Business understanding

Mushroom hunting is a hobby popular in Estonia, Russia, Poland and many other countries. It implies going a far distance from cities to some forest and gathering edible mushrooms (to eat them afterwards). It is common to spend 3-5 or more hours in the forest and to gather about 10 liters of mushrooms, although the volume depends greatly on how lucky and trained the hunter is. Of course, not all mushrooms that can be found in the forest are edible, and this is a major inconvenience, since an inexperienced gatherer could pick all the mushrooms and later (after consulting with experienced gatherers) find out that some or even most of them are not edible.

Given the small dataset we would not try to build a system that will be sufficient to determine if a mushroom is safe to eat, since wrongly assuming that a mushroom is safe could end up badly (need for hospitalization). This may only change if we find a larger dataset that will be homogeneous-enough with ours. Instead, we would like to build a system (probably an application) that will allow an inexperienced mushroom hunter to gain some experience and to learn how inedible mushrooms look, so that he/she will not pick them up. This means that afterward consulting is still necessary. Given that, in the long run the system could ask the hunters to provide their data and therefore become better; possibly one day eliminating the need of consulting. The system should determine if a mushroom is edible in under a second on a personal computer, learning time is not bounded strictly (a few hours on a personal computer). Usability questions (for example: "Will there be an Android app for this and will it be easy to use to beginner hunters?") are currently outside of the scope of the project.

Our project success criteria: we hope to create a system that potentially could be used by inexperienced mushroom hunters to gain some advantage. The instructors could help us evaluate if the system would be sufficient for this.

In this project we will use Kaggle dataset (https://www.kaggle.com/uciml/mushroom-classification) and our personal computers. In a long run, we could use help of experienced mushroom hunters to better predict edibility. We will spend some time seeking bigger suitable datasets in the Internet. If we success finding one, we will use it. Software: python with some libraries, possibly Jupiter notebook.

Project should hopefully be done until deadline.

There is a risk that a dataset this small will not be sufficient to meet the goals. As a "workaround", we will publish as it is but with a feature to add more data (discussed earlier). Also, there is a risk that our clusterization goal will fail (since we do clusterization and not classification, which is much simpler). The "workaround" will be as with the first risk.

Things that grow in forest and have mycelia are mushrooms, the project is centered about such mushrooms.

Mushroom hunter/shroomer/gatherer/hunter - a person who is involved with activity described in the project overview. This activity is called mushroom hunting/shrooming/gathering/hunting. Edible mushroom is safe to eat if processed properly, no important health concerns present. Inedible means not edible.

Cap, gill, stalk, veil, ring, spore – all parts of mushroom. Properties of cap are: shape, surface, color. Properties of gill are: attachment, spacing, size, color. The mushroom can have or not have bruises and may have a type of odor.   
Habitat – where a species of a mushroom usually grows. Population – how often the species can be seen in its habitat.

Costs and benefits - our project is not for money, but if we need profit, we may consider making our system paid. Costs – since our project is run 2 enthusiasts, there will not be any significant costs to the project.

Our model should achieve the following: system correctly identifies at-least 80% of edible mushrooms (true positive rate), while correctly identifying at-least 90% of not edible mushrooms (false positive rate not more than 10%). The system can at-least vaguely classify the mushrooms so that a manual labeler could label all the clusters; so that our system could actually know species of mushrooms (and display them to the users). The system knows the most significant properties to look for to tell edible and inedible mushrooms apart (in future, could be used to create entry-level shroomer guide).

Hard to tell how to estimate other variables of success of our models.