Milk Grading System Using Machine Learning

Category: Machine Learning

Skills Required:
Python Web Frame Works, Python For Data Analysis, Python For Data Visualization, Exploratory Data Analysis, Data Preprocessing Techniques, Machine Learning, Classification Algorithms, Pandas, Matplotlib, Seaborn.

Project Description:

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THE PURPOSE of grading milk is to separate the available supply of potable milk into classes differing in superiority. Nearly all food products are graded in some way. so that the consumer may select milk for particular purposes according to his desires and pocketbook. Certified milk is practically the only stable grade, rules for production being laid down by the American Association of Medical Milk Commissions. There is a serious question as to whether or not it is possible in the present state of the industry to enforce uniform grades universally. The main problem here is not just the feature sets and target sets but also the approach that is taken in solving these types of problems.

We will be using classification algorithms such as Decision Tree, Random Forest, Support Vector Machine and Extra tree classifier. We will train and test the data with these algorithms. From this the best model is selected and saved in pkl format.

Technical Architecture:
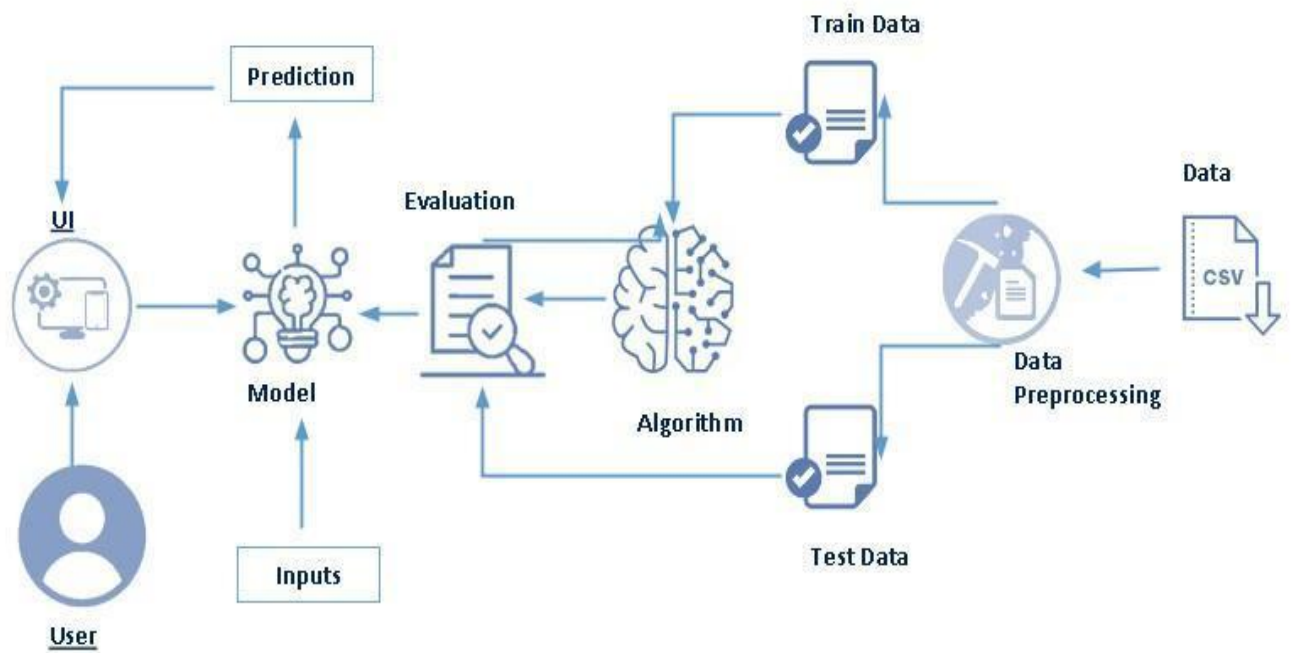
Project Objectives

By the end of this project you will:

- Know fundamental concepts and techniques used for machine learning.
- Gain a broad understanding about data.
- Have knowledge on pre-processing the data/transformation techniques on outlier and some visualization concepts.

Project Flow

- User interacts with the UI to enter the input.
- Entered input is analysed by the model which is integrated.
- Once model analyses the input the prediction is showcased on the UI

To accomplish this, we have to complete all the activities listed below,

- Data collection
    - Collect the dataset or create the dataset
- Visualising and analysing data
    - Univariate analysis
    - Bivariate analysis
    - Multivariate analysis
    - Descriptive analysis
- Data pre-processing
    - Checking for null values
    - Handling outlier
    - Handling categorical data
    - Splitting data into train and test
- Model building

Prior Knowledge

You must have prior knowledge of following topics to complete this project

1) ML Concepts

- o Supervisedlearning
- o Unsupervisedlearning
- o Regression and classification
- o Decisiontree
- o Randomforest
- o KNN
- o Svm
- o Extra tree classifier
- o Evaluationmetrics

- Flask Basics

Supervised Machine Learning

Supervised learning is the types of machine learning in which machines are trained using well "labelled" training data, and on basis of that data, machines predict the output. The labelled data means some input data is already tagged with the correct output.

In supervised learning, the training data provided to the machines work as the supervisor that teaches the machines to predict the output correctly. It applies the same concept as a student learns in the supervision of the teacher.

Supervised learning is a process of providing input data as well as correct output data to the machine learning model. The aim of a supervised learning algorithm is to **find a mapping function to map the input variable(x) with the output variable**

How Supervised Learning Works?

In supervised learning, models are trained using labelled dataset, where the model learns about each type of data. Once the training process is completed, the model is tested on the basis of test data (a subset of the training set), and then it predicts the output.

The working of Supervised learning can be easily understood by the below example and diagram:
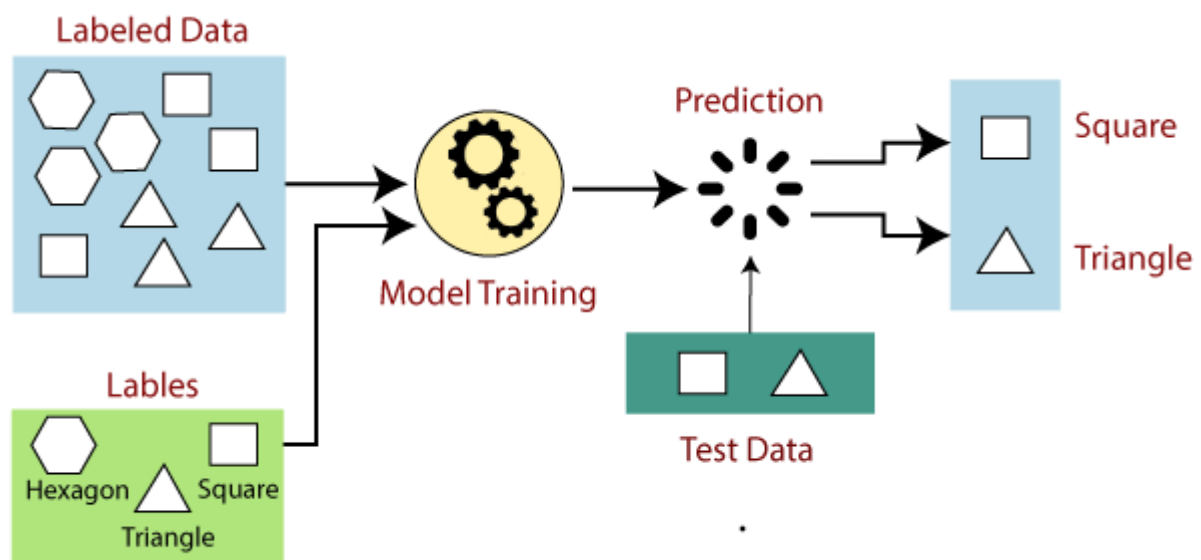
In the real-world, supervised learning can be used for **Risk Assessment, Image classification, Fraud Detection, spam filtering**, etc.

Unsupervised Machine Learning

Unsupervised learning is a machine learning technique in which models are not supervised using training dataset. Instead, models itself find the hidden patterns and insights from the given data. It can be compared to learning which takes place in the human brain while learning new things.

Unsupervised learning cannot be directly applied to a regression or classification problem because unlike supervised learning, we have the input data but no corresponding output data. The goal of unsupervised learning is to **find the underlying structure of dataset, group that data according to similarities, and represent that dataset in a compressed format**.

Example: Suppose the unsupervised learning algorithm is given an input dataset containing images of different types of cats and dogs. The algorithm is never trained upon the given dataset, which means it does not have any idea about the features of the dataset. The task of the unsupervised learning algorithm is to identify the image features on their own. Unsupervised learning algorithm will perform this task by clustering the image dataset into the groups according to similarities between images.

Why use Unsupervised Learning?

Below are some main reasons which describe the importance of Unsupervised Learning:

- o Unsupervised learning is helpful for finding useful insights from the data.
- o Unsupervised learning is much similar as a human learns to think by their own experiences, which makes it closer to the real AI.
- o Unsupervised learning works on unlabelled and uncategorized data which make unsupervised learning more important.
- o In real-world, we do not always have input data with the corresponding output so to solve such cases, we need unsupervised learning.

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C:\Users\LenSam\Downloads\Flask-20230615T111011Z-001\Flask

C:\Users\LenSam\Downloads\Flask-20230615T111011Z-001\Flask\templates\submit.html

app(ml).py × home.html × predict.html × submit.html ×

```
1   # -*- coding: utf-8 -*-
2   """
3   Created on Wed Jun  8 12:00:37 2022
4
5   @author: user
6   """
7
8   <!DOCTYPE html>
9   <html lang="en">
10  <head>
11      <meta charset="UTF-8">
12      <title>Output</title>
13      <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.
14      <style>
15          body
16          {
17          background-image: url("http://i0.wp.com/www.dairyproducts.it/eng/wp-content/uploads/201
18          background-size: cover;
19          }
20          h3.big
21          {
22          line-height: 1.8;
23          }
24      </style>
25  </head>
26  <body>
27      <br>
28          <div class="container">
29
30              <div class="row">
31                  <div class="col-md-12 bg-light text-right">
32                      <a href="/home" class="btn btn-info btn-lg">Home</a>
33                      <a href="/predict" class="btn btn-primary btn-lg">Predict</a>
34
35                  </div>
36              </div>
37              <br>
38              <h1><strong>Milk Grading System</strong></h1><br>
39              <h3>
40              The predicted grade for the milk is {{prediction_text}}
```

Name	Date Modified
templates	15-06-2023 16:40
home.html	07-06-2022 10:19
predict.html	07-06-2022 11:50
submit.html	07-06-2022 12:16
app(ml).py	15-06-2023 21:26
ibm deployment.py	07-06-2022 14:15
milk.pkl	07-06-2022 16:20

Help Variable Explorer Plots Files Profiler Code Analysis

Console 1/A ×

```
  warnings.warn(
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI
server instead.
 * Running on http://127.0.0.1:5000
Press CTRL+C to quit
127.0.0.1 - - [15/Jun/2023 22:04:40] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [15/Jun/2023 22:06:25] "GET /home HTTP/1.1" 200 -
127.0.0.1 - - [15/Jun/2023 22:06:31] "GET /predict HTTP/1.1" 200 -
C:\tools\Anaconda3\lib\site-packages\sklearn\base.py:420: UserWarning: X does not have valid feature
names, but SVC was fitted with feature names
  warnings.warn(
127.0.0.1 - - [15/Jun/2023 22:06:50] "POST /pred HTTP/1.1" 200 -
[['4', '20', '1', '1', '1', '1', '21']]
(1, 7)
[['4' '20' '1' '1' '1' '1' '21']]
Bad
127.0.0.1 - - [15/Jun/2023 22:06:57] "GET /home HTTP/1.1" 200 -
```

IPython Console History

conda: base (Python 3.10.9)   Completions: conda   Line 1, Col 1   UTF-8   CRLF   RW   Mem 86%

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127.0.0.1:5000/home

-*- coding: utf-8 -*- """ Created on Wed Jun 8 10:36:38 2022 @author: user """

Home   Predict

Milk Grading System

The objective of this article is to predict milk grading given the various parameters. This will be a classification problem since the target or dependent variable is the grade(categorical values).THE PURPOSE of grading milk is to separate the available supply of potable milk into classes differing in superiority. Nearly all food products are graded in some way. It appears equally logical to separate milk into similar classes so that the consumer may select milk for particular purposes according to his desires and pocketbook.The main problem here is not just the feature sets and target sets but also the approach that is taken in solving these types of problems. We will be using classification algorithms such as Decision tree, Random forest, svm, and Extra tree classifier. We will train and test the data with these algorithms

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