Executive Summary

Smart Bites: Nutritional Clustering and Recommender System for Healthier Food Choices

Margvinatta Senesie | Stockton University | DSSA 5302 Final Practicum

In today's world, chronic illnesses like obesity, heart disease, and diabetes are increasing, many of them linked to poor dietary choices. But with food labels that are often complex and misleading, it can be difficult for consumers to understand what's truly healthy. This project, titled **Smart Bites**, set out to simplify nutrition guidance by analyzing thousands of common food items and grouping them based on nutritional value.

Using a public nutrition dataset containing 8,789 foods, I cleaned and standardized nutrient data and created a **custom health score** that rewards high protein and penalizes excess fat and sodium. This scoring system allowed me to rank foods based on overall nutritional quality. I then grouped similar foods into three clear categories: calorie-dense processed foods, mixed-nutrient items like cereals, and high-protein, low-fat items like eggs and protein powders.

The results are presented using simple, intuitive visuals including scatter plots, radar charts, and word clouds. I also developed a working **recommendation tool** that, when given a food item, suggests healthier alternatives with similar use or taste. For example, when tested on a low-rated item like meatless frankfurters, the tool successfully recommended lean meats and protein-rich foods with significantly better nutritional profiles.

Although the interactive app I created runs locally, it could not be deployed online due to technical limitations. Nevertheless, the analysis and tool are fully functional and open for review on GitHub.

This project shows how nutrition data can be used to build tools that help everyday people make smarter, healthier food decisions quickly and without confusion. With

further development, Smart Bites could evolve into a mobile app or online platform to support personal and public health goals.