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Prediction of BMI Using Predictive Analytics

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Abstract

Predictive analytics is the latest technology in which statistical and analytics data techniques are used for making predictions. Predictive analytics use the technologies like statistics, machine learning, and data mining. It has base of classical statistical method. With the help of predictive analytics, the future outcomes can be predicted. A score is given by predictive analytics models. A higher score means higher instance of an event and a lower score means the lower instance of an event. With the help of predictive analytics many business problems are solved. The models help to identify the risks and opportunities of individual customer, employee or manager of an organization. In this paper, I will present a BMI calculation prediction using height and weight of the persons and Body Mass Index is calculated and the outcomes are given like Underweight, Healthy Person, Overweight, Obesity.

Keywords: Body Mass Index, Neural Network, Prediction Analysis.

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1.Introduction

We have often seen predicting things like if I do this, this will happen, so predictive analytics is the same thing. It is basically the branch of data analytics, in which the predictions are done for future outcomes with the help of historical data along with statistical models, data mining techniques and machine learning.

It basically use the statistics and model technique for the predictions about future performance and outcomes. It looks all the historical data patterns to determine those patterns are likely to come again. It encompasses the variety of statistical techniques from data mining, predictive modeling and machine learning that actually analyze the current and historical facts about future or otherwise unknown events.

This is widely useful for investors and business people. It gives slight idea about how their money will grow. So that the risk factor is much decreased and is more efficient. Predictive Analytics judges relationships among factors to access.

2. Applications of predictive analytics

1. Weather predicting.

2. Video games.

3. Translation of voice to text on mobile.

4. Investment Portfolio.

5. Customer Acquisition.

6. Detection of fraud.

7. We have to see how many numerical values are there, what kind of data types are there inside the data.

8. Checking the file extensions, like csv, etc..
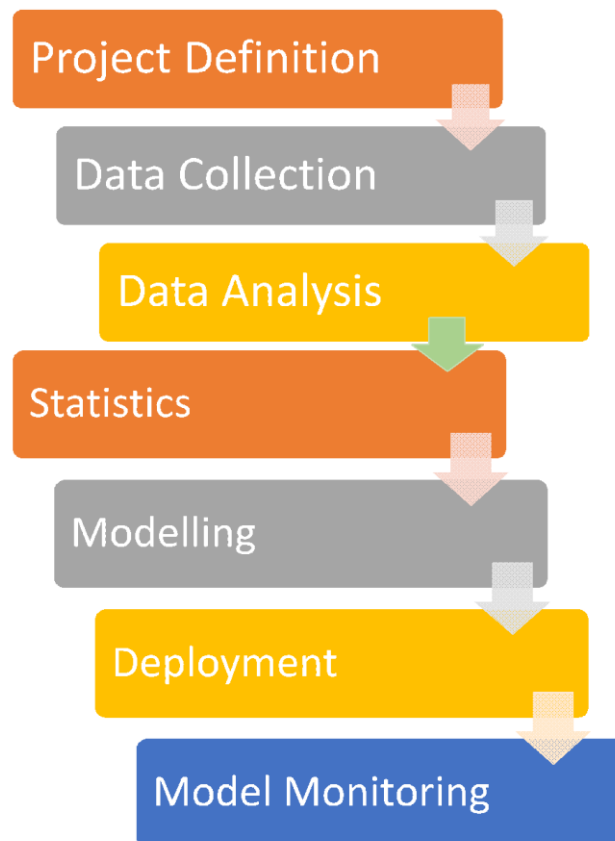
3. Steps of Predictive Analytics

Figure 1. Steps of Predictive Analytics

3.1. Finding the problem

Prediction of outcomes, identifying the problem, objective of the analysis, identifying the data sets used in this process.

3.2. Collection of Data

Required data is collected. In which the past reference's, historical charts, etc. data is there. After knowing the requirement of the customer , collection of datasets are performed by the analysts, information is collected from different sources. This is the complete information of the regular consumers of the company. The data may be in the structured form or in unstructured form. The analyst verifies the information on their own level.

3.3. Cleaning of Data

In this process the filters are used. The unnecessary data and duplicate data is removed.

