A COMPARATIVE ANALYSIS OF FOOD HABIT AND NUTRITION ON FOOD IN BANGLADESH USING MACHINE LEARNING

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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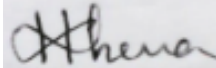**JANUARY, 2022**

APPROVAL

This Research Project titled "**A Comparative Analysis of Food Habit and Nutrition on Food in Bangladesh Using Machine Learning**", submitted by Md.Tofael Ahmed , ID :181-15-10782, Jannatul Ferdaous,ID:181-15-11171 And Md. Kamruzzaman, ID: 181-15-11113 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 06-01-2022.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mst. Eshita Khatun, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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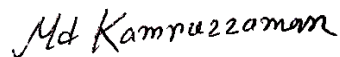Lecturer
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ABSTRACT

Day by day, our lifestyle has changed. From them, food habit is one of them. Our research mainly focuses on the eating/food habits of the people in our country and finding Nutrition in their eating habits. For a healthy and beautiful nation, our food habits must be correct. Just as good eating habits keep our bodies healthy and beautiful, bad eating habits make us sick. So, after collecting a dataset of food habits we find, we can learn about the food tastes of the people of our country research. We collect 1200 data from different ages of people about their daily food habits. We divided our data into Breakfast, Lunch, Snacks, Street food, Dinner & sweets. We will try our best to provide the best knowledge About Nutrition on food habits because it is impossible to develop Bangladesh without a healthy nation. We divided our research into two steps. (i) Finding food habits; and (ii) synthesizing information and finding Nutrition on them. An annotated reference list is included for ease in finding another helpful guideline. We use seven algorithms. We are using different types of algorithms, Decision Tree, KNN ADA boosting classifier, Logistic Regression, Bagging Classifier, Gaussian Naive Bayes, Extra Trees Classifier.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Food is one of the five basic needs of the people of Bangladesh. And human habits are formed to meet basic needs. We are going to inform you about the eating habits of the people and their nutrition and quality. Food is essential for those who have souls. Because if you want to survive, you have to have food in your stomach. And there is no end to the variety in human food. Allah Ta'ala has made almost everything halal for mankind except for certain foods. Alhamdulillah!!

According to the geographical location of the earth, there are several variations in the human diet. As Bengalis, we may be satisfied with pulses and rice, but in other countries outside the country, we are satisfied with the food of each nation. Similarly, in our country also many variations can be noticed in different regions.

For example, people all over the country are crazy about rice, but some people get satisfaction from many when they get biryani. Some people eat four meals a day instead of three. If they don't play anything in the afternoon, something remains incomplete. Again, as Bengalis, they sleep after lunch and are not satisfied without rice. Some people go to restaurants for dinner and eat all kinds of foreign food. Again, some people can tolerate food prepared on the side of the road.

Our country is rich in green crops. The food production of this agricultural country is very rich. Rivers, canal and sea are full of sea fish. And the soil of Bengal should be harvested with both hands.

Again, there are many non-vegetarian producers like chicken and cow in the house. On the other hand, there are some foreign foods. At different times, some cultures outside the country have infiltrated our country on a large scale.

As a result, food diversity and food habits are changing a lot. The use of spoons instead of hands is on the rise and even ,in cooking there is diversity. One thing that exists in the midst of all this is human eating habited at the bend of the road, various restaurants have sprung up in line with the times. There is a list of different types of food in the leaf menu.

However, most of the time we are extremely prone to food on the side of the road. So, our aim is to discuss the eating habits and qualities of the Bengali people in fish and rice.

1.2 Motivation

Food is one of the most important needs for living beings Starts day Start with eating food in the morning and end with eating dinner before sleep. Food is that things which provide us nutrients. Nutrients provides energy, growth and the function of body as breathing, keeping warm and repair our whole body. Keep our body Healthy. Different countries have different types of food habit. We working on our country food habit and finding nutrients. Because for bad food habit people face a lot of diseases.

At present the biggest problem is people get various types of diseases and at the root of it is lack of proper eating habits. That is why we are working in food habit. Based on that eating habits of our country we work on it. People eats various food and which kind of foods they eat and we will defend how much nutrition there. We will work on how useful those foods are for us and how much food we need to keep our bodies healthy. Most of the people of our country Don't know about nutrition of food. When we define the food habit we find out Good food habit people and Bad food habit people. And which food are not good for our body. By our research people can easily know about which nutrition are on which food. Which are good Food which are not. Also, how much food they need to take regular.

1.3 Objectives

There are eating habits where life exists, and there are many rules for taking food. The ecosystems of animals other than humans are different. People's food list and food intake

are different. A wide range of effects can be observed on the diversity and quality of food based on geographical location. Different societies and cultures adopt different types of food and there are many variations in food. Different types of food at different times. People do not eat the same food every time. Again, not all foods are the same. Different foods have different qualities.

If we want to choose the most nutritious food on the food list, then we must know the amount of nutrients present in the same amount of food. And based on that, the place in the list is determined. It is very difficult for people to live only by eating fruits. So, we as people of South Asia place more importance on rice and we have enough demand on a balanced diet. There is no shortage of balanced food in agricultural Bangladesh. The only problem is providing adulterated food in the hope of making more profit.

There is no end to the research on food as the first basic human need. Researchers say that it is important to eat breakfast every day and that food should be eaten with satisfaction. Fruits, vegetables, sweets should all be on the food list.

1. Eat breakfast daily
2. Eat mindfully
3. Stay hydrated
4. Snack
5. Eat dessert

And according to the quality of food, its value can be noticed. We have tried to make some decisions by researching on eating habits and qualities, that is what I will try to present to you Insha'Allah.

1.4 Expected Outcome

Through this we will be able to know about our conventional food and Food habit of regular day. Successful result of existing or new algorithm for getting accurate result. This research will help us to predict the risk of becoming bad food habit. Data set for Food habit in the context of Bangladesh and Nutrition. We didn't find accurate type of works and dataset in journal. We made our data set by own invention.

Through this we will be able to know about our conventional food and Food habit of regular day. Successful deployment of existing or new algorithm for getting accurate result. This will help people to have a good food habit. We find out about the amount of nutrients in a food. Find out which foods are harmful to our health and which foods are good for our health. From this we can good food habit for good health for daily life.

1.5 Report layout

This research paper contains the following contents as given below:

- Chapter one explains the introduction motivation Objective of the research and expected outcome.
- Chapter two discusses related works, research summary, the scope of the problem, and challenges.
- Chapter three contains the workflow of this research, data collection procedure, Data Preprocessing, Dataset Description, Implementation Requirements statistical analysis, and implementation tools.
- Chapter four covers Experimental Results & Analysis, Descriptive Analysis.
- Chapter five covers Why Nutrition and Describe nutrition on research food habits.
- Chapter Six covers this research's impact on society and Impact on The Country.
- Chapter Seven contains a summary of this research work Scope for Further Developments and Limitations.

CHAPTER 2
BACKGROUND

2.1 Related Works

This literature review section of this research paper is going to present the near past related works done by some researchers on food habit and nutrition on food. We have followed and studied their work to understand the processes and methods expressed by them.

This cross-sectional study involving 327 university sport aged 18-26 years was undertaken to gauge the food habits, health conditions and healthy life vogue perceptions of University sport in People's Republic of East Pakistan. Majority of sport Greek deity meals and breakfast regularly and most popular to want meat and sustenance than fruits and vegetables. Males had a lower consumption of vegetables, sustenance and meat whereas they'd following intake of wet drinks, tea or occasional. although females were further acutely aware regarding their balance nutrition and avoirdupois, they were further anxious (OR = one.35) but less depressed (OR = zero.83) additionally as felt further physical health problems like fever (OR = 3.83), metastasis (OR = one.80) and disagreeable person problems (OR = one.73) than males. Overweight sport reported the simplest consumption of sustenance (73.17%), meat (80.49%) and soft drinks (82.93%) but the bottom consumption of vegetables (31.71%). There are different between food habits and major health problems, like depression, disagreeable person problems and overweight were collectively discovered. As the better dietary habit ends up in higher| the higher health consequently higher performance, it is very important to produce correct data regarding nutritious foods and healthy life vogue to the sportsman.[1]

