**REPORT WRITING FORMAT**

**Team Name:** NEWBIE TIGER

**School Name:** Princess Chulabhorn Science High School Pathumthani, THAILAND

**Team Members:**

Mr. Waranthorn Chansawang

Mr. Thunchanok Watthapornsiri

Ms. Pimmada Sawangwong

Ms. Parinporn Chairattana-Apirom

**Title of Invention:** Food Waste Controlling Program for Restaurant (FWCR)

|  |
| --- |
| **Problem Statement** |
| Nowadays food waste is an urgent problem that many countries try to reduce by promoting campaigns that emphasize the importance of this problem.Small amount of waste can become enormous if it combines together. More than 4.3 billions ton of food, worth over 400 billion dollars, are wasted each year, while 8.05 million people all over the world are malnutritious. The study shows 33% of the world's food waste is from restaurant, which is the second biggest part after food waste from residential. A noticeable effect on the economy is a higher expense for garbage disposal. The dumped food in large quantities shows the inefficient investment of resources and also affect the environment because most of the food has been destroyed by landfill, which causes Methane gas that results in a Greenhouse effect that is 25 times stronger than Carbon dioxide, etc.We have invented "Food Waste Controlling Program for Restaurant" to help reducing food waste from restaurants. |
| **Relevance to theme** |
| "Sustainable Development Goal 12: Responsible Consumption and Production”   * Reducing food waste.   + Nowadays, 1/3 of all food produced , equivalent to 1.3 billion tons worth around $1 trillion , ends up rotting in the bins. Many of them come from the leftover ingredients in the restaurants. Moreover, those ingredients have never been cooked before and was dumped uselessly. Plus, destroying food waste by landfill will create Methane gas which can made the greenhouse effect issue getting worse. Our program, Food Waste Controlling Program for Restaurant, is created in order to reduce food waste and the problems that will come after. * effective use of raw materials   + By using our program, restaurant owner can estimate the amount and buy the ingredients with the exact number that will create least food waste. Which means all grams of the ingredients are used and none are abandoned. |
| **Description of invention** |
| Our innovation is the program that helps predict the amount of consumer for calculate ingredients used in cooking in store for reducing food waste problems in restaurants. The working of the program starting with data collection of the amount of ingredients used in a restaurant for a period of time. Then, creating a database of external factors which are temperature, humidity, precipitation and population density according to the Meteorological Department’s forecasting. Rain may cause less people to eat out and later leads to wasting excess cooking ingredients. The data will be collected as .csv file and extract them to calculate and predict by Machine Learning (ML) which uses Regression perform on environmental variables (temperature, humidity and chance of having rain) to predict the number of customers and amount of ingredients needed for later time. The results will help to manage the amount of ingredients used for cooking worthy and efficiently. |
| **Originality** |
| Food waste crisis is one of the world’s important problems which developed countries and developing countries are facing with. In each year, 4.3 billion tons of food all over the world were thrown away and become a food waste. This is about 1/3 of the food produced for human (Gustavsson et al., 2011). Even in European Union (EU), which is known as developed countries, also has such a large amount of food waste, 89 million tons per year or 180 kg per person per year in average. In the past, many countries have done many campaigns to reduce the food waste problem such as charging money according to the amount of waste, donating the food, and segregating the waste. But those are the way of solving symptoms, not from the root cause. So, we are thinking of how to solve it from the root cause focusing on the situation in the restaurant. To reduce the food waste in the restaurant we create a program to calculate the amount of ingredients that the restaurant should buy per day. Machine Learning (ML) was used in the program to collect the information such as amount of ingredients and other factors affecting the number. Then, these factors are calculated, and those numbers are used for predicting the amount of ingredients the shop should buy. In order to reduce the number of food waste from restaurants. |
| **Diagram with specifications** |
|  |
| **Cost analysis** |
| No cost used because our innovation is made by using the software. |
| **Benefits** |
| 1. Food waste which comes from the restaurants will be reduced. 2. Restaurant owners can estimate the number of ingredients they should buy per day more accurately. |
| **Conclusion and Future Projects** |
| 1. Since the database of sale’s information is based on only one selected restaurant in Bangkok, the accuracy of the prediction is not in reliable level. We are looking forward to allowing account creation for restaurants. Their sales information will be collected daily and customized the own database make the program can customize. So, our prediction will be more accurate and up to date. 2. Our interested external factors are daily temperature, humidity and raining chance. Not only quantitative factors, which are listed earlier, but also qualitative factors that affect the number of customers. Special holidays, days of week, open hours and population density in the area will be used in the calculation. |
| **References** |
| - “Food waste” the big problem that been unheeded  https://ngthai.com/environment/17253/food-waste-crisis/?fbclid=IwAR2H9SX6JkJoJrS3acO0\_tJZlSXfHhrTww-5x\_nq0zoUnGwAGgLtJrv9rGk  - Goal 12: Ensure sustainable consumption and production patterns  https://www.un.org/sustainabledevelopment/sustainable-consumption-production/?fbclid=IwAR37kpqqt8gUv\_eQ1xHCheA8ge9DYv\_CqKt6I8\_ttrHuCLbnNsZH\_S7\_nm8  - Gustavsson, J., Cederberg, C., Sonesson, U. (2011). Global food losses and food waste.  - Meteorological Department  https://www.tmd.go.th/index.php?fbclid=IwAR0kQGMQ\_GakxDs3zXpfQiXixjdZjNjhPya-HWOjBA04XBeE2PnXlds59qk  - Multiple Linear Regression Analyze Procedure  https://sites.google.com/site/mystatistics01/regression-correlation-analysis/multiple-linear-regression-step?fbclid=IwAR2YuFJfu\_tcM7cPDi7xFUaZRii8zxjIufQpNTRkNYA7NvAra\_xt4Gv8tCA  - Tutorial: Deploying a machine learning model to the web form https://blog.cambridgespark.com/deploying-a-machine-learning-model-to-the-web-725688b851c7 |