technologies to provide immediate nutritional insights. The goal is straightforward, to provide consumers with an intuitive Android app that uses barcode scanning to group food items into clusters that are health-conscious. Through the conversion of complicated nutritional information into easily comprehensible health ratings, encouraging consumers to regularly integrate healthier food choices into their everyday purchasing experiences.

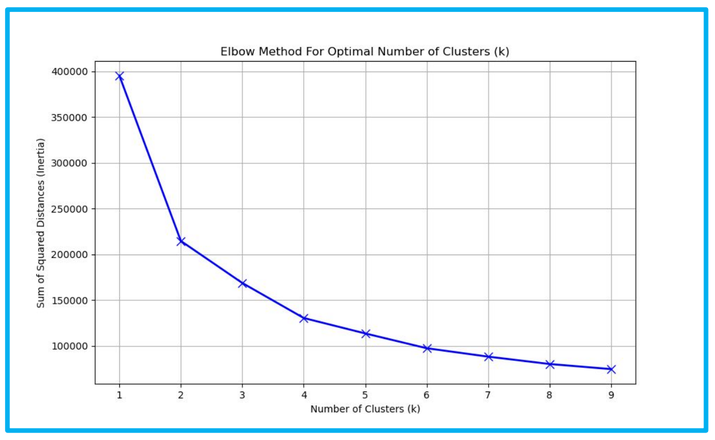
Clustering



Heatmap represents the contribution of each feature to the principal components



Clusters Visualization on PCA
(Principal Component Analysis)

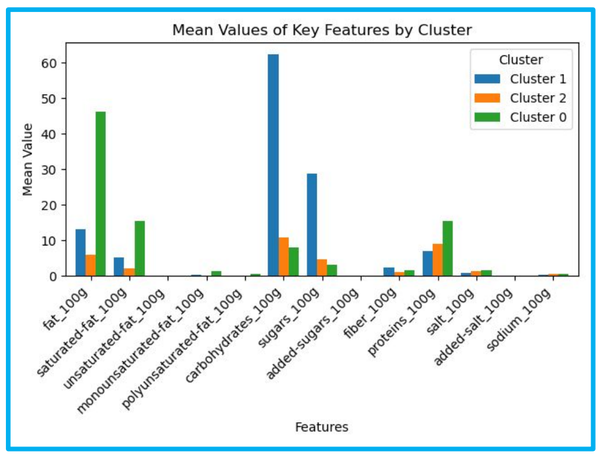


Elbow method explaining optimal number of clusters.

The clustering results supply the recommendation engine within the app, which helps users receive basic nutritional advice based on the product scanned. By defining these clusters, dietary decisions can be addressed in a more refined way, with data serving as the foundation for health optimization.

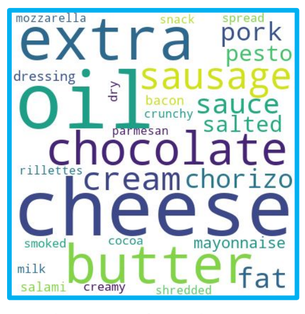
Sample Analytics

The bar chart showcases the model's feature analysis, with mean values to highlight the significant nutritional differences while the word cloud for individual clusters helps us to identify most common words from product name. Combining everything together we are able to more informally make a decision regards which Cluster belongs in which food type category (Good/Bad, consume in Moderation)

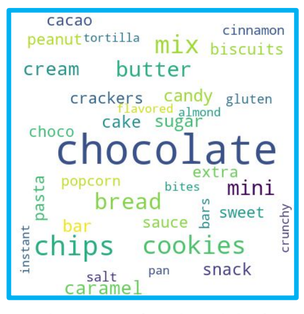


Sample graph of summary statistics

Generated Word Cloud from results of NLP (Natural Language Processing) from individual Clusters



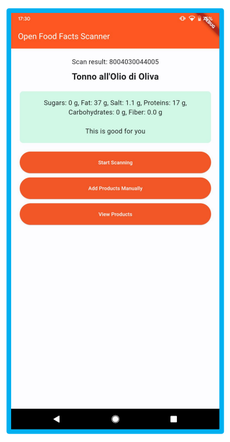
Cluster 0 (Moderate Consumption)



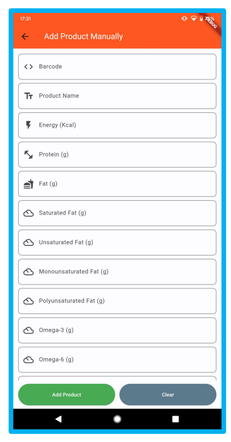
Cluster 1 (Unhealthy)

Cluster 2 (Healthy)

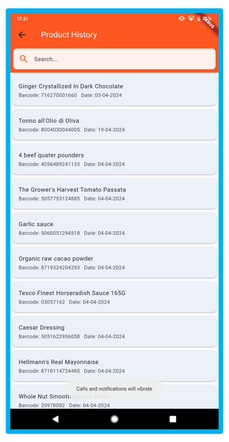
Application



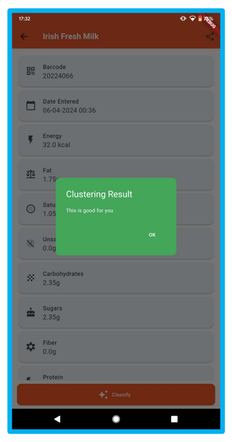
Main Menu



Manually adding product

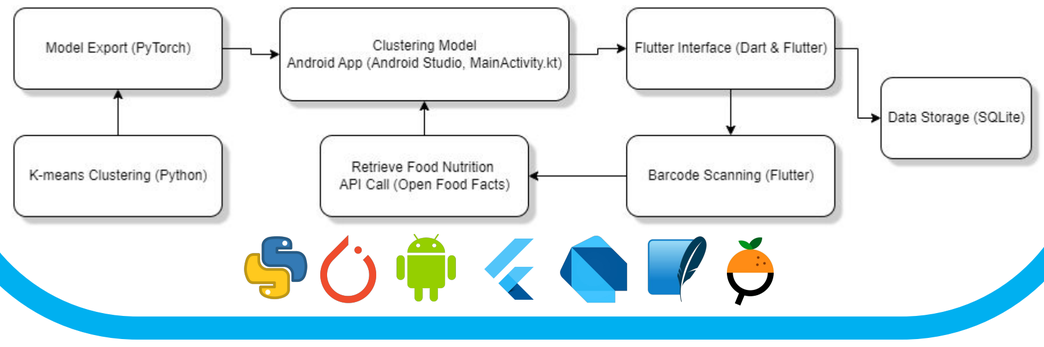


Product History



Detailed Product History

High-level architecture diagram



Conclusions

Integrating machine learning models for data clustering into mobile applications can greatly simplify nutritional information, making healthy choices accessible and straightforward. The successful development and implementation of the barcode scanning feature, coupled with the nutritional clustering model, underscores the potential of technology to positively influence public health. By providing a clear classification of food items into health-oriented clusters.

Acknowledgments

Special thanks my wife and child for their patience.