Little is thought regarding abstinence practices and dietary changes throughout Ramadan in low- and lower-middle-income countries. though pregnant girls square measure exempts from abstinence, they'll still quick. this is often of interest as dietary habits throughout maternity could have an effect on the event of the unborn kid. in an exceedingly community-based sample of young girls in rural Sylhet division, Bangladesh, we tend to

delineate abstinence practices and beliefs (n = 852). we tend to conjointly examined reported food cluster consumption and minimally adequate dietary diversity for girls (MDD-W) by Ramadan incidence (n = one,895) and by abstinence adherence (n = 558) victimization supply regression with Hindu girls. During Ramadan in 2018, seventy eight of pregnant Muslim girls fasted on a daily basis. Over eightieth of Muslim girls believe that they must quick throughout maternity and over five hundredth expect positive health effects on the mother and therefore the unborn Child. we tend to found sturdy proof that Muslim girls have additional numerous diets throughout Ramadan, with higher odds of MDD-W (OR [95% CI]: five.0 [3.6, 6.9]) and magnified consumption of pulses, dairy, fruit, and huge fish. Dietary diversity magnified to a lesser extent on non-fasting days throughout Ramadan. Ramadan seems to boost dietary quality in each abstinence and non-fasting Muslim girls in an exceedingly rural population in BanglaDesh. These results shown that interpret findings from studies on Ramadan throughout maternity on later-life outcomes and therefore contribute to a much better understanding of intrauterine influences of maternal nutrition on healthy kid development.[2]

This analysis was carried out in seven districts of Tejgaon, known as the center of Dhaka, the capital of Bangladesh, where 41 police stations are located. Accommodation for street children is quite common in this part of Dhaka. A well-structured form was developed that included each closed and open survey to collect information through face-to-face interviews with respondents. A sample of 80 street youths with a quantitative relationship of 90 boys and 100% girls was collected using the chosen simple sampling method. The results showed that there were about 65 skinny street children. Nearly 77.5% of children ate three meals and 22.5% of children ate only twice a day. Most of the young people in the study (85%) had the habit of washing their hands before eating a healthy meal. The results also show that about 60.5% of street children are ready to take a bath every day and almost 61. They suffer from completely different diseases in the last three months before starting the farm [3]Little is known about fasting practices and dietary changes during Ramadan in low- and lower-middle-income countries. Although pregnant women are exempt from fasting, they may still fast. This is of interest as dietary habits during pregnancy may affect the development of the unborn child. In a community-based sample of young women in rural Sylhet division, Bangladesh, we described fasting practices and

beliefs (n = 852). We also examined reported food group consumption and minimally adequate dietary diversity for women (MDD-W) by Ramadan occurrence (n = 1,895) and by fasting adherence (n = 558) using logistic regression with Hindu women as a seasonal control.[3]

Little is known about fasting practices and nutrition modification during certain periods of Ramadan in low- and middle-income countries. Although pregnant girls are exempt from fasting, they will be fast nonetheless. This is a preference, because the conduct of nutrition at a certain stage of pregnancy can also affect the improvement of the fetus. In a purely community-based model of young girls in a rural area of Sylhet, Bangladesh, we identified vegetarian beliefs and practices (n = 852). We also examined the indicated planned intake and the minimum tolerable nutritional range for girls (MDDW) using the month of Ramadan (n = 1,895) and using the fasting (n = 558) using logistic regression with Hindu girls as seasonal controls. During the month of Ramadan 2018, 78% of pregnant Muslim girls fasted every day. More than 80% of Muslim girls admit that they need to accelerate their pregnancy at some point, and more than 50% expect effective results for the physical condition of both mother and fetus. We found strong evidence that Muslim girls had a variety of diets at one point in time during Ramadan, with a better MDDW ratio (OR [95% CI]: 5.0 [3,). 6, 6,9]) and prolonged consumption of legumes, dairy products, fruits and large fish. . The food range has expanded to a smaller amount on non-fasting days at some point during Ramadan. The month of Ramadan seems to improve the nutritional quality of every fasting and non-fasting Muslim girl in rural Bangladesh. These effects help to explain the results of the Ramadan study at a certain stage of pregnancy in terms of subsequent lifestyle consequences and, for this reason, contribute to a better understanding of the intrauterine effects of these factors. maternal nutrients to the patient's body. baby.[4]

[5]

2.2 Challenges

At first, when we start our work, we think It's will be easy for us. But in life works, we face so many problems. When we go to collect data, the man was not kind to us at all. They didn't want to talk to us and nobody wanted to give us the information. This work is hard

to collect information from the field as like as neighborhood, bus &train stations and so many different places. Then we have to learn about different algorithms and colab,jupyter, anaconda, etc. Our supervisor helps us to familiar with these tools. After that, we start our working hardly and smoothly.

CHAPTER 3
IMPLEMENTATION AND TESTING

3.1 Data Collection

We need to collect data for working purpose. Because of that, we can easily Identify our food habits. We have collected our Data from our friends, neighborhoods and in different places. It is the most challenging task for us. After research our topic we created our form than we have visited many places and collect data of food habit. We have collected 1200 data during the whole Collecting time to make a better dataset for our research. There are 828 male and female 372.

Here we given which things we think to collected our data:

1.Gender

2.Age

3.Feelings

4.Breakfast

5.Lunch

6.Dinner

7.snacks

8.street food

9.Deserts.

3.2 Research Methodology

Here we give research methodology of our research :
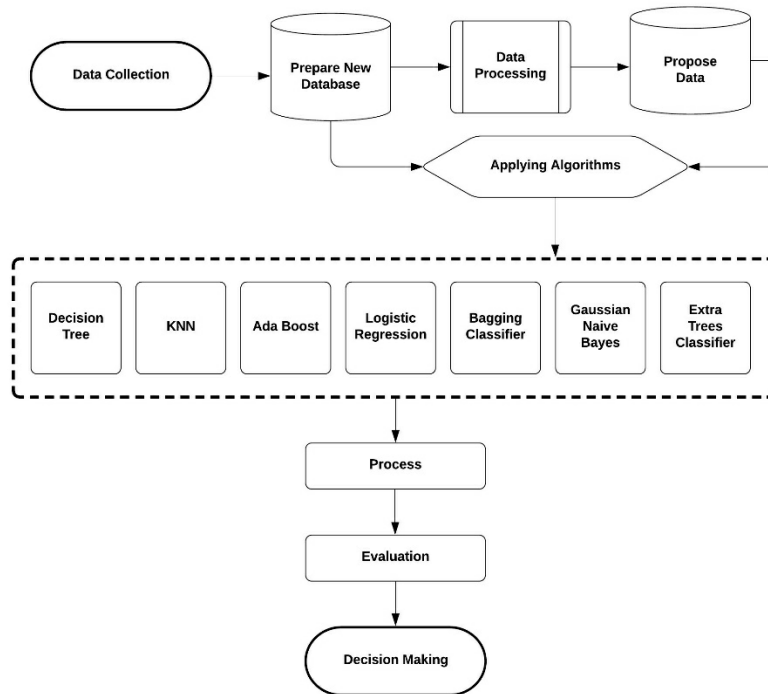
Figure 3.1: Steps of Research Methodology.

3.3 Data Preprocessing

When we completed amassing the dataset, we discover a few null values, lacking facts, greater speeches, white speeches, punctuations, etc. Then we determine to prepossess our dataset to make our dataset appropriate for algorithms. This allows us to get the correct output. Our dataset, Handel the null values. Cheak the noise of facts and evaluation to accurate any problem. After doing all of these items we get our predicted output.
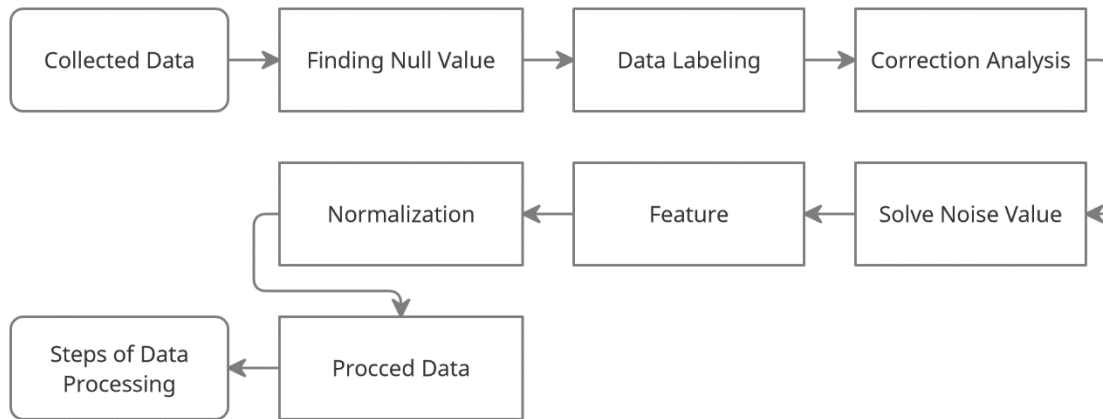
Figure 3.2: Steps of data preprocessing.

3.4 Dataset Description

When we collected 1200 data we stop collecting. After that, we preprocess our data. Data preprocessing help us to find accurate result and It's making the ability to transform data. We solve missing values. Then we analyze our data. Then we get the processed data. And Start our analysis using algorithms and visualization. We work on Google Colab and Jupiter notebook.

3.5 Statistical Analysis

we are collected 1200 data. There are 372 are female and 828 are male. People aged 15-25 have filled out our 828 form, 25-40 have filled out 277 form, 40+ have filled out 118 forms. After gathering all of dataset we start our research on them using algorithms.
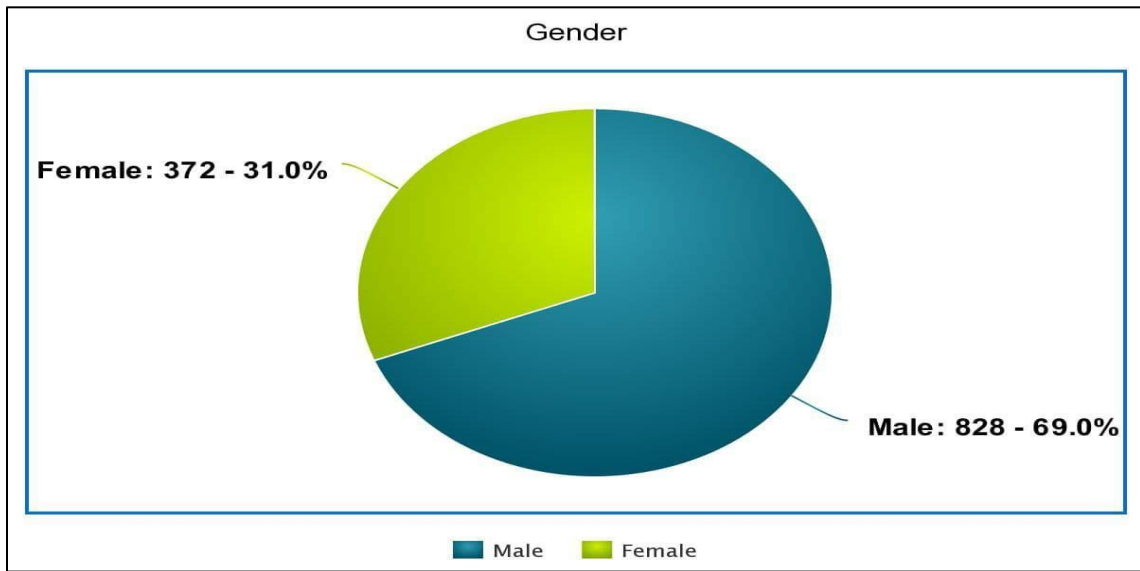
Figure 3.3: Percentage of Male and Female
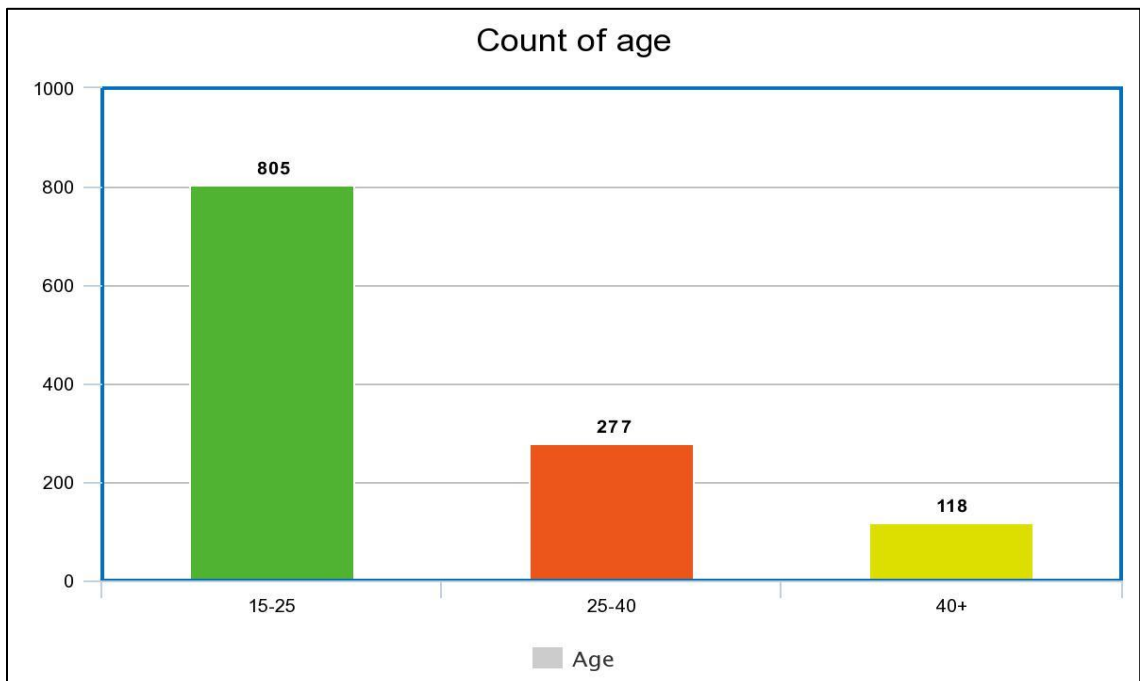
Figure 3.4: Survey with age

3.6 Implementation Requirements/Tools'

When we start our research on our dataset, we first need machine learning tools, data processing tools, data storing tools for our works. We collect data by using Google forms and handwritten forms. Makes our data set with Microsoft Excel. For data preprocessing and algorithms, we used "Anaconda-navigator" and "Jupyter notebook". [11]

Hardware and Software:

Intel Core i5 8th generation

Hard Disk Drive

8GB RAM

Development Tools:

Windows 10p

Pandas

Matplotlib

Lumpy

Scikit-Lear

3.7 Import library:

Project, here using many libraries. Like as

data analysis library,

data visualization library,

text Processing,

machine learning packages,

model training and evolution,

Some machine learning which are using algorithm.

CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Introduction

In the previous section, we discussed dataset and dataset processing process. Processed data is used in some algorithms, and the results of the algorithm will be discussed in this section: Decision Tree, KNN, ADA Boosting Classifier, Logistic Regression, Bagging Classifier, Gaussian Nave Base, and Extra Tris Classifier, And the results are analyzed to see which algorithm provides the best accuracy. We collect 1200 data from both food reviews of which 80 percent are used as training data and 20 percent as test data.

4.2 Experimental Results & Analysis

We have divided our entire data set into several sections Breakfast, Lunch, Dinner, Street Food and Dessert. We used Seven Compares the machine-learning algorithms and their algorithms by calculating their accuracy.

Figure 4.1 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 98.12% accuracy, KNN has achieved 97.91% accuracy, ADA boosting classifier has achieved 75.50% accuracy, Logistic Regression has achieved 77.50% accuracy, Bagging Classifier has achieved 98.12% accuracy, Gaussian Naive Bayes has achieved 57.92% accuracy, Extra Trees Classifier has achieved 98.12% accuracy.
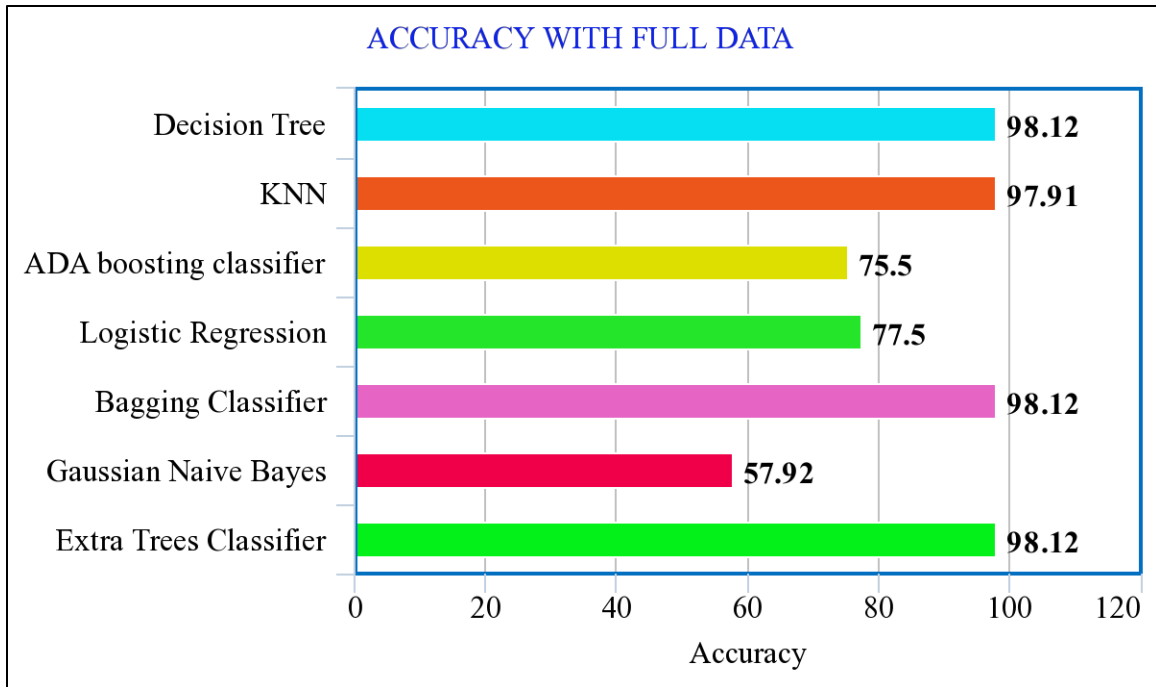
Figure 4.1: Accuracy with Full Data.

Figure 4.2 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 97.5% accuracy, KNN has achieved 97.5% accuracy, ADA boosting classifier has achieved 67.92% accuracy, Logistic Regression has achieved 69.6% accuracy, Bagging Classifier has achieved 97.5% accuracy, Gaussian Naive Bayes has achieved 65.83% accuracy, Extra Trees Classifier has achieved 97.5% accuracy.
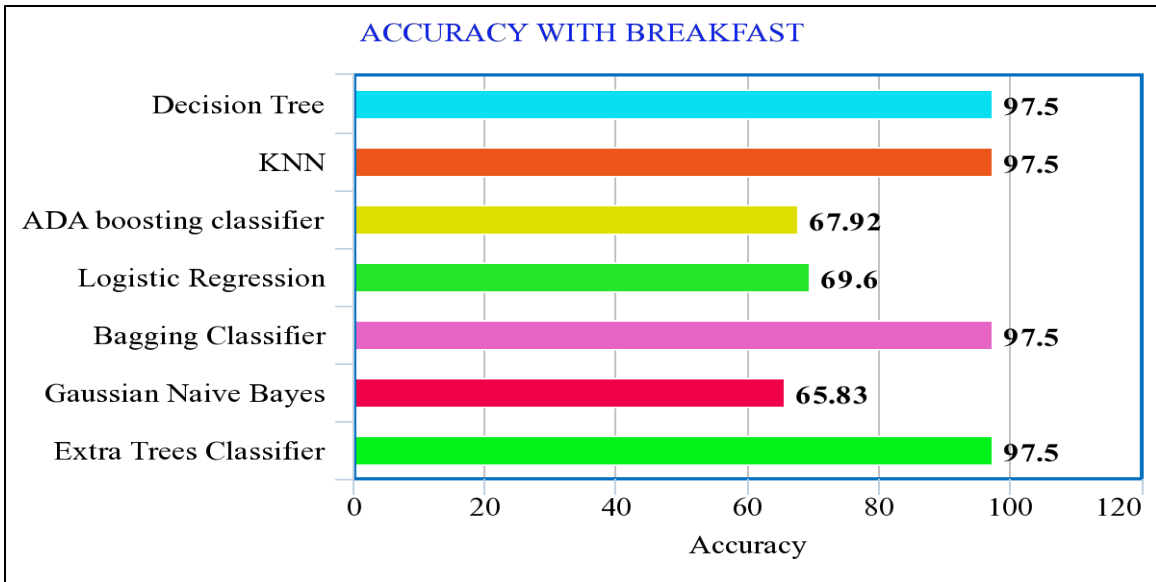
Figure 4.2: Accuracy with Breakfast   .

Figure 4.3 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 84.2% accuracy, KNN has achieved 87.92% accuracy, ADA boosting classifier has achieved 67.92% accuracy, Logistic Regression has achieved 66.25% accuracy, Bagging Classifier has achieved 83.75% accuracy, Gaussian Naive Bayes has achieved 57.67% accuracy, Extra Trees Classifier has achieved 84.17% accuracy.
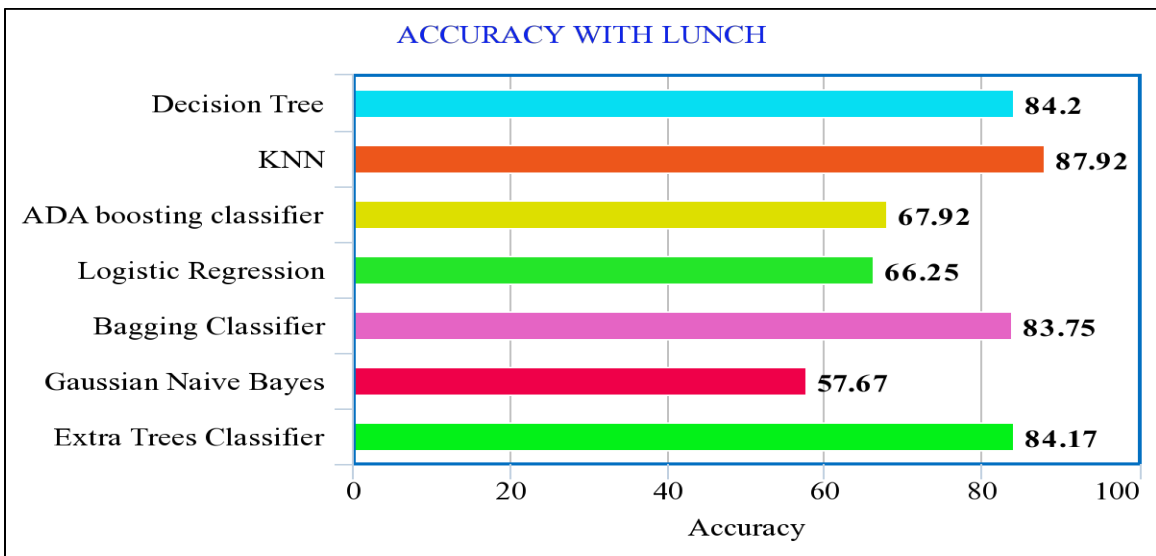
Figure 4.3: Accuracy with Lunch

Figure 4.4 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 88.75% accuracy, KNN has achieved 83.75% accuracy, ADA boosting classifier has achieved 52.50% accuracy, Logistic Regression has achieved 63.75% accuracy, Bagging Classifier has achieved 87.92% accuracy, Gaussian Naive Bayes has achieved 57.10% accuracy, Extra Trees Classifier has achieved 88.75% accuracy.
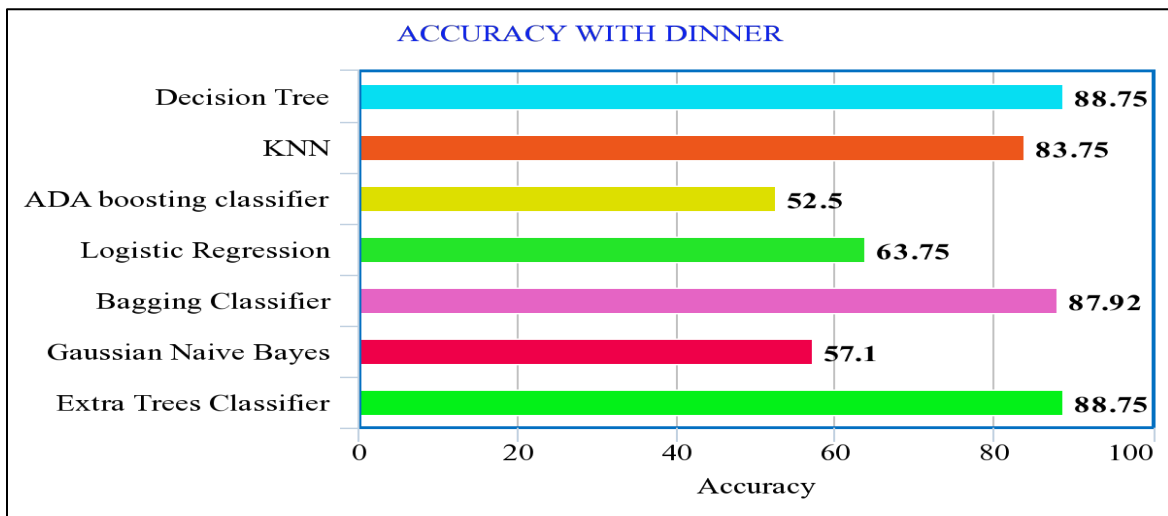
Figure 4.4: Accuracy with Dinner

