

## **Engineering Method**

### **Problem description:**

Alfonso is a genius biologist who loves to eat various kinds of mushrooms every day. One day he was eating mushrooms while reading the news and he found an article in the Smithsonian Magazine website titled “You May Have Been Eating Mushrooms That Were Unknown to Science” (link to the article: <https://www.smithsonianmag.com/smart-news/you-may-have-been-eating-mushrooms-unknown-science-180951974/>). For more information about the article, please consult the bibliography included at the end of this document). According to the article, many mushrooms, including some we eat every day, are still unknown to science and may be poisonous or harmful to our health. Since he eats many mushrooms every day, Alfonso got scared and shared the article with his biologist colleagues. His biologist colleagues then asked our team, TWICE Spiderman (a team made up of Esteban Ariza, Johan Sebastián Giraldo, Juan José Restrepo and Mateo Valdés), for help.

The biologists say that we must first read the data already available regarding the mushrooms. Furthermore, the biologists advise us to make graphs and charts about all the available data in order to get a better grasp of the information. Finally, they want us to use all of the information and determine, given any mushroom’s attributes, whether the mushroom is edible or poisonous. They say that if we do this Alfonso will be able to enjoy mushrooms again without feeling scared and crying.

### **Identifying the problem:**

The biologists want a way to determine if a mushroom is edible or poisonous given its attributes.

### **Research:**

#### **Decision trees:**

Decision trees is “a predictive model that divides the predictor space by grouping observations with similar values for the response or dependent variable” (maximaformacion, 2020).

The process of these is dividing the space of the predictors, grouping observations with similar values for a response or dependent variable, thus dividing the sample space into subregions, of which a series of rules or decisions

applies, so that each subregion has the equal greater quantity of the individuals of one of the populations. If one of the sub-regions contains data different from the classes, it is divided into even smaller sub-regions until they are separated into smaller sub-regions that integrate data from the same class (maximaformacion, 2020).

### **Fungi:**

Living beings that are part of the Fungi Kingdom, one of the groups in which life is classified, are commonly called fungi. There are more than 144,000 different species of fungi (caracteristicas.co, 2020). In turn, fungi are classified into four large groups: **Saprophytes** (They feed on the decomposition of organic matter), **Mycorrhizae** (Proliferates in plants, exchanging nutrients), **Lichenized** (Product of union with a cyanobacteria), **Parasite** (Poriferan inside the body of other living beings).(caracteristicas.co,2020). We recognize when a mushroom is edible given its smell or taste, the shape of the hat. One of the edible mushrooms are the white cap mushrooms, characterized by their strong smell, short and thick feet, likewise truffles are another type of edible mushrooms that grow on the roots of plants. Finally we have the poisonous mushrooms, which their species are: Amanita Phalloides, Amanita Muscaria, Cortinarius Orellanus, Lactarius Scrobiculutus, etc.

### **Food and Agriculture Organization of the United Nations (FAO):**

FAO is the agency charged with ending hunger. Its objective is to achieve food security for all and at the same time regulate sufficient food (...) with more than 194 member states, the FAO works in more than 130 countries. Finally, Develops international standards to guarantee quality food for all, maintains the largest and most complete statistical database in the world on food and agriculture (Food and Agriculture Organization, 2020).

### **.NET Framework:**

.NET Framework The .NET Framework is a “software development framework for building and running applications on Windows” (Microsoft Corporation, 2020). There are two major components in the .NET Framework. One component is the Common Language Runtime (CLR), which is an execution engine used to run the applications with features such as garbage collections, threading and exception handling; the other component is the Class Library, which contains various APIs and types to perform actions such as reading and writing files and drawing objects on the screen (Microsoft Corporation, 2020).

**Kaggle:**

Kaggle is “a crowd-sourced platform to attract, nurture, train and challenge data scientists from all around the world to solve data science, machine learning and predictive analytics problems” (Usmani, 2017). The platform has hundreds of thousands of active members from all over the world and receives more than 100 thousand submissions per month (Usmani, 2017). It contains courses, contests, and a huge collection of datasets.

**Windows Forms:**

Windows Form is a UI Framework that is part of the .NET Framework. It can be used to create desktop applications and various features to process and visualize data; furthermore, it has a visual designer integrated in Visual Studio (Microsoft Corporation, 2020).

**Bibliography:**

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**Creative solutions:**

Brainstorming: