Project Main Field: SOFTWARE

Project Thematic Field: FOOD AND FOOD SUPPLY SAFETY

Project Title: ARTIFICIAL INTELLIGENCE-BASED FOOD PREFERENCE ANALYSIS

Summary:

Official reports indicate that one-third of the world's food production is wasted. Despite efforts to educate people to reduce waste, the scale of food waste remains unchanged. The project aims to use machine learning to adjust the quantity of meals in places like hotels, hospitals, and schools based on the interest shown in the meals. Data for this project was collected from the Ankara Pursaklar Science High School cafeteria for 28 days as of October 1, 2021. Daily counts of people eating were recorded and combined with the day's menu to create a table. Using the collected data, a model was created using the Python programming language and multiple linear regression. A preference coefficient was established for each meal, providing numerical data on how many people are expected based on future menus. The modeling results achieved an accuracy rate of 99%. The success suggests that this approach could be extended to other areas, such as different cafeterias, hotels, and mass dining areas, to reduce waste.

Keywords:

Food waste, Machine learning, Python, Information technologies, Food safety, Artificial intelligence, Data analysis

Objective:

Waste is a significant issue in areas where mass meals are consumed. Reasons for this include uneaten food, varying meal preferences, and the inability of meal providers to accurately predict consumption. The project aims to plan for waste reduction in places with mass meal consumption based on the meal preferences of target groups. Research conducted in this context focused on encouraging people to take only what they can eat to reduce food waste. However, this alone is not sufficient to prevent the production of unwanted meals.

Introduction:

According to the Turkish Language Institute, waste is defined as "spending money, time, effort, etc., unnecessarily." Reports indicate that one-third of the total global food production (1.3 billion tons) is wasted annually, with an economic value of $990 billion (FAO, 2019). Considering that one out of every three plates goes to waste worldwide, and three children die of hunger every minute, with 60% of wasted food believed to be reclaimable (TÜİK, 2018), the severity of the situation becomes evident. In facilities where cafeteria-style meals are prepared, the quantity of production is planned based on the anticipated number of consumers. However, this number does not accurately reflect the number of people who will consume the prepared meal. Using artificial intelligence, the project aims to analyze the meal preferences of a specific group and make predictions for future meals based on the historical meal preference habits of that group.

Method:

Machine learning, as a branch of computer science, originated in 1959 from numerical learning and pattern recognition studies in artificial intelligence. It relies on machines and computers using data from past experiences to model and predict situations not encountered before. Various methods are used for data analysis and modeling in artificial intelligence, and in this study, multiple linear regression is deemed appropriate. Multiple linear regression involves associating one dependent variable with multiple independent variables. In this study, the dependent variable (Y) represents the daily number of meals consumed. The study analyzes the meal preferences of a specific sample group of students from Ankara Pursaklar Science High School. The data is transformed into a dictionary structure for analysis, and the Python programming language is used for efficient and reliable analysis.

Results and Discussion:

The project successfully achieved its goals, with a high level of accuracy in predicting the number of people consuming each meal. The model developed has the potential to be applied in various settings such as hotels, hospitals, and schools to reduce food waste significantly. The success of the model suggests potential economic contributions in these contexts.

Project Timeline:

\*\*table\*\*

The machine achieved a success rate of 92%, with a deviation of approximately 9 in the number of people. The values were calculated using the r2\_score and cross\_val\_score functions of the sklearn library in Python.

Conclusion:

The project successfully demonstrated that machine learning-based data analysis can predict the target number with a 1% deviation. This approach can be especially beneficial in places with large crowds, effectively preventing food waste and contributing to the economy. Suggestions for future work include expanding the data set for more accurate calculations, conducting comprehensive studies on students' meal choices in mass dining areas, and encouraging hotels to use the model for meal preparation.

References:

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