Figure 4.5 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 72.92% accuracy, KNN has achieved 65.45% accuracy, ADA boosting classifier has achieved 68.75% accuracy, Logistic Regression has achieved 71.25% accuracy, Bagging Classifier has achieved 73.33% accuracy, Gaussian Naive Bayes has achieved 71.25% accuracy, Extra Trees Classifier has achieved 72.92% accuracy.
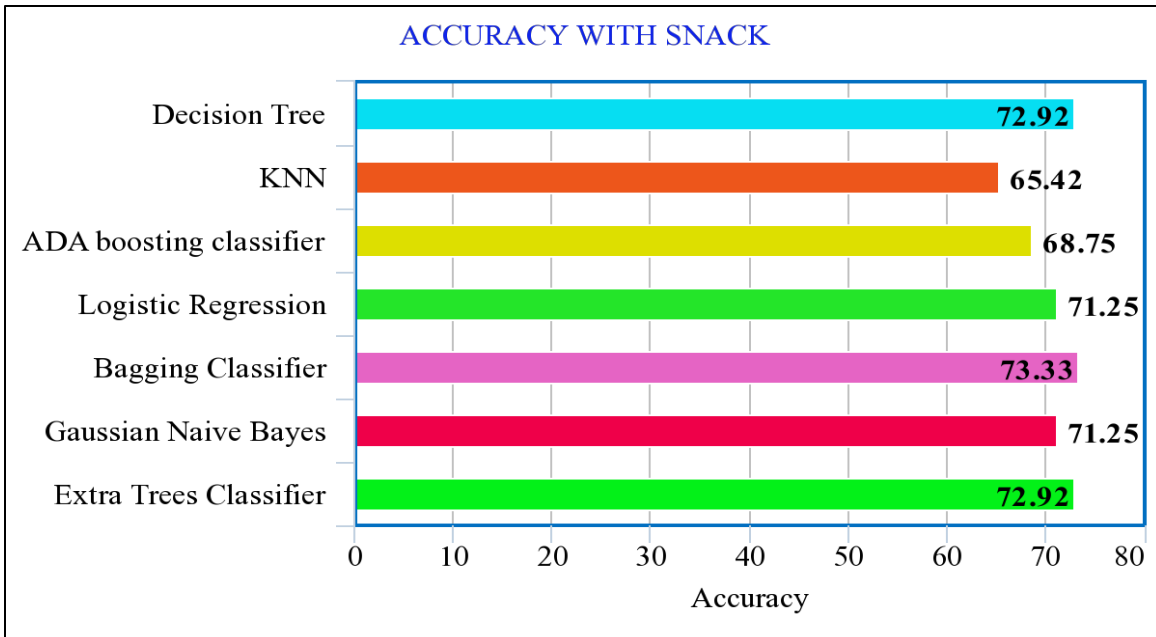
Figure 4.5: Accuracy with Snack

Figure 4.6 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 93.33% accuracy, KNN has achieved 84.58% accuracy, ADA boosting classifier has achieved 63.75% accuracy, Logistic Regression has achieved 61.25% accuracy, Bagging Classifier has achieved 93.33% accuracy, Gaussian Naive Bayes has achieved 57.50% accuracy, Extra Trees Classifier has achieved 93.33% accuracy.
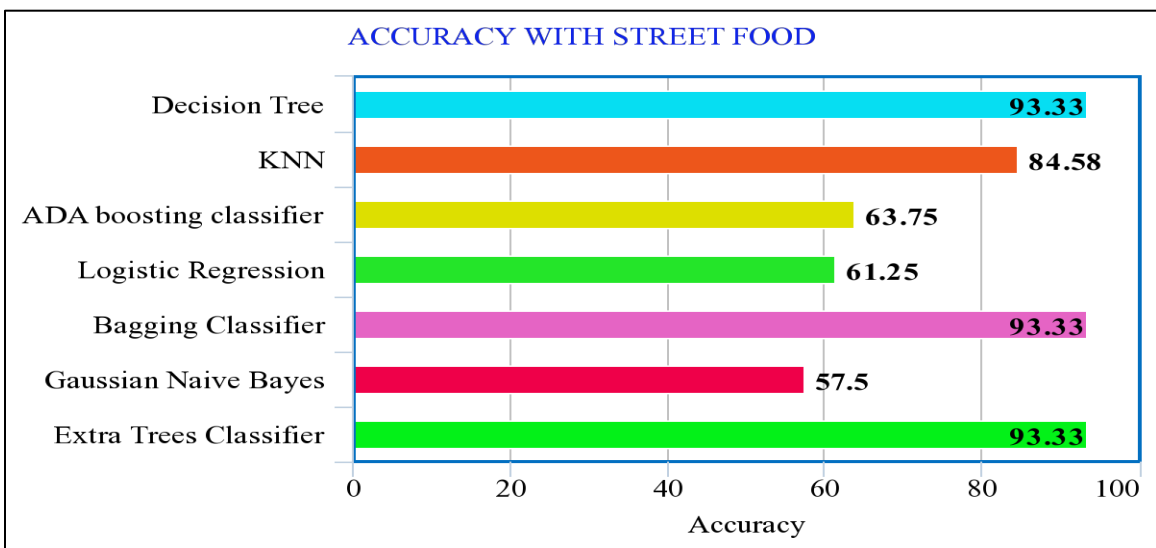
Figure 4.6: Accuracy with Street Food

Figure 4.7 shows the accuracy of Seven algorithms. we are using different types of algorithms, Decision Tree has achieved 85.42% accuracy, KNN has achieved 84.58% accuracy, ADA boosting classifier has achieved 68.33% accuracy, Logistic Regression has achieved 64.58% accuracy, Bagging Classifier has achieved 82.30% accuracy, Gaussian Naive Bayes has achieved 70.33% accuracy, Extra Trees Classifier has achieved 85.42% accuracy.
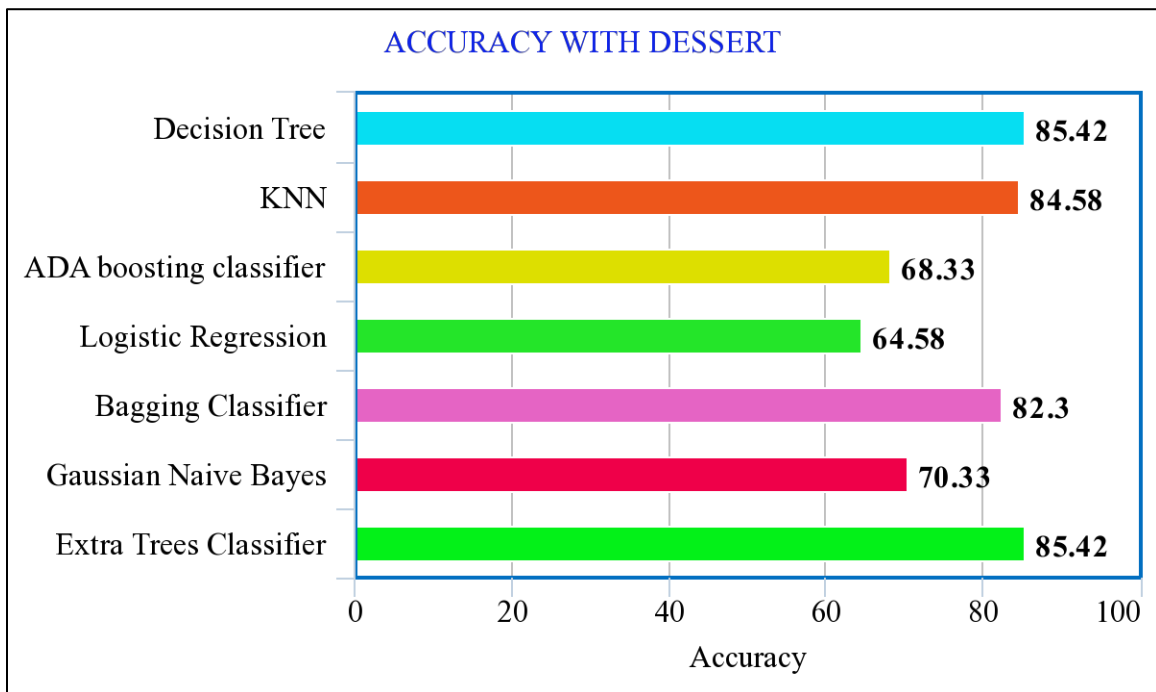

