

CALORIES BURNT PREDICTION USING MACHINE LEARNING

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Abstract— Now a days, people are having terribly busy schedules because of changes in their style and work commitments. folks aren't concentrating in their food habits, thus it ends up in obesity. fatness is changing into a typical downside in today's trendy life. in order that we want a system which may create changes to the food decisions of individuals and provides them with instruction that leads to effective results of maintaining their body. If a system informs the biological process data of a food item and classify it as healthy or non-healthy to the user, then people are ready to determine their daily intake of calorie price of their food items. This projected system helps the user to manage their food habit system and additionally provides data on the way to burn calories in daily routines that produces user's healthy. Convolutional Neural Network model is applied to classify food item from the input image and also the proposed system provides the accuracy of 91.65%.

Keywords— Android Application, Convolutional Neural Network, Deep learning, Food nutritional information.

I. INTRODUCTION

Food has forever been essential in human life and attracted people's attention quite before. every food things have each nourishing worth which can be high or low. Therefore, a food detection system is crucial which will mechanically show their nutritious value of food items and calculate the calories supported the quantity of food that the user intakes by capturing the image of the food. Nowadays everyone are using smart phones, so we have developed smart application to

monitor the food habits of the user and prompt the user which food suits based on their health condition. Due to the development in technology utilized in clever telephones, their computational strength has additionally increased. Nowadays clever telephones can take care of excessive fine of images, studies on meals category is targeted on growing actual time utility which seize picture and get end result from the version instantly. Most of the human beings are overeating and now no longer being energetic enough. Because in their busy schedules and those are burdened today, they overlook to hold music of the meals they eat. So with the aid of using the usage of this utility we are able to capable of get information of the dietary price of the meals items. It facilitates to keep away from extreme situation of illnesses inclusive of diabetes, blood strain and so on. Some of the strategies presently in use for nutritional evaluation contain self-reporting and manually recorded instruments. The difficulty with such strategies of evaluation is that the assessment of calorie intake via way of means of a player is liable to bias, with a view to growth the accuracy and decrease the bias; improvements to the modern strategies are required. Automatically examine the nutritional and calorie records using the computing potential of the cloud for an goal evaluation. Over the previous few years, many studies and improvement efforts had been made withinside the subject of visual-primarily based totally nutritional and calorie records analysis. However, the green extraction of records from meals photos stays a hard difficulty.

II. LITERATURE SURVEY

The undertaking of the meals detection gadget pixels have been segmented first of all to shape the function vector with size, shape, texture, colour (normalized RGB), and different context-primarily based totally features. With this motivation, a minimized function vector with the Gabor clear out responses (texture), pixel intensity, and colour additives however, the overall performance is right for meals replicas, and a much less green overall performance is located with actual pixels. The length of photos and their versions in taking pictures might be the cause for the overall performance degradation with this, the higher overall performance is discovered with much less quantity of classes, despite the fact that the photos of every elegance are more. Images incorporate a few not unusual place visible styles which can be beneficial in spotting the class of meals. This technique reduces the complexity raised through the direct photo matching techniques. Experiments had been performed on actual time database with fast-meals photos has been created.

Later the studies has centered on accumulating the styles of dataset proposed a brand new dataset to assess algorithms to apprehend meals which facilitates to reveal diets. The database has been created for greater variety of times of meals images. A medium sized dataset has been created to expand a cell primarily based totally log system.

Deep Convolutional Neural Networks were used for meals popularity these days which makes use of an aggregate of baseline function extraction and neural community fine-tuning. Convolutional Neural Networks together with a Maximum Pooling layer generates Activation Maps (warmness maps of meals probability). Fine tuning is finished for Activation Map generation, which incorporates including a convolutional layer with stride, and putting a softmax layer. Additionally, through threshold, bounding bins are generated. The gift paintings is to mix above methodologies together, that creates a meals class machine that predicts the elegance of meals the picture is in, and additionally offers the calorie cost primarily based totally at the meals weight or remember given with the aid of using the user. This idea has an excessive scope withinside the fitness sector, as humans need to hold song of what and what kind of they devour and simplifying the technique into this shape of implementation will increase utilization and cognizance of fitness-associated factors.

III. EXISTING SYSTEM

There are a few programs are found in this user's meals calorie management. But every one has its very own drawbacks. The following are the to be had

programs withinside the current system.

3.1 Fatsecret

Fatsecret utility is Australia primarily based totally utility. In this utility person want to feature a seize in their meals objects and upload tag call to that then it'll deliver calorie data of the meals item. User can proportion what they devour to others and hook up with their friends. This utility specially offers the food plan plans to the person to lessen their weight. But to apply the food plan plans, they want to shop for a top class club for a few cost. They deliver barcode scanner for packed meals objects to stumble on and deliver dietary data of meals objects. The bar code scanner does now no longer paintings with Indian packed foods. In this they offer hook up with our dietitian through invite them however it additionally require top class club. It offers the record of what they ate and calorie data in their intake. Overall this utility is ideal however works properly handiest for overseas people. It doesn't offer food plan plans and accurate vitamins values of all Indian foods. In this utility, the developer did now no longer use deep learning or any other technologies to classify food items.

3.1 Nutrition plus

Nutrition Plus is an application where the user can search for the food items based on the nutrition values such as carbohydrates, protein, fat, iron, calcium and vitamin. The user can also search by food items and find the particular food's nutrient composition. It gives the healthcare information about the diseases and provides the diet plans. They didn't use any technologies for the classification of food images.

3.1 Calorie Mama

Calorie mama is another application in this domain. It provides calorie and other nutritional information of food items by capturing the food items. It uses image classification technology to classify food items. It works well with foreign foods and some of Indian foods. It gives foreign meal plans to gain, reduce; maintain body weights for their premium membership holders. This is a paid application after free trails, the user need to upgrade the account. This application will not suggest Indian foods to user based on their health conditions.

In this paper we introduce an utility this is able to classifying meals with the aid of using shooting the images, offer accurate dietary records of Indian meals and classify the meals primarily based totally on user's fitness condition. For the reason of analysis, the user's

meals intake, calorie values , Duration of exercise, weight, height, coronary heart charge and frame temperature are given. Also enables them to burn the energy with the aid of using doing sporting events or a few adjustments of their every day routines.

IV. PROPOSED SYSTEM

The Exercise dataset with 8 independent variables and 1 dependent variable has been used for implementation. Performance analysis is done using metrics like MAE

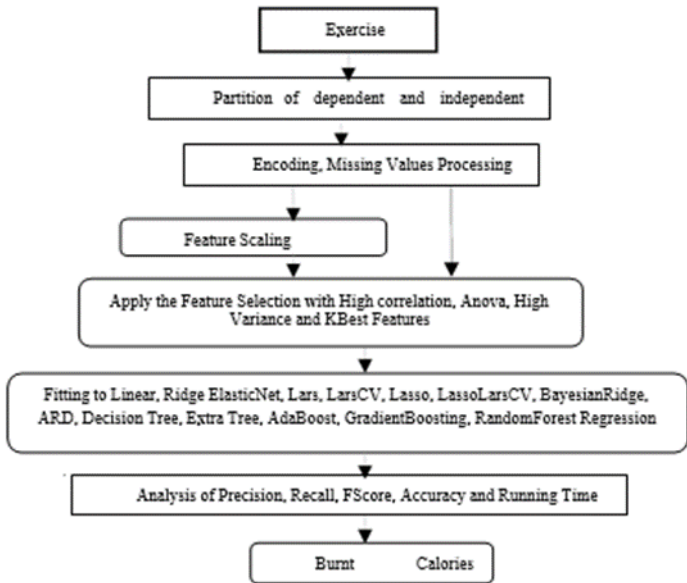
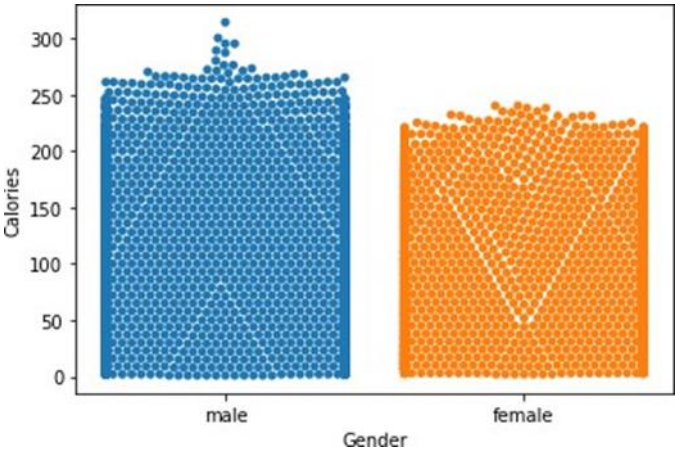
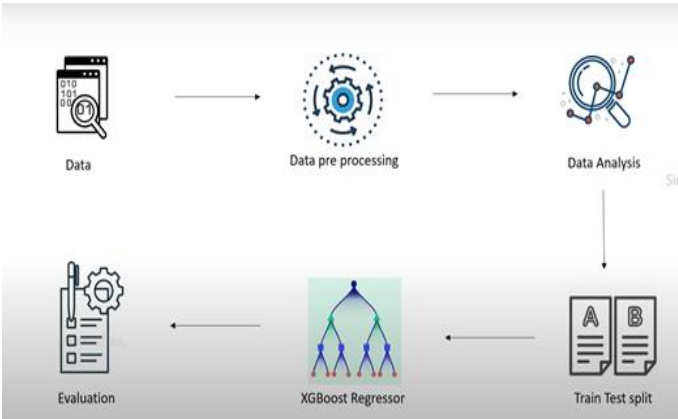


Fig.1. Overall workflow of the system.

4.1 Exploratory Data Analysis

The Exercise dataset extricated from the UCI machine learning store is utilized for usage. The dataset comprises of 15,000 person information with 8 autonomous highlights (User_ID, Gender, Age, Height, Weight, Duration, Heart Rate, Body Temperature) and 1 Target“Calories”.



The code is applied with python beneathneath Anaconda Navigator with Spyder IDE. The statistics set is splitted with 80:20 for schooling and checking out dataset. Fig.2. indicates the goal function analysis. The correlation of the capabilities is proven in Fig. 3.

I. DEEP INSIGHTS

In this fast and busy schedule life, people are not giving importance to the quality of food they are eating. They tend to neglect their eating patterns and habits. The fast-food consumption rate is alarmingly high and this consequently has led to the intake of unhealthy food. This leads to various health issues such as obesity, diabetes, an increase in blood pressure etc. Hence it has become very essential for people to have a good balanced nutritional healthy diet. There are many applications which are booming to help people so that they can have control over their diet and hence can reduce weight or they can help them to keep them fit and healthy. This project focuses on the calories burned in accordance with the duration provided and heart rate during the exercise period. It introduces the topic of linear regression and its predicting capability with the effectiveness from the data provided. This research helps in providing the benefits of a machine learning algorithm over predicting the calories burned.

I .BENEFITS OF REGULAR PHYSICAL ACTIVITY

1. Exercise controls weights
Exercise can assist save you extra weight advantage or assist keep weight loss. When you have interaction in bodily activity, you burn energy. The extra severe the activity, the extra energy you burn.
2. Exercise combats health condition and diseases
Regular journeys to the health clubnasium are great,

however do not worry in case you cannot discover a big bite of time to exercising each day. Any quantity of pastime is higher than none at all. To gain the blessings of exercising, simply get greater energetic all through your day — take the steps as opposed to the elevator or rev up your family chores. Consistency is key.

3. Exercise combats health condition and diseases

Worried approximately coronary heart disease? Hoping to save you excessive blood pressure? No be counted what your modern weight is, being lively boosts excessive-density lipoprotein (HDL) cholesterol, the "good" cholesterol, and it decreases bad triglycerides. This one- punch maintains your blood flowing smoothly, which decreases your danger of cardiovascular diseases.

4. Exercise promotes better sleep

Winded via way of means of grocery buying or family chores? Regular bodily hobby can enhance your muscle electricity and increase your endurance.

Exercise supplies oxygen and vitamins on your tissues and facilitates your cardiovascular device paintings greater efficiently. And while your coronary heart and lung fitness enhance, you've got got greater electricity to address every day chores.

Struggling to snooze? Regular bodily interest let you doze off faster, get higher sleep and deepen your sleep. Just do not exercising too near bedtime, or you will be too energized to visit sleep.

5. Exercise can be fun

Exercise and bodily hobby may be enjoyable. They come up with a risk to unwind, experience the outside or genuinely interact in sports that make you happy. Physical hobby also can assist you connect to own circle of relatives or buddies in a amusing social setting.

So take a dance class, hit the trekking trails or be part of a football team. Find a bodily pastime you enjoy, and simply do it. Bored? Try some thing new, or do some thing with buddies or family.

6. Exercise boosts energy

Winded with the aid of using grocery buying or family chores? Regular bodily interest can enhance your muscle energy and improve your endurance.

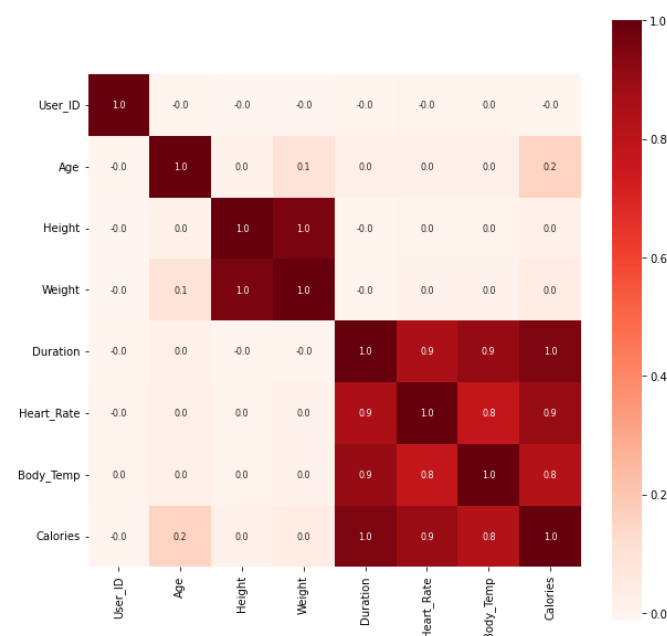
Exercise grants oxygen and vitamins in your tissues and allows your cardiovascular gadget paintings extra efficiently. And while your coronary heart and lung

fitness enhance, you've got got extra strength to address day by day chores.

The Bottom line on exercise

Exercise and bodily interest are incredible methods to sense better, raise your fitness and feature fun. For maximum healthful adults, the U.S. Department of Health and Human Services recommends those exercising guidelines.

- **Aerobic Activity:** Get at the least one hundred fifty mins of mild cardio interest or seventy five mins of full of life cardio interest per week, or a aggregate of mild and full of life interest. The hints endorse which you unfold out this workout throughout the route of per week. To offer even more fitness gain and to help with weight reduction or retaining weight reduction, at the least three hundred mins per week is recommended. But even small quantities of bodily interest are helpful. Being energetic for quick intervals of time during the day can upload as much as offer fitness gain.
- **Strength education:** Do power education physical games for all foremost muscle companies as a minimum instances a week. Aim to do a unmarried set of every exercising the use of a weight or resistance stage heavy sufficient to tire your muscular tissues after approximately 12 to fifteen repetitions.



- **Moderate cardio exercising** consists of sports together with brisk walking, biking, swimming and mowing the lawn. **Vigorous cardio exercising** consists of sports together with running, heavy yardwork and cardio dancing. **Strength education** can consist of use of weight

machines, your very own frame weight, heavy bags, resistance tubing or resistance paddles withinside the water, or sports together with rock climbing.

I. DATA DESCRIPTION

In this, I have used two data files one is exercise.csv and calories.csv. Exercise.csv file contain data about person it contain person's

- User_ID
- Gender
- Age
- Height
- Weight
- Duration (exercise)
- Heart_rate Average
- Body_Temperature

Calories.csv file contain :-

- User_ID
- Calories

INFO ON NULL VALUES

```
User_ID      0
Gender       0
Age          0
Height       0
Weight       0
Duration     0
Heart_Rate   0
Body_Temp    0
Calories     0
dtype: int64
```

I. TO HANDLE MISSING VALUES IN DATASET

In actual global records, there are a few times in which a selected detail is absent due to diverse reasons, such as, corrupt records, failure to load the information, or incomplete extraction. Handling the lacking values is one of the finest demanding situations confronted via way of means of analysts, due to the fact making the proper choice on a way to deal with it generates strong records models. Let us study exceptional approaches of imputing the lacking values .

1. 1. Deleting Rows

This technique generally used to address the null values. Here, we both delete a selected row if it has a null fee for a selected function and a selected column if it has extra than 70-75% of lacking values. This technique is recommended best whilst there are sufficient samples withinside the facts set. One has to ensure that once we've deleted the facts, there's no addition of bias. Removing the facts will cause lack of data to be able to now no longer deliver the predicted outcomes whilst predicting the output.

2. 2. Replacing with Median/Mode/Mean

This approach may be implemented on a characteristic which has numeric facts just like the age of someone or the price price tag fare. We can calculate the mean, median or mode of the characteristic and update it with the lacking values. This is an approximation that could upload variance to the facts set. But the lack of the facts may be negated via way of means of this technique which yields higher effects in comparison to elimination of rows and columns. Replacing with the above 3 approximations are a statistical method of dealing with the lacking values. This technique is likewise referred to as as leaking the facts whilst training. Another manner is to approximate it with the deviation of neighbouring values. This works higher if the facts is linear.

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15000 entries, 0 to 14999
Data columns (total 9 columns):
#   Column      Non-Null Count  Dtype
---  ---
0   User_ID     15000 non-null  int64
1   Gender      15000 non-null  object
2   Age         15000 non-null  int64
3   Height      15000 non-null  float64
4   Weight      15000 non-null  float64
5   Duration    15000 non-null  float64
6   Heart_Rate  15000 non-null  float64
7   Body_Temp   15000 non-null  float64
8   Calories    15000 non-null  float64
dtypes: float64(6), int64(2), object(1)
memory usage: 1.0+ MB
```

3. Assigning a unique category

An express function can have a precise range of possibilities, together with gener, for example. Since they've a precise range of classes, we will assign any other magnificence for the lacking values. Here, the functions Cabin and Embarked have lacking values which may be changed with a brand new category, say, U for 'unknown'. This method will upload extra data into the dataset in an effort to bring about the alternate of variance. Since they're express, we want to locate one warm encoding to transform it to a numeric shape for the set of rules to recognize it.

4. Predicting the missing values

Using the functions which do now no longer have lacking values, we are able to are expecting the nulls with the assist of a gadget getting to know algorithm. This approach can also additionally bring about higher accuracy, until a lacking fee is predicted to have a completely excessive variance. We could be the usage of linear regression to update the nulls withinside the feature 'age', the usage of different to be had functions. One can test with distinctive algorithms and test which offers the excellent accuracy in preference to sticking to a unmarried algorithm.

5. Using Algorithms which support missing values

KNN is a gadget getting to know set of rules which matches at the precept of distance measure. This set of rules may be used whilst there are nulls gift withinside the dataset. While the set of rules is applied, KNN considers the lacking values through taking the bulk of the K nearest values. In this precise dataset, deliberating the person's age, sex, magnificence etc, we can expect that human beings having equal statistics for the above noted functions may have the equal sort of fare.