3.4. Analysis of Data

Data exploration is done in this stage. Many outcomes and patterns are identified. Useful information is obtained in this stage. Patterns and trends are decided.

3.5. Building Predictive Model

Various algorithms are used based on the patterns observed in above stage. Hypothesis is also tested in this.

3.6. Data Validation

Data efficiency is checked using multiple tests. Validity of the model is checked using the sample input. Accuracy should also be validated in this stage.

3.7. Deployment of the model

In this stage the model is made in real-environment, many discussions are performed.

3.8. Model Monitoring

After the multiple testing, the model is given to the client for daily predictions and for decision making process. By taking that data the report is generated. And after that the model is regularly monitor to check if model is giving the accurate results.

4. Predictive Analytics Techniques

4.1. Decision Tree

A decision tree is used for creating and visualizing the predictive models and algorithms. Decision trees are the popular choice for predictive analytics because it is easy to understand and effective method. The data is divided into smaller segments. There are two stages to prediction. First stage is training stage. In this stage tree building, testing and optimization from available data is done. Second stage is prediction of unknown results.
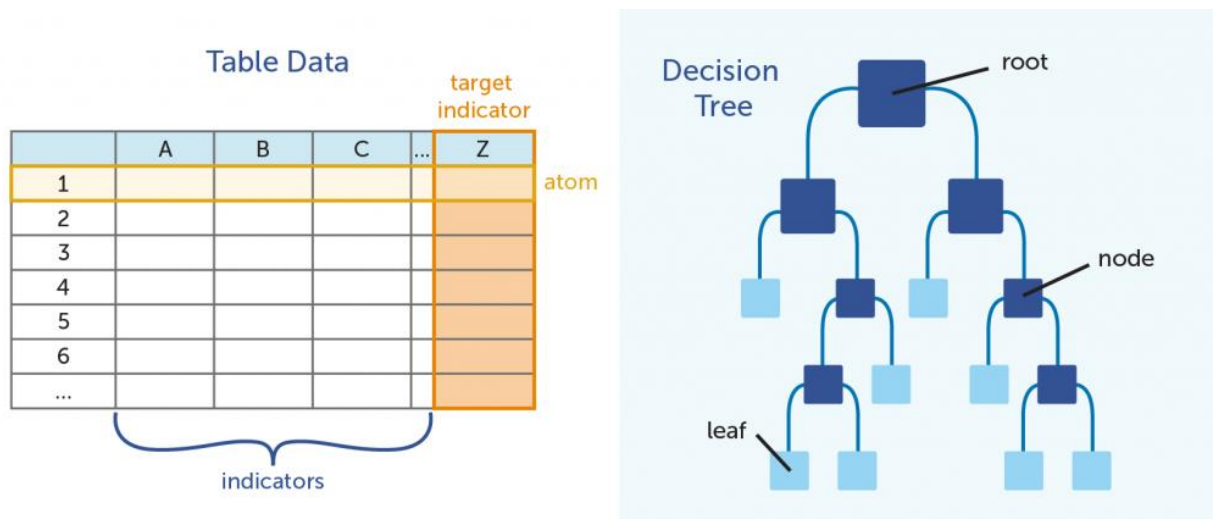

Figure.2. Indicators

Column Z is the *Target Indicator; it is piece of information that is being predicted.* The columns A, B, C, etc are called **Indicators.** This are used to make predictions. With multiple indicators the **Indicator vector** is formed.

