Exercise 2: Introduction to Pattern Recognition:

1. The main differences between supervised and unsupervised learning are:

-Supervised learning main goal is to classify (creating different labels) or to use regression (for creating an easy and linear output) whereas on unsupervised learning, our goal is to extract the structure of the inputs without labeling anything (working only with the inputs).

-The inputs to our different learning models are going to be different depending on the type of learning. For example, we know that when working with supervised learning, all of our inputs are going to be labeled and if we used an unsupervised learning method the data wouldn’t be labeled.

There are lots of differences between these models but the main one is knowing that the data is going to be labeled or not. That means that it will be really different when working with one or the other.

For example, let’s pretend we have a big factory of chairs and we have to manage how we ship them. Using a supervised learning method like classification would lead to an output of having our chairs distributed by colors, height, or any difference that the method would use. And if we used an unsupervised method like clustering, it would lead to an output totally different and it’s likely that our chairs are going to be mixed on clusters for shipping. With that in mind, the best learning method for shipping would be the one that fits our interests more, so the best one it’s going to depend on the situation of the factory and how the managers want to ship the chairs.



A=1:10; %works only for vectors

S=0;

for i=1:length(A) %Summatory

S=S+A(i);

end

M=S/length(A); %Mean

x=0;

for i=1:length(A)

x=x+(A(i)-M)^2;

end

Var=x/length(A); %Variance

1. Some examples of applications of pattern recognition might be: Speech recognition, facial recognition, object recognition, character recognition, image recognition, …

For all of the examples, we could use supervised or unsupervised methods, but the most efficient would be to use a supervised method of recognition so in that case we know that the data will be interpreted and classified into the groups that we need. Probably the best method would be classification because in most of the cases, we need to differentiate words, faces or even objects. The most useful features would be, in order of examples: the frequencies of the different letters of the alphabet, search for the pattern of the faces, the color of the object, last visited websites, colors of the image, … In these examples the best method is the same for all the cases, and it is because for all of them, we need some database of objects for our system to work. For example, we should know beforehand what the frequencies of the vocals on our language are so we can identify them when people speak to our system.