But is good we don't have to use any one of it because we have don't have any missing or null value in dataset

II. CORRELATION IN DATASET

Machine Learning fashions are as desirable or as awful because the records you have. That's why records scientists can spend hours on pre-processing and cleaning the records. They pick out best the functions that might make a contribution maximum to the first-rate of the ensuing version. This procedure is called "Feature Selection". Feature Selection is the procedure of choosing the attributes that could make the expected variable extra correct or doing away with the ones attributes which might be inappropriate and may lower the version accuracy and first-rate.

Data and function correlation is taken into consideration one vital step withinside the function choice section of the facts pre-processing mainly if the facts kind for the functions is continuous.

Data Correlation: Is a manner to recognize the connection among more than one variables and attributes on your dataset. Using Correlation, you may get a few insights such as:

- One or multiple attributes depend on another attribute or a cause for another attribute.
- One or multiple attributes are associated with other attributes.

Why Correlation is useful?

- Correlation can help in predicting one attribute from another (Great way to impute missing values).
- Correlation can (sometimes) indicate the presence of a causal relationship.
- Correlation is used as a basic quantity for many modelling techniques.

The overall performance of a few algorithms can go to pot if or greater variables are tightly related, referred to as multicollinearity. An instance is linear regression, in which one of the offending correlated variables must be eliminated in an effort to enhance the ability of the model.

We can also be inquisitive about the correlation among enter variables with the output variable so as offer perception into We can also be inquisitive about the correlation among enter variables with the output variable so as offer perception into which variables can also additionally or might not be applicable as enter for growing a model. The shape of the connection can be known, e.g. it could be linear, or we can also additionally don't have any concept whether or not a dating exists among variables or what shape it could take. Depending what is thought approximately the connection and the distribution of the variables, one of a kind correlation rankings may be calculated.

