Results Part 2 – Final Project.

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1. INTRODUCTION

This final part will show the improvements developed in our Project and how they have affected to the final result of the categorization of test images and videos.

First of all, we have to define the new features that have been implemented in this final part for our Project. In my case, I have only done the compulsory functionality explained in the documentation document and it involves:

- Implementing SVM as the classifier, allowing the user to choose between various parameters during training (kernel and margin)
- Recognize objetct in real-time using web camera or a video passed by argument.

This being explained, in the next section I will show the results after making numerous trainings in our database using SVM as classifier, comparing the results with SURF using knn as the classifier, using the same values for the parameters used in SURF (threshold and number of samples used per class).

In my case, I have done the training using SURF as the main categorization method because it is the method that show better results with our database.

At the end, I will compare the results of using different kernels and making a conclusión about which is better for our purpose, the categorization of images and videos.
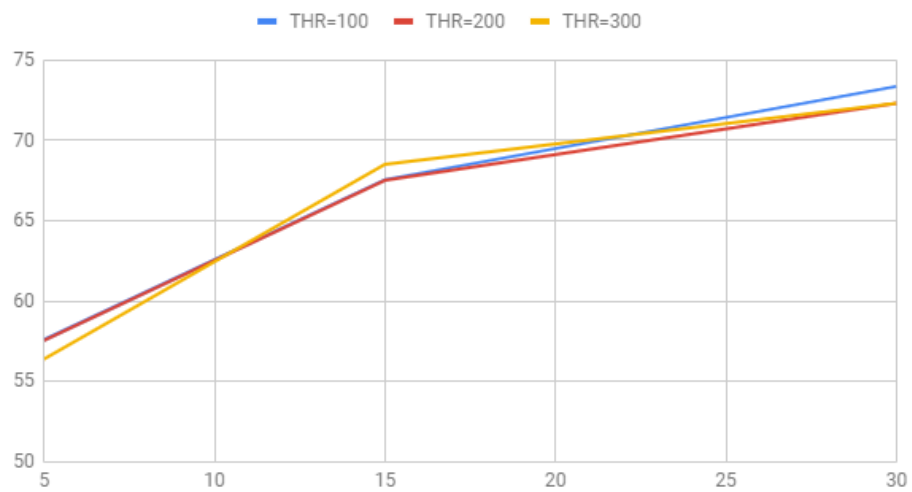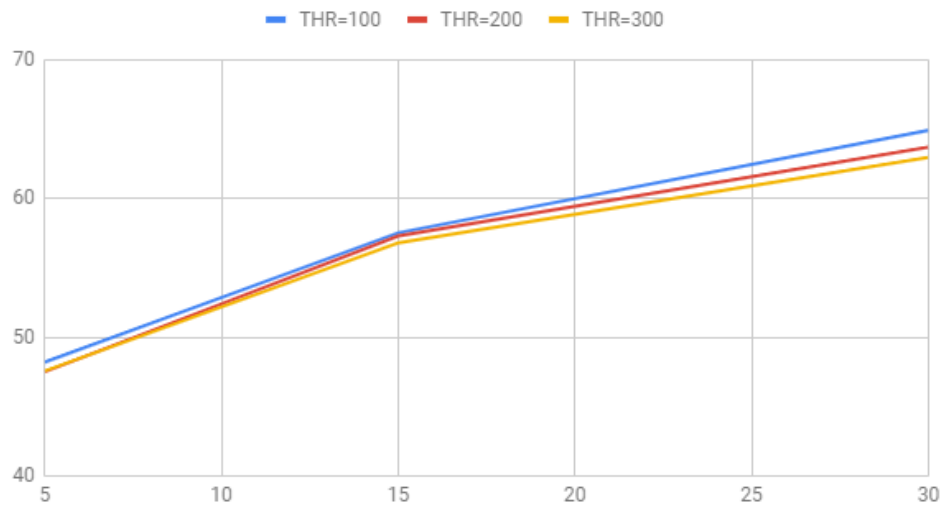
2. RESULTS

CATEGORIES = 2 - SVM (CHI2)
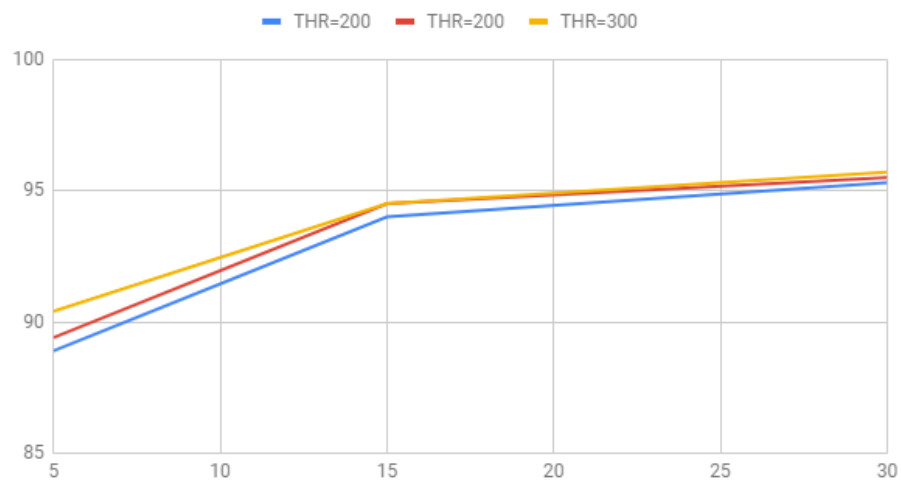
SAMPLES	THR=100	THR=200	THR=300
5	88,9	89,4	90,4
15	94	94,5	94,5
30	95,3	95,5	95,7

CATEGORIES = 5 - SVM(CHI2)

SAMPLES	THR=100	THR=200	THR=300
5	57,6	57,56	56,4
15	67,56	67,52	68,52
30	73,36	72,32	72,32

CATEGORIES = 10 - SVM (CHI2)

SAMPLES	THR=100	THR=200	THR=300
5	48,2	47,5	47,56
15	57,52	57,3	56,8
30	64,92	63,7	62,96

KNN VS SVM

CATEGORIES = 2 - KNN VS SVM (SURF)
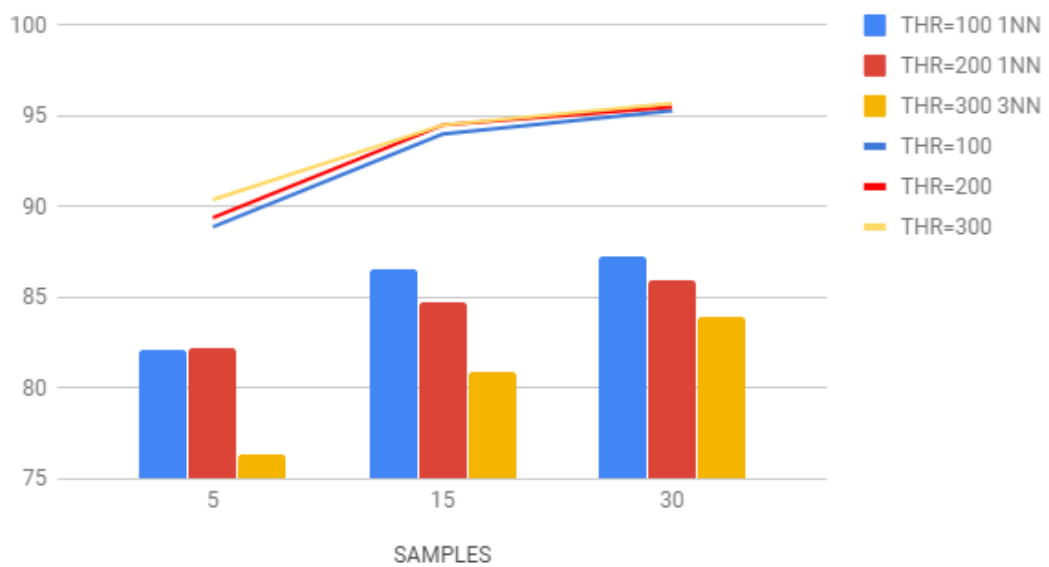
CATEGORIES = 5 - KNN VS SVM (SURF)

