distinguish between different types of fruits

**Machine Learning**

**Final Version 1.0**

**Tshepo Makgoba**

# Revision and Approval

**Revision History**

The table 1 below explains the changes between approved revisions of this document.

Table 1: Revision History

| Ver. | Date | Author | Comment/Summary of Updates |
| --- | --- | --- | --- |
| 0.1 | 07 March 2021 | Tshepo Makgoba | Initial Draft. |
| 0.2 | 09 March 2021 | Tshepo Makgoba | Changes based on initial review |
| 1.0 | 10 March 2021 | Tshepo Makgoba | Introduction and relevant information |
| 1.1 | - | Tshepo Makgoba | Changes based on feedback from FNB interview panel |
| 1.2 |  |  |  |

# Focused Reviews

| **No.** | **Location** | **Reviewers** | **Sections Discussed** |
| --- | --- | --- | --- |
| 1 | TEAMS | FNB Panel |  |
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# Document Distribution

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| --- | --- |
| **Full Name** | **Business Area** |
| FNB Panel |  |
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# Reference Documents

| No. | Document Name | Version / Date | Attachment |
| --- | --- | --- | --- |
| 1 | Baseline model code | 10 March 2021 |  |
| 2 | Exploratory Data Analysis code | 10 March 2021 |  |
| 3 | Final model | 10 March 2021 |  |
| 4 | Dataset | 10 March 2021 |  |

# Abbreviations

The Table below details the terms, entities, acronyms and abbreviations relevant to this document.

| **Terms** | **Definition** |
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# Introduction

This is a business requirement document (BRD) for the classification of different types of fruits dated 10th of March 2021. This document is titled, DISTINGUISH BETWEEN DIFFERENT TYPES OF FRUITS, available in the [Reference Documents](#_Reference_Documents) section above.

This document serves as the requirements elicitation to the fruits classification project.

The objective of this project is to identify the machine learning algorithm that is best-suited to distinguish different types of fruits thus, we want to compare different algorithms, selecting the best-performing one.

The fruits dataset was created by Dr. Iain Murray from University of Edinburgh. He bought a few dozen oranges, lemons and apples of different varieties, and recorded their measurements in a table. And then the professors at University of Michigan formatted the fruits data slightly and it can be downloaded at the link available in the [Reference Documents](#_Reference_Documents) section above.

This is a supervised classification machine learning problem. It is supervised because there is labelled features and the target that will be used for prediction. During training the model is fed the features and target to learn how to map the data to a prediction. Moreover, this is a classification task because the target value is discrete classes (as opposed to continuous values in regression)

# Roadmap

Before any programming there must be a guide/overview/architecture to keep things on track

This roadmap pertains to the machine learning workflow once there is a problem and a model in mind. The ten steps to a successful end to end model build.

## Stating the question and determining the required data

### Can we distinguish different types of fruits? Although the question has already been checked off in the introduction section above.

### Why build a model instead of using an existing system or a simpler solution?

This approach is more effective and will results in higher productivity, reliability, availability, increased performance, and reduced operating costs for business (Retail Stores)

### What is the business value and how will the idea?

The value in this process is that, the model will be integrated with API’s and technological retail transformation systems to optimize cost and productivity while maximizing business value.

It will be integrated with paying system automation, for product detection and scaling.

## Acquire the data in an accessible format

The data is accessed through a link available in the reference section above. It is a text document that can be parsed in languages such as Python and R

Figure 1 below depicts a data frame view of the data

Table

Description automatically generated

Figure 1: Data view

The dataset is made of 59 entries and 7 columns. Target variable is fruit\_label

There are two categorical variables and 5 numerical variables

Figure 2 below depicts an overview information of the dataset.

Table

Description automatically generated

Figure 2: Overview

## Identify and correct missing data points/anomalies as required

There are no missing values, which is a great. Missing data can impact an analysis as can incorrect data or outliers.

Figure 2 below depicts a view and calculation of missing valuesShape

Description automatically generated

Figure 3: Missing values

* Data was very clean, No missing values, in tidy format
* Preprocessing preparing the data for modeling

Approach to impute for future reference

* Categorical base imputer for categorical data
* Mean imputer for numerical data
* Median imputer for numerical data
* Drop columns or rows with NA’s based of 5% rule

## Prepare the data for the machine learning model

## Establish a baseline model to exceed

## Train the model on the training data

## Make predictions on the test data

## Compare predictions to the known test set targets and calculate performance metrics

## If performance is not satisfactory, adjust the model, acquire more data, or try a different modeling technique