Figure 4.7: Accuracy with Dessert

Decision tree is a tree-based model. It divides properties with similar response values into smaller sections using the splitting rule. The divide-and-concord method is used to create tree diagrams. The decision plant requires a small pre-processing and can easily control the class characteristics without pre-processing. [12].

Gradient Boosting Classifier creates a section of shallow tree with tree learning and improvement techniques. The Gradient Boosting Classifier works with the principle of repeatedly boosting weaker students by shifting the focus to problematic observations. It

builds a stage-based fashion model similar to the others boosting methods and normalizes them with arbitrarily differentiated functions. [12].

Naïve Bayes is one of the most seasoned calculations of machine learning. This calculation is based on Bayes hypothesis and essential insights. Lesson Probabilities and conditional Probabilities are utilized within the Gullible inclination show. It amplifies properties utilizing Gaussian dispersion. [12].

Yoav Freund and Robert Schapire propose ADA boosting or Versatile boosting in 1996. It creates a classification of a combination of numerous ineffective performing classifiers. It set the weight of classifiers and prepare the information in each emphasis [12].

TABLE 4.1: SUMMARY OF FULL DATA ACCURACY

Algorithms	Decision Tree %	KNN %	Ada Boost %	Logistic Regression %	Bagging Classifier %	Gaussian NB %	Extra Trees %
Full Data	98.12	97.91	75.5	77.50	98.12	57.92	98.12
Breakfast	97.50	97.50	67.92	69.60	97.5	65.83	97.5
Lunch	84.2	87.92	67.92	66.25	83.75	57.67	84.17
Dinner	88.75	83.75	52.5	63.75	87.92	57.10	88.75
Snack	77.92	65.42	68.75	17.25	73.33	71.25	72.92
Street Food	93.33	84.58	63.75	61.25	93.33	57.50	9.33
Dessert	85.42	84.58	68.33	64.58	82.30	70.33	85.42

4.3 Descriptive Analysis

We not only calculate the accuracy of different algorithms but also calculate the accuracy, precision, recall and f1-score of each algorithm. Any model selection requires an evaluation of that model. In the case of the Daffodil International University model evolution, some specific classification needs to be measured. Classification measurements are based on test data sets for better measurement.

Exactness is the estimation of precision. It is the proportion of genuine positive esteem and anticipated positive value

$$Precision = \frac{TN}{FP+TN} \times 100\% \tag{1}$$

A recall is the measurement of completeness. It is the proportion of genuine positive worth and genuine positive worth.

$$recall = \frac{TP}{TP+FN} \times 100\% \tag{2}$$

F1 score is the estimation of the consonant cruel of review and accuracy. It considers both untrue positive and wrong negative values for calculation.

$$F_1 = \frac{2 \times precision \times recall}{precision+recall} \times 100\% \tag{3}$$

TABLE 4.2: CLASSIFIER PERFORMANCE WITH FULL DATA.

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score %
Decision Tree	57.08	50.00	50.00	57.00
KNN	61.67	51.00	50.00	62.00
Ada Boost	68.75	65.0	55.0	69.0
Logistic Regression	66.67	58.0	52.0	67.0
Bagging Classifier	61.67	53.0	52.0	62.0
Gaussian Naive Bayes	50.83	48.0	48.0	51.0

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score %
Extra Trees	57.08	50.0	50.0	57.0

TABLE 4.3: CLASSIFIER PERFORMANCE WITH BREAKFAST.

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score %
Decision Tree	97.50	95.0	99.0	99.0
KNN	97.50	93.0	98.0	97.0
Ada Boost	67.92	55.0	53.0	73.0
Logistic Regression	69.60	61.0	47.0	73.0
Bagging Classifier	97.50	99.0	97.0	99.0
Gaussian Naive Bayes	65.83	47.0	52.0	62.0
Extra Trees	97.50	95.0	99.0	99.0

TABLE 4.4: CLASSIFIER PERFORMANCE WITH LUNCH.

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score %
Decision Tree	84.20	89.0	66.0	84.0
KNN	87.92	85.0	78.0	87.0
Ada Boost	67.92	42.0	40.0	62.0
Logistic Regression	66.25	48.0	35.0	65.0
Bagging Classifier	83.75	88.0	66.0	72.0
Gaussian Naive Bayes	57.67	45.0	45.0	42.0
Extra Trees	84.17	83.0	77.0	79.0

TABLE 4.5: CLASSIFIER PERFORMANCE WITH DINNER.

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score %
Decision Tree	88.75	86.0	84.0	84.0
KNN	83.75	90.0	72.0	77.0
Ada Boost	52.50	49.0	42.0	42.0
Logistic Regression	63.75	50.0	36.0	32.0
Bagging Classifier	87.92	85.0	85.0	85.0
Gaussian Naive Bayes	57.1	48.0	49.0	46.0
Extra Trees	88.75	89.0	84.0	84.0

TABLE 4.6: CLASSIFIER PERFORMANCE WITH SNACK.

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score %
Decision Tree	72.92	32.0	34.0	31.0
KNN	65.42	45.0	44.0	44.0
Ada Boost	68.75	27.0	33.0	29.0
Logistic Regression	71.25	24.0	33.0	28.0
Bagging Classifier	73.33	46.0	41.0	41.0
Gaussian Naive Bayes	71.25	24.0	33.0	28.0
Extra Trees	72.91	57.0	36.0	34.0

TABLE 4.7: CLASSIFIER PERFORMANCE WITH STREET FOOD.

Algorithms	ACCURACY %	Precision %	Recall %	F$_1$ score

			%
Decision Tree	93.33	97.0	87.0	91.0
KNN	84.58	82.0	75.0	78.0
Ada Boost	63.75	60.0	50.0	52.0
Logistic Regression	61.25	42.0	36.0	35.0
Bagging Classifier	93.33	97.0	87.0	91.0
Gaussian Naive Bayes	57.50	52.0	49.0	48.0
Extra Trees	93.33	97.0	87.0	91.0

TABLE 4.8: CLASSIFIER PERFORMANCE WITH DESSERTS.

Algorithms	**ACCURACY** %	**Precision** %	**Recall** %	**F$_1$ score** %
Decision Tree	85.42	77.0	75.0	76.0
KNN	84.58	85.0	70.0	74.0
Ada Boost	68.33	52.0	49.0	50.0
Logistic Regression	64.58	22.0	33.0	26.0
Bagging Classifier	82.92	73.0	77.0	73.0
Gaussian Naive Bayes	70.83	58.0	54.0	55.0
Extra Trees	85.42	77.0	75.0	76.0

CHAPTER 5
DISCUSSION ABOUT NUTRITION ON FOOD

5.1 Introduction

Nutrition is the main thing of human lives because it helped to the process by which living organisms obtain food and use it for growth, metabolism, and repair. Nutrition is important for the human body because it helped to grow a body and parts and also it helps to digestion and recover body issues. nutrition is produced by what food we take and how our life was routine daily.

5.2 Why Nutrition?

If Nutrition was very low in your body will feel dull and tired. Nutrition is contained from foods in vegetables and some meats. so, it will help to Nutrition on your body.

In our country, we take Breakfast, lunch, snacks, Dinner as our regular eating time. For a healthy nation, we need a healthy food habit. Because nowadays we face a lot of disease for bad food habit like Diabetics, High blood pressure, heart problem, heart attack, etc. If we make our nation healthy we need to provide a good food habit. For that, we need to know about the nutrition of food. Which food needs most which not. Which food we have taken which time. Need to maintain right weight and BMI. Also, maintain the Right time to take food.

5.3 Describe Nutrition on Research Food Habit

Breakfast: Breakfast is one of the best important parts of the meal. It absorbs nutrition on the body early. We should take breakfast 7-9 am And Calories shouldn't exist 300 to 400 calories for breakfast. By using an algorithm, we get results about breakfast is given below.

By our research we get,

TABLE 5.1: Breakfast Food Review Data

Food Name	Ratting	Count
Breakfast-Paratha	**3**	**309**
	1	264
	5	213
	2	210
	4	204
Breakfast-Bread	**5**	**356**
	4	304
	3	218
	2	163
	1	159
Breakfast-Fry Eggs	**4**	**351**
	5	326
	3	248
	2	158
	1	117
Breakfast-Pulses	**3**	**318**
	4	268
	1	243
	5	219
	2	152
Breakfast-Vegetables	**5**	**357**
	4	315
	3	247
	1	147
	2	134
Breakfast-Tea	**5**	**366**
	4	292
	1	231
	3	194
	2	117
Breakfast-Coffee	**4**	**310**
	1	297
	3	236
	5	210
	2	147
Breakfast-Green Tea	**1**	**417**
	3	242
	5	217
	4	184
	2	140

Breakfast-Rice	1	339
	4	274
	5	222
	3	219
	2	146
Breakfast-Bread_Jelly	1	381
	3	301
	4	179
	2	176
	5	163
Breakfast-Boil_Egg	5	391
	4	285
	3	218
	1	189
	2	117
Breakfast-Fruit (Apple)	5	386
	4	267
	3	229
	1	195
	2	123

TABLE 5.2: Breakfast Food Calories Data

ID	Name	Weight	Calories	Protein	Fat	Carbohydrates
1	Paratha	100gm	336	6.4	13	45
2	Fry Eggs	100gm	90	6.3	6.8	0.4
3	Boil Egg	100gm	78	6.3	5.3	0.6
4	Coffee with suger	1 cup	65	2.3	1.2	11
5	Bread, Jelly	100gm	131	2.6	1	28
6	Bread	1 slice	67	2.2	0.8	12
7	Pulses	100gm	116	9	0.4	20
8	Rice	100gm	130	2.7	0.3	28
9	Fruit Apple	100gm	52	0.3	0.2	14
10	Vegetables	100gm	65	2.9	0.1	13
11	Coffee	1 Cup	2	0.3	0.1	0
12	Tea	100gm	2	0	0	0.5
13	Green Tea	100gm	2	0.5	0	0

People give Five stars on:

Green tea:417

Boil egg:391

Fruit:386

Tea:366

Bread;356

Vegetable :357

Rice:222

Paratha :213

Pulses:219

Coffee:210

Jelly:163

So, can see here People choose Green tea best for the morning. if we see the nutrition on Green tea see that in 100gm green tea there is fat and carbohydrate is 0.00 minerals and protein are good num. Green tea increases metabolism in our body to keep our BMI good. Then in 2nd position is Boil Egg. Boil egg gives 78calories. Minerals, protein, fat 5.3 and carbohydrate 0.6. We know that boiling egg is good for our bodies. So, this one is also good for our body. 3rd fruit, fat 0.2 carbohydrates 14, calories 52. bread and vegetables are in 5th position. In Vegetables calories 65. Fat. 0.1, carbohydrate 13. We give a chart about breakfast calories and all of the nutrition percentage. we see that people are interest on good food. Have a healthy life style we need to concern about our daily food habit. In Breakfast as ideal breakfast, we have to take Green tea, Fruits, egg, Bread, vegetables. In Morning if we drink Chia seeds, Or lemon with warm water on an empty stomach, it's so helpful for our body. In breakfast if we avoid rice in it is best for our body. And we have also kept our food calories at 300-400 range. we need to make sure that we get enough calories in the morning. And also concern about healthy food. [6]

In Lunch: the rest of the afternoon Lunch is an essential meal for everyone. It provides energy and nutrients to keep the body and brain working through the afternoon. According to experts, lunch offers nourishment to the body and brain and reduces stress, and eating lunch provides a break from the activities of the day and gives energy for the rest of the afternoon. We collect information about lunch where we get people's needs. Standardized plates when looking at the ideal lunch. Celery should have 500 to 700 calories at a time for lunch. Lunch is an essential meal for everyone. Provides energy and nutrients to keep the body and brain function during the afternoon. According to experts, lunch supplies nutrients to the body and brain, and reduces stress and eating. Lunch opens the day and gives you energy for the rest of the afternoon. There is no particular food that is "ideal" in and of itself.

What we eat for lunch should be balanced with what we have for breakfast and what we are likely to have for dinner, and don't forget about snacks in between. And today needs to be reconciled with yesterday and tomorrow in terms of what we ate. or will eat.

After analyzing our lunch dataset, we get:

TABLE 5.3: Lunch Food Review Data

Food Name	Ratting	Count
Lunch-Rice	5	487
	4	296
	3	195
	2	123
	1	99
Lunch-Biryani	5	341
	4	310
	3	244
	2	155
	1	149
Lunch-Fish Curry	5	343
	4	309
	3	249
	1	153
	2	146

Lunch-Chickens	**5**	**503**
	4	322
	3	195
	2	99
	1	81
Lunch-Beef_Mutton	**5**	**494**
	4	261
	3	223
	1	141
	2	81
Lunch-Vegetables	**5**	**426**
	4	315
	3	231
	1	123
	2	105
Lunch-Pulses	**5**	**398**
	4	340
	3	186
	1	183
	2	93

So we see that people are mostly interest on chicken. We have give a calories measurement chart here where see how much nutrition is on lunch food. We see here people like most measurement

TABLE 5.4: Lunch Food Calories Data

ID	Name	Weight	Calories	Fat	Carbohydrates	Protein
1	Rice	100gm	130	0.3 g	28 g	2.7 g
2	Biryani	100gm	142	4.6 g	15 g	9.6 g
3	Fish Curry	100gm	128	2.7 g	0 g	26g
4	Chicken	100gm	220	13 g	0.1 g	24 g
5	Beef Curry	100gm	250	15 g	0g	26g
6	Pulses	100gm	116	0.4 g	20 g	9 g
7	Vegetable	100gm	65	0.1 g	13 g	2.9 g

Here,

1st position chicken -503

2nd Beef -494

3rd Rice -487

4th Veg-426

5th Pulse -398

6th Fish -343.

So, we see that people are most interested in chicken. We have given a calories measurement chart here where see how much nutrition is on lunch food. We see here people like most chicken, beef more than vegetables and Fish. But for ideal lunch Vegetables and fish are better for health. At Bengali, we always prefer rice for lunch. Since we have to calculate our calorie intake in lunch, if we eat rice as it is in 100 grams of rice, it has 130 calories and carbohydrate 28. So, when we eat rice, if we eat vegetables curry it's best for our body we get vitamins, calcium, iron from different types of vegetables. Another hand in 100gm fish has 146 calories, carbohydrates 1, and protein 17. We can eat fish along with vegetables as an ideal lunch. We also add pulses. Then we can eat beef, Biryani for somedays in a month and chicken for every week per day. But we need to make our eating habits with vegetables and fish, pulses. We also avoid soybean oil as much.[7]

Dinner: In Bangladesh, we eat dinner at the last of the meal. The ideal time to have Dinner is before 7 pm—500 to 700 calories each for Dinner. We collect data on dinner food.

TABLE 5.5: Dinner Food Review Data

Food Name	Ratting	Count
Dinner-Rice	**4**	**340**
	5	317
	3	315

	2	123
	1	105
Dinner-Bread	**5**	**350**
	1	247
	4	238
	3	218
	2	147
Dinner-Chickens	**5**	**437**
	4	357
	3	208
	1	123
	2	75
Dinner-Beef_Mutton	**5**	**437**
	4	357
	3	208
	1	123
	2	75
Dinner-Fish_Curry	**5**	**437**
	4	357
	3	208
	1	123
	2	75
Dinner-Vegetables	**5**	**437**
	4	357
	3	208
	1	123
	2	75
Dinner-Pulses	**5**	**380**
	4	285
	3	229
	1	201
	2	105

TABLE 5.6: Dinner Food Calories Data

ID	Name	Weight	Calories	Fat	Carbohydrates	Protein
1	Rice	100gm	130	0.3 g	28 g	2.7 g
2	Bread	100gm	266	3.3 g	49 g	8.9 g
3	Fish Curry	100gm	128	2.7 g	0 g	26g
4	Chicken	100gm	220	13 g	0.1 g	24 g
5	Beef Curry	100gm	250	15 g	0g	26g
6	Pulses	100gm	116	0.4 g	20 g	9 g
7	Vegetable	100gm	65	0.1 g	13 g	2.9 g

We get,

Chicken, Fish, Beef, Vegetables both are the first choice for Dinner.