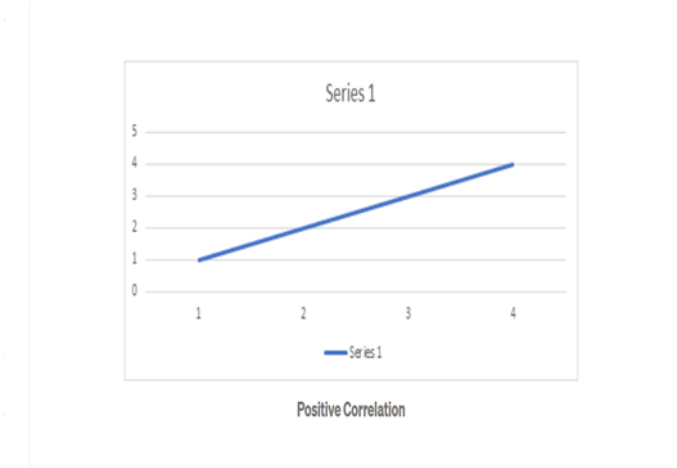
Types Of Correlation: -

1. Positive Correlation

Two features (variables) may be undoubtedly correlated with every other. It manner that after the price of 1 variable growth then the price of the opposite variable(s) additionally increases

A tremendous correlation does now no longer assure boom or benefit. Instead, it's far used to indicate any or greater variables that flow withinside the identical course together, so whilst one increases, so does the opposite.

But the lifestyles of a correlation does now no longer always imply a causal courting among variables. Correlation is a shape of dependency, in which a shift in a single variable manner a alternate is in all likelihood withinside the other, or that sure acknowledged variables produce precise results. A widespread instance may be visible inside complementary product call for. If the call for for automobiles rises, so will the call for for vehicular-associated merchandise and services, together with tires. An growth in a single vicinity has an impact on complementary industries

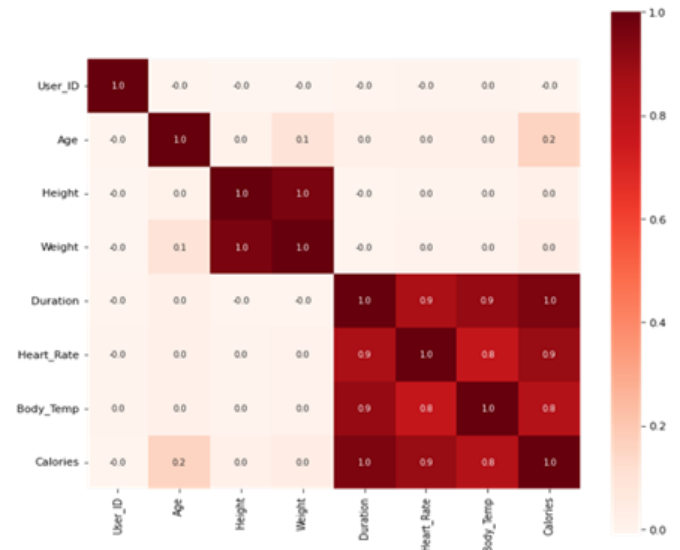


2. Negative Correlation

Two features (variables) may be negatively correlated with every other. It way that after the cost of 1 variable boom then the cost of the opposite variable(s) decreases. In phrases of device gaining knowledge of a robust correlation (both high-quality or negative) is ideal news. Your classifier has a relation among variables that it could paintings with. No correlation (zero, 0) is bad, due to the fact that there would not appear a relation among the features.

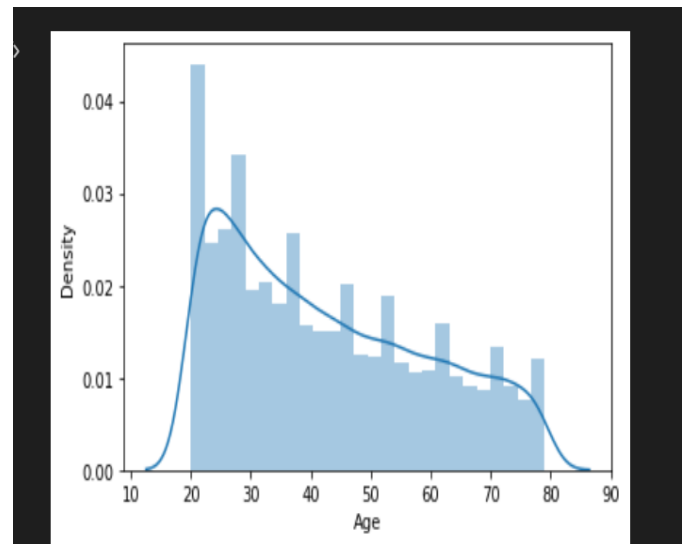


BELOW HEAT MAP SHOWS CORRELATION

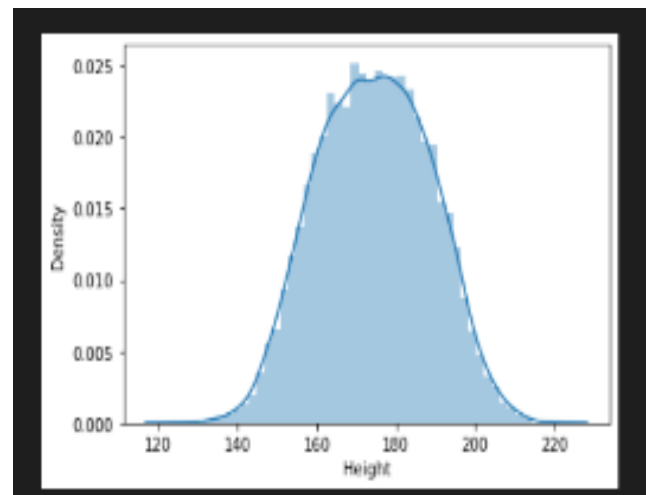


DATA VISUALISATION

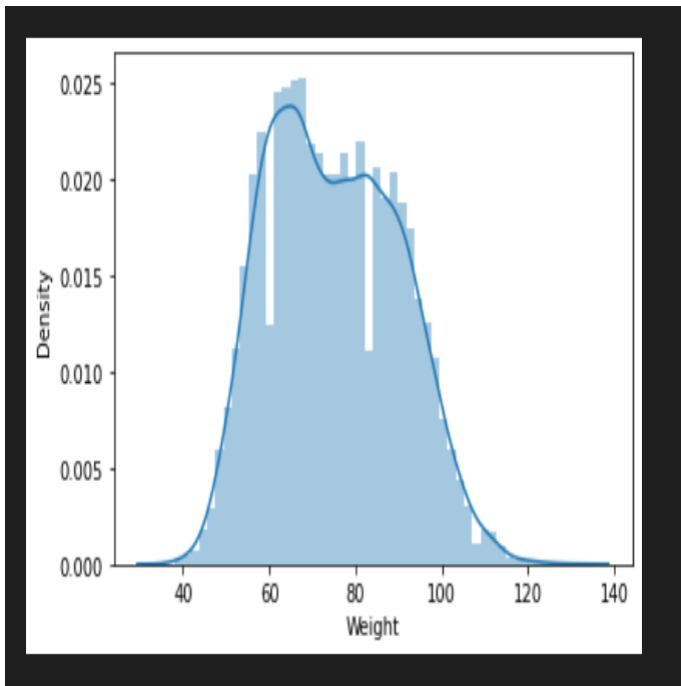
1. Distribution of Age Column



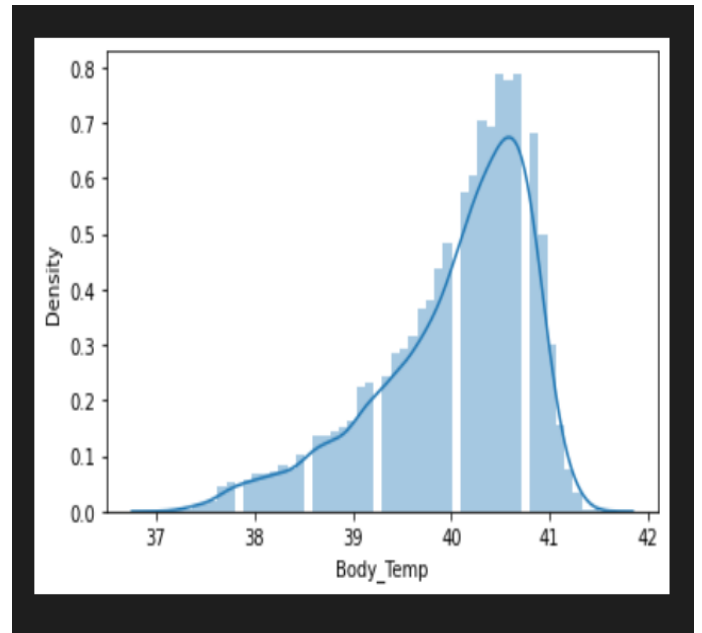
2. Distribution of Duration



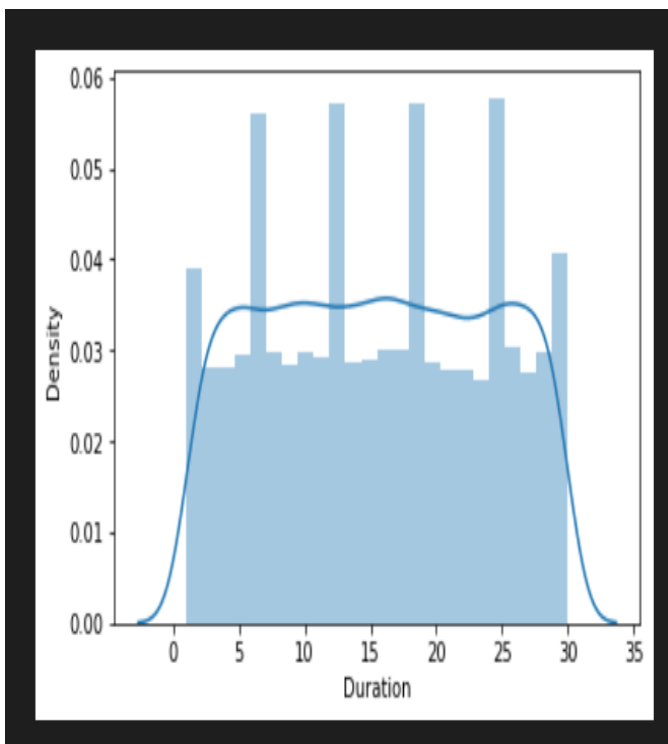
3. Distribution of Weight Column