Legend:
- THR=100 1NN
- THR=200 1NN
- THR=300 3NN
- THR=100
- THR=200
- THR=300
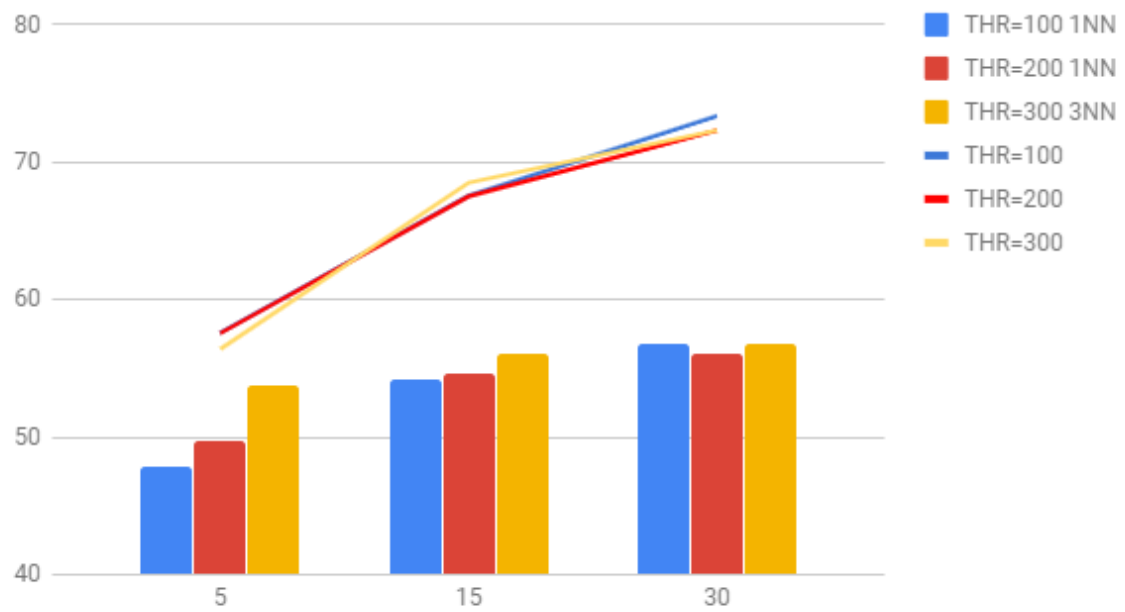
CATEGORIES = 10 - KNN VS SVM (SURF)

Legend:
- THR=100 1NN
- THR=200 1NN
- THR=300 3NN
- THR=100
- THR=200
- THR=300

4
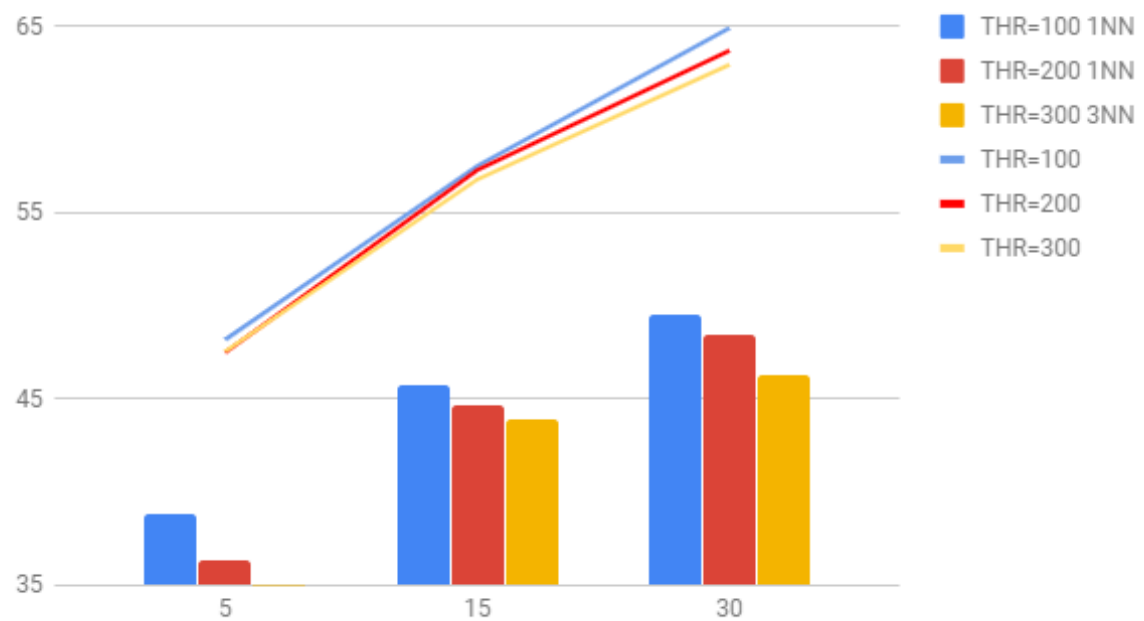
COMPARISON BETWEEN KERNELS (SURF – THRESHOLD = 300)
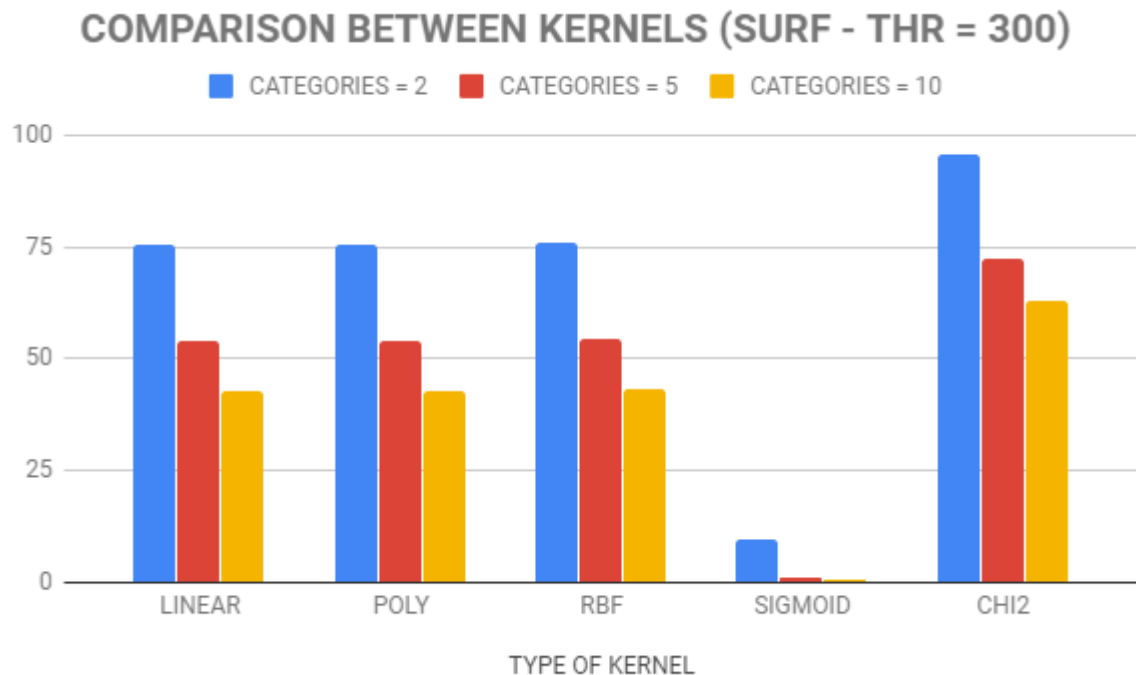
TYPE OF KERNEL	CATEGORIES = 2	CATEGORIES = 5	CATEGORIES = 10
LINEAR	75,5	54,04	42,94
POLY	75,5	54,04	42,94
RBF	76,1	54,48	43,4
SIGMOID	9,5	1,24	0,48
CHI2	95,7	72,32	62,96