4.2. Regression Model

Linear regression method is used for predictive analysis. With the use of linear regression graph is obtained it calculates the relationship between a dependent and independent variables to predict the values.
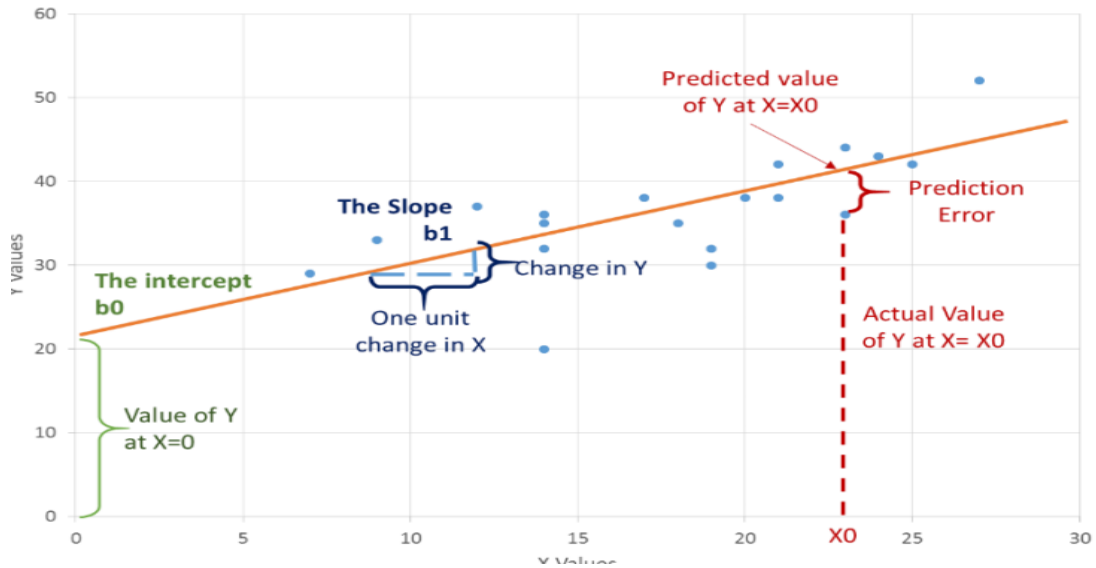
Figure.3. Example of linear regression is height and weight, income and expenses.This is usually in straight line.

Multiple Regressions uses more than one input that will affect the output. For multiple regressions, it is important to identify the second input that will affect the output. Non-Linear used in some parts of marketing. For example as the number of emails is increased in a particular data, the number of responses starts to decline vs. the number of emails sent. To model this, we need a non-linear regression model.

4.3. Neural Network

Neural networks consist of hidden layers. In Linear regression input nodes and output nodes are used for make predictions. Due to hidden layer predictions become more accurate.

4.3.1. Layers of neural networks

The input layer: - The data values from past into the next (hidden) layer.

The hidden layer uses many complex functions to extract predictors mostly these functions are hidden from the user. The black circles (set of nodes) represent mathematical functions in which modification of input data, which is called neurons.

The output layer: - The data is collected from hidden layer to produce the final result.
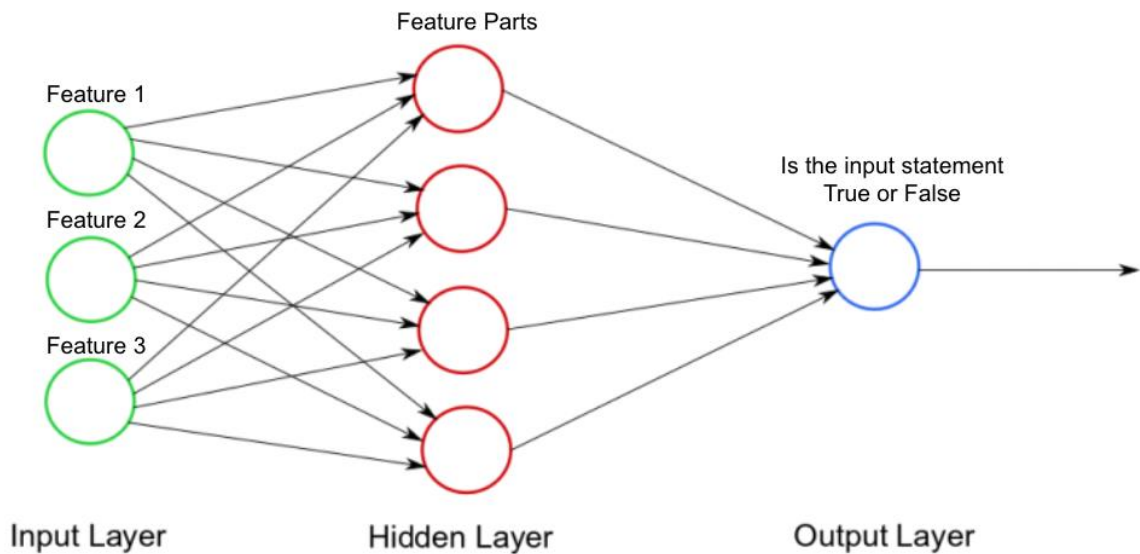