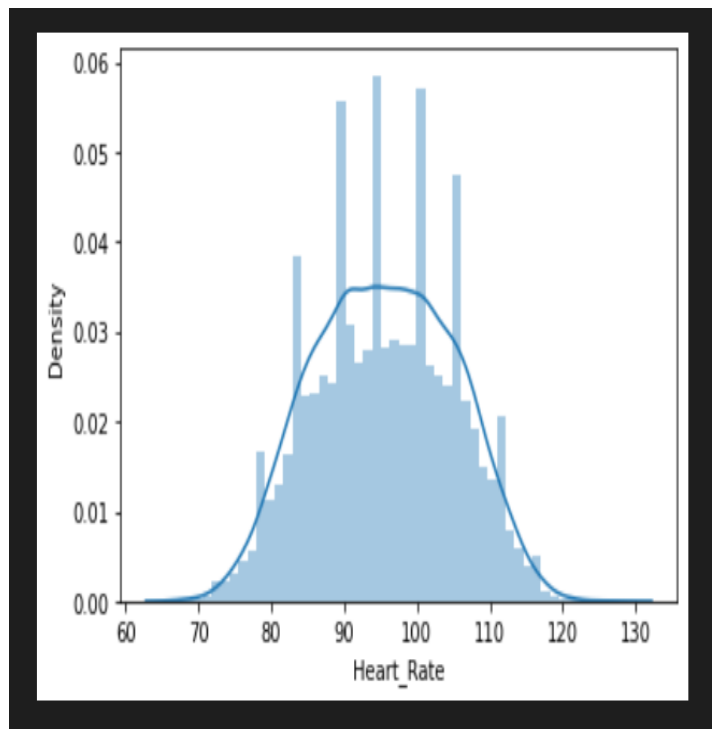
5. Duration of Body Temperature Column



4. Distribution of Duration Column



6. Distribution Of Heart Rate Column





CONCLUSION

This paper is to empower the person through a convenient, wise device that facilitates them emerge as practical approximately their calorie intake. We hired alternatively specific deep mastering neural networks as a way of correctly classifying and spotting meals items. We get the type version accuracy of 91.65%. However, the CNNs want high- overall performance computing machines if you want to test at the large multi-media datasets. The CNN is able to education fantastically non-linear data, and for that during contrast, it takes greater computational time to teach network. However, the overall performance is topics and as soon as the device is nicely trained, the device can produce the outcomes in much less time.

However I have done train, my model, by XGBOOST Regressor and later on I compare the prediction values by given and MAE is calculated.

REFERENCES

- [1] Lili Pan, Samira Pouyanfar, Hao Chen, Jiaohua Qin, Shu-Ching Chen (2017). DeepFood: Automatic Multi-Class Classification of Food Ingredients Using Deep Learning - IEEE 3rd International Conference on Collaboration and Internet Computing, 2017, DOI 10.1109/CIC.2017.00033
- [2] Wu W. and Yang J. (2009), "Fast food recognition from videos of eating for calorie estimation," in Multimedia and Expo, ICME 2009. IEEE International Conference on. IEEE, (pp.1210–1213)
- [3] Pouladzadeh P., Shirmohammadi S., Bakirov A., Bulut A., & Yassine A. (2014).Cloud-based SVM for food categorization, Multimedia Tools and Applications, 74(14), 5243–5260, DOI 10.1007/s11042-014-2116-x

[4] Zhang W., Zhao D., Gong W., Li Z., Lu Q., & Yang S. (2015),

Food Image Recognition with Convolutional Neural Networks. 2015 IEEE 12th Intl Conf on Ubiquitous Intelligence and Computing and 2015 IEEE 12th Intl Conf on Autonomic and Trusted Computing and 2015 IEEE 15th Intl Conf on Scalable Computing and Communications and Its Associated Workshops (UIC-ATC-ScalCom),DOI 10.1109/UIC-ATC-ScalCom-CBDCCom-IoP.2015.139

[5] National Food Security Mission, Operational Guidelines, Department of Agriculture and Cooperation, Ministry of Agriculture, Govt of India ,2007