3. CONCLUSIONS

After showing the results of training with the new type of classificator in the Project, we are going to finish making a conclusion about the result obtained.

First of all, it is important to say that I have used SURF in tests in order to obtain the best result with each dataset. I have also used CHI2 as kernel of the SVM because as I am going to comment down below, the best type of kernel is CHI2 for categorize or images in comparison with other types that opencv brings us (linear, poly, sigmoid…).

SVM:

- Irrespective of the number of categories used during training, it is interesting to point that when we increase the number of samples, the final percentage that we finally get is higher, as we expected.

- Another interesting point is that in most cases, as we increase the number of threshold, the better results we get.
- In the last training (10 categories) the more we increase the threshold, the worse result we get, so we can conclude that when the problema has a considerably number of categories, we need to decrease the threshold in order to obtain a better result.
- In the other hand, when we only work with 2 categories, the threshold should be higher in order to obtain a high percentage

KNN VS SVM:

- As we can see in the graphs shown before, the results in all cases is much better with SVM. The reason of this result is the complexity of each method. KNN needs less computation activity and it is much faster than SVM. However, using SVM ensure us a better result and also a better response when we use the test program.
- We can conclude that SVM is better than KNN in all cases. We will prefer to use SVM in all cases except from problems when we don't have access to a decent computational response and the only way to get the result is using KNN.

COMPARISON BETWEEN KERNELS:

- The results obtained show how each kernel perform in the same database, concluding that CHI2 is much better in order to recognise features in images and classifying them.
- The result obtained in linear, poly and RBF kernels are similar to each other, so in this problem, it doesn't matter which one of these 3 we use, we will get similar results.
- On the other hand, sigmoid kernel execute a really bad percentage of result and we can conclude that sigmoid kernel for this problema is not a good choice.
- Finally, CHI2 kernel is the one that offer the user the best result and we give the user a better performance in recognising images.

To finish with this section, we can conlude that results obtained in all cases using SVM are considerably better than using KNN, so we can say that SVM is the best classificator for categorize images and also for this project.