Figure.4. Neural network Structure

5. Data predicted for BMI

For doing the predictive analytics, it must be clear which data we are dealing with. In this analysis I have taken the data like height in centimeters, weight in kilograms and by comparing it the Body mass index is calculated.

Formula= [BMI= weight (kg)/ [height (m)] ^2.

Ranges are provided in which we will be able to get the weight status.

Table 1: BMI and Weight Status

S. No	BMI	Weight Status
1	Below 18.5	Underweight
2	18.5-24.9	Normal Weight
3	25.0-29.9	Overweight
4	30.0-39.9	Obesity class 1
5	35.0-39.9	Obesity class 2
6	Above 40	Obesity class 3

Table 2: BMI, Height and Weight

S. No.	Height(cm)	Weight(kg)	BMI(kg m^2)
1	159	55	21.76
2	166	62	22.50
3	172	65	21.97
4	170	80	27.68
5	162	45	17.15
6	163	59	22.21
7	164	58	21.56
8	165	66	24.24
9	168	75	26.57
10	180	70	21.60
11	169	96	33.61
12	172	60	20.28
13	166	82	29.76
14	150	45	20.00
15	155	46	19.15
16	154	57	24.03
17	176	98	31.64
18	165	53	19.47
19	184	74	21.86
20	145	65	30.92
21	159	49	19.38
22	175	38	12.41
23	167	96	34.42
24	158	66	26.44
25	190	99	27.42

Table 3: Body Mass Index

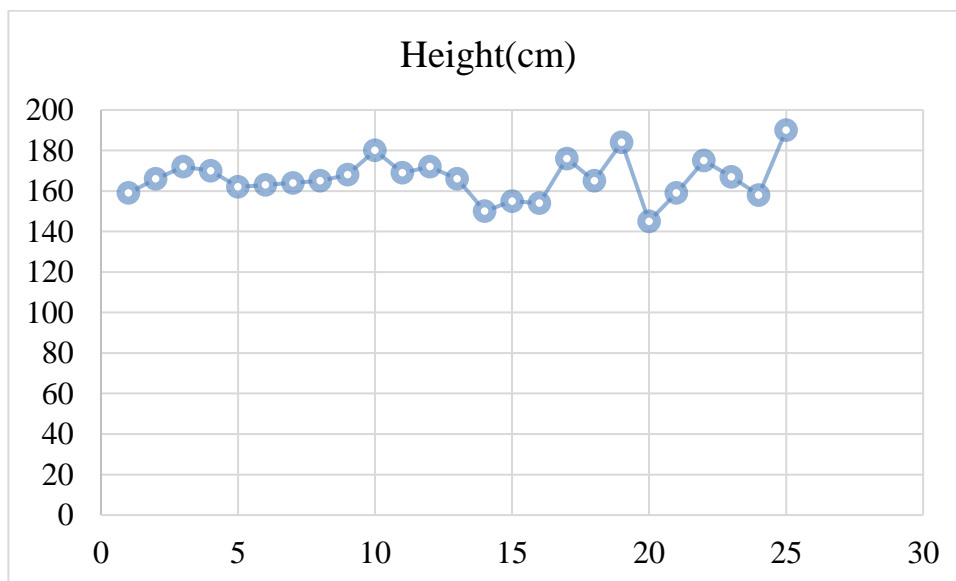| Specifications	Details
Formula	BMI=(Weight/height/height)*10000
BMI Ranges	1)Below 18.5- you're underweight
	2)between 18.5 and 24.9- Normal
	3) Between 25.0-29.9- Overweight
	4) Between 30.0-39.9-Obesity class 1
	5) Between 35.0-39.9- Obesity class 2
	6) Above 40 – Obesity class 3

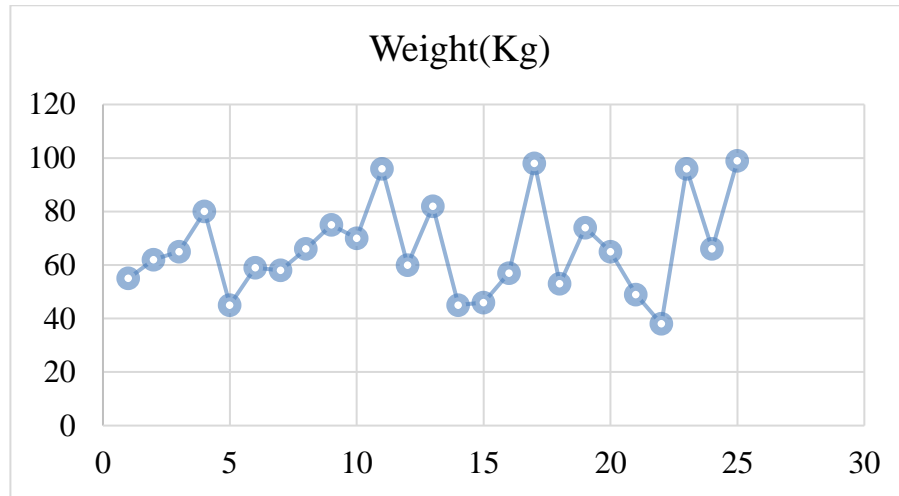**Figure.5. Variation in height**

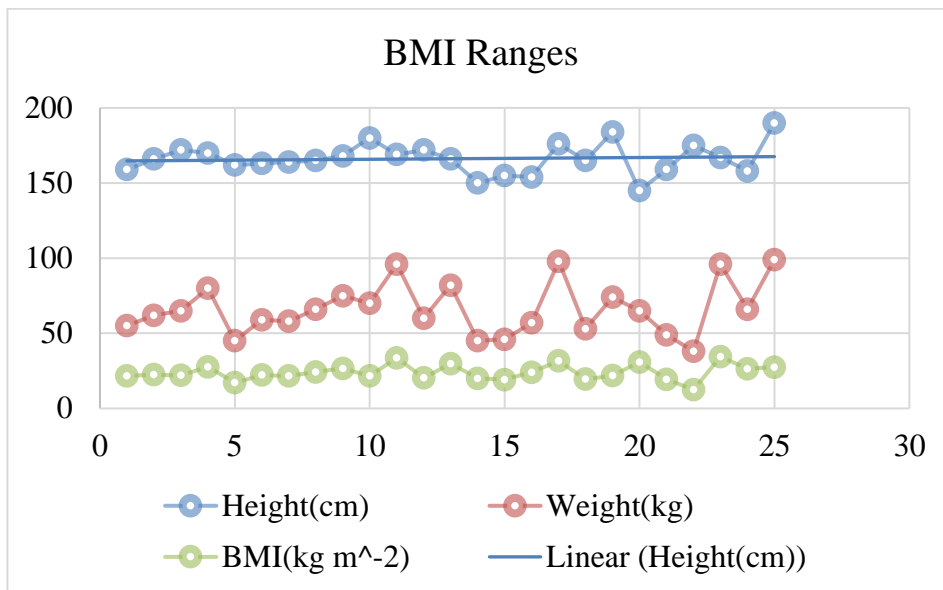**Figure.6. Variation in Weight**

Figure.7. Variation in BMI Ranges

6. Conclusion

Initially the statistical model means the predictive models which contained the large quantity of data. Predictive analytics was in use for a long period of time. Later much advancement in science new techniques was developed. Algorithms were developed. Predictive Analytics

requires the knowledge of R, data mining, Python, etc. The machine learning keeps the track of record that will be used as predictive models.

In this research paper I have calculated the Body Mass Function by taking the parameters like Height (in cms), and Weight (in kgs) by which the weight ratio is calculated. The average is 21. From which we conclude that most of the people are healthy.

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