Pulses are in the second position.

Bread in 3rd position

Rice is in 4th position.

So here we see people like bread than rice for Dinner. So this is a good sign for a healthy habit. But they like chicken, beef, fish, vegetables in the same position. From them, vegetables and fish is the ideal food for Dinner.

We should avoid beef for Dinner. We can take chicken for Dinner but only one piece. To take any food for our body, first, we have to measure the percentage of the calories. We give our dinner food nutrition chart where we can easily find out the measurement of nutrition on our food. Then we should take food. Because for a healthy person it is most important. We mustn't take our Dinner more than 700 calories it is bad for our health.

Street Food:

Nowadays, more than 2.5bn people eat street food per day from the whole world. food and agriculture organization of the UN .[8]

In addition to our three daily meals, we eat street food. Street food has frequently become degree integral a region of the urban food culture and vital due to appease the appetite of

the multitude in Bangladesh. However, what specialists and food buffs are concerned relating to is that the daily intake of harmful street-vended food.[9]

Most of our Country loves to take street food. Physicians said that the street foods, which are being produced in an unhygienic state, may increase the risk of typhoid, hepatitis A and E, and other waterborne diseases like cholera and diarrhea.

TABLE 5.7: Street Food Review Data

Food Name	Ratting	Count
Street_Food-Fuchka '	**1**	**268**
	5	260
	4	255
	3	218
	2	199
Street_Food-Velpuri	**1**	**293**
	3	281
	4	231
	2	205
	5	190
Street_Food-Jhalmuri	**4**	**320**
	3	243
	1	221
	5	211
	2	205
Street_Food-Singara	**4**	**302**
	3	295
	1	209
	2	206
	5	188
Street_Food-Grill_Nan	**4**	**350**
	5	343
	3	195
	2	163
	1	149
Street_Food-Chanachur	**1**	**317**
	3	264

	4	262
	2	211
	5	146
Chola	**4**	**334**
	5	291
	3	264
	1	166
	2	145

We collect data on street food because nowadays street has become part of our country's food habit. Through this is not good for our health. After analysis we get,

In Bangladesh, there is a lot of variation in street food, but now we are working on some of them. In the future, we will make our dataset larger.

From the dataset, people vote,

Grill-nan 350.

Chola 334.

Jhal muri 320

Chanachur 317

Singara 302

Velour 293

Fuckha 268.

We also give a chart of calories measurements of them. Though street food is not good for health, it's part of our daily food habits. We should take this food by measuring the calories.

Snacks: Snacks are regularly much more minor than everyday food and are typically served among food. Snacks are available in many forms, including packaged processed ingredients and homemade gadgets crafted from sparkling ingredients.

Traditionally, snacks had been crafted from family ingredients. A snack is just a kind of food. We can't call it a meal or a necessary food. People often eat it while watching TVs or other relaxing things, or maybe they feel hungry. Many kids love it, and it may cause fat. On the other side, if we control its use, it will be good for our body. We should eat it and watch out for our health. Just my opinion.[10]

We collected only two items for snacks as we also collected dessert items and street food because most people take their snacks as dessert items and street food.

1. Fried burnt food (Vajapora)

2. Tea, coffee.

We get from the dataset,

Yes   696

No   504

51.1% people are interested in taking snacks regularly and

48.9% of people are not interested in taking snacks regularly.

Dessert : Dessert is the kind of candy meal. It is a kind of meal this is had after lunch or supper, and in a few instances after a short chew or chew. It is typically a candy meal, just like frozen yogurt, treats, and cakes. In sure nations, cheeses, for example, Brie cheddar, and herbal product are crammed in as dessert. We accumulate information on dessert. In addition to the 3 meals, we devour dessert objects like avenue meals. On our unique varieties of the glad occasion, we cherished delivering dessert/candy objects. Through we cherished to eats cakes however we ought to restrict to take dessert objects via way of means of energy measurements. We get the information of dessert and the energy size chart given below,

TABLE 5.8: Dessert Food Review Data

Food Name	Ratting	Count
Desserts-Sweet_Yogurt	**3**	**288**
	4	272
	5	245
	2	205

	1	190
Desserts-Doi_Chira	**1**	**322**
	3	296
	2	250
	4	220
	5	112
Desserts-Falooda	**4**	**304**
	5	249
	2	240
	3	224
	1	183
Desserts-Rasmalai	**5**	**400**
	3	264
	4	238
	2	175
	1	123
Desserts-Cake	**5**	**308**
	3	278
	4	275
	1	171
	2	168
Desserts-Different_Types_of_Sweet	**3**	**323**
	5	243
	4	222
	1	207
	2	205

Which type of food people likes most?

We also collect data about which type of food people like most as a soldier or sweet or sour.

We see that our Country people love soldier food more than sweet and last one sour.

By analysis age, we see that,

15-25 age people vote on soldier most. 25-40 people vote sour most and 40+ people vote on soldier most.

CHAPTER 6

IMPACT ON SOCIETY AND COUNTRY SUSTAINABILITY

6.1 Impact on Society

The goal of our research is to aware people of the quality of food and nutrition. Most of the people's habit is not good in our country they like fatty and unhealthy food most. As a bad food habit, they face many diseases as like as diabetics, high pressure, heart block, etc. Our research will help people to recognize healthy food habits and People are aware of the quality of food and nutrition. Then they will be able to act to control disease and ensure their good healthy life. In this way, our research will help farmers to financially benefit. Our research survey helps people who do have not enough knowledge about Healthy food habits it will be benefited from our research. So, this research has a great impact on society.

6.2 Impact on The Country

Our Research is helpful for our whole nation. We already know about our project and what we have done there. Already we have described how our project Impacts our society. When any works impacts society It also impacts the whole country and nation.

To improve our country, we need a healthy nation. Because an unhealthy man Doesn't do any works properly.

6.3 Sustainability of Research

The sustainability plan has three parts they are community financial and organizational. The Sustainability Plan gives us a realistic idea of any project run and plans for the project. Our model cohort mission is to find the food habit of our country and give nutrition to them. This model has to be targeted to make it easy for people to understand nutrition and the importance of nutrition on food.

6.4 Discussion and Conclusion:

In our study, we have tried to discuss the eating habits and quality of nutrition of food of the people of Bangladesh.

We have tried to do our best research on people's daily meals and we have been able to make decisions, For example, we have tried to discuss what kind of food people eat when and at what time and at what stage it falls as a quality standard With this little bit of nutrition information, we've done at least some research on everything from a variety of foods, from heavy meals to light street food. In this study, all kinds of results have been discussed in detail in different ways and at different stages. The results of the study have been published through various lists, algorithms accuracy, and tables.

We have tried our best to present the results of our research to you. And the research thing never ends, it just keeps going. We will update our dataset day by day.

6.5 Scope for Further Developments

We have 7 categories of different sub-categories food for our work. We are currently working on 1200 data. And through these data we can find out about the Habit of food, the number of nutrients in the food, which food, how many calories and which food will affect our body. In the future, we will add more foods in our form and works in different areas and countries. In the future, we will work on a huge number of datasets and through this data, we will be able to know about the quality of food, food habit of different countries and areas and the number of nutrients in the food, the number of calories in the food, and the effect of any food on our body. We will work on more algorithms and more visualization also. It Will help our nation to have a healthy life.

6.6 Limitations

Our study is about the Food habits of Bangladesh and Nutrition on food s which are Data mining algorithms. When we start and finished our works we see there are some limitations. They are:

1. The dataset we used was not analogously large if our dataset will be greater when we use a larger and portly dataset.
2. As covid-19 situations we failed to collect a large number of data from different types of people from different professions, people from different divisions and different cultures, etc.
3. We can also use so many advanced methods of algorithms. Which algorithms can also use for data processing, and the model could be presented orderly using different changes in the using of algorithms.

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