Comparing the similarity of pictures based on varying the “NumActiveColumnsPerInhArea” variable, while using localInhibition

To use the NumActiveColumnsPerInhArea parameter, the value of localAreaDensity has to be set to a negative value

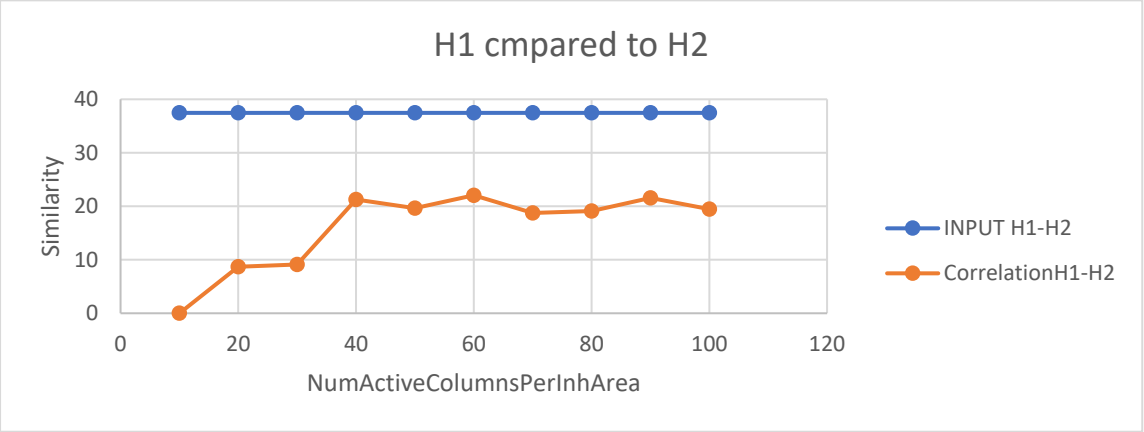

Figure 1 : Comparing Hexagon1 to Hexagon2, varying the NumActiveColumnsPerInhArea from 10 to 100

H1 H2

The similarity is increased until the NumActiveColumnsPerInhArea reaches 40. For 40 and more the similarity is sandwiched between 18% and 23 %. It’s even less than similarity of input values of H1 and H2.

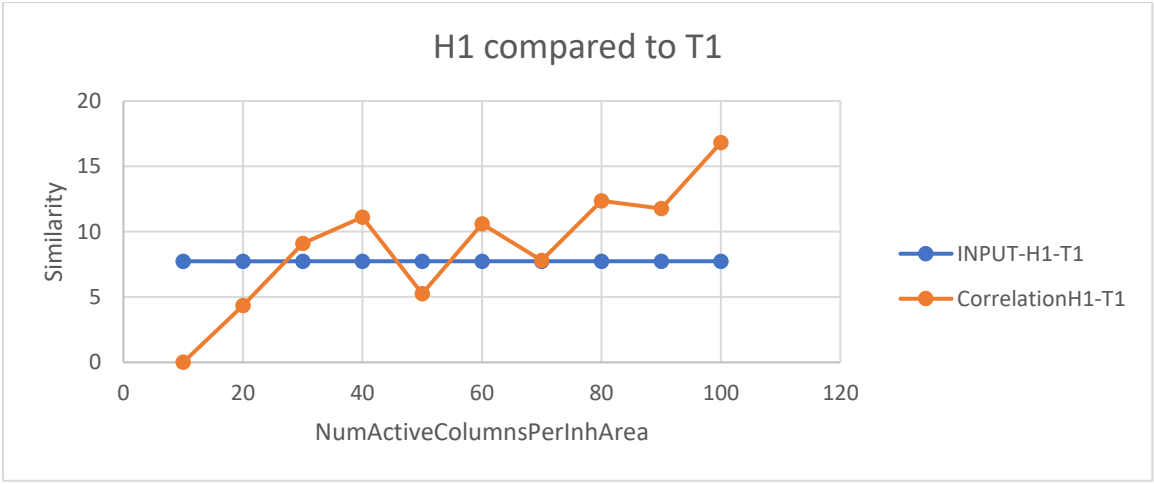

Figure 2 : Comparing Hexagon1 to Triangle2, varying the NumActiveColumnsPerInhArea from 10 to 100

H1 T1

When we compare Hexagon1 to Triangle1 as the NumActiveColumnsPerInhArearfrom 10 up to 40, the similarity between H1 and T1 from0 to about 12%. Up to 90, the similarity changes between 5 and 12%. For NumActiveColumnsPerInhArea =100 the similarity of the H1 and T1 is jumped up to 16. The range of similarity here is satisfying as the compared elements are from two different categories and similarity percentage is low.

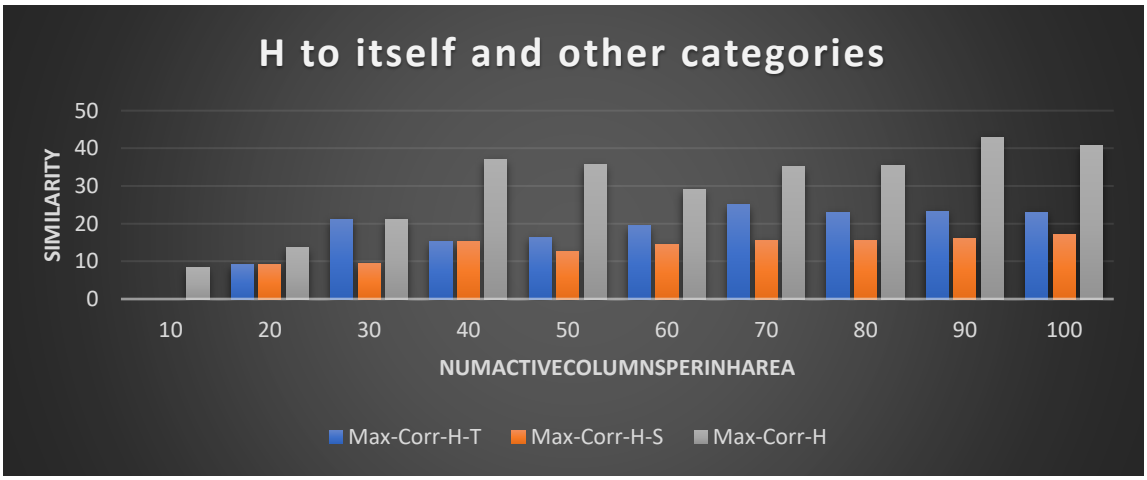

Figure 3: the Max-similarity of Hexagon category to itself compared to Max-similarity of Hexagon to other categories varying NumActiveColumnsPerInhArea from 10 to 100

Comparinmg the max-similarity of Hexagon category members to themselves and comparing the result to similarity between Hexagon category and other categories, could be a good approach to choose the best NumActiveColumnsPerInhArea parameter among 10-100. Because here we can have a clearer sight on how HTM system is functioning. For example, for NumActiveColumnsPerInhArea=10 the similarity is not that high, but the safe margin (the difference

of Max-Corr-H compared to other categories) is 0. But for example, as we consider NumActiveColumnsPerInhArea=30, the Max-Correlation of H to itself is increased to 22% where Mac Correlation of Hexagon to Triangle is also 22%, this means that due to a safe margin of 0, the system in this point is not reliable at all.

So the reliability factors could be a high similarity to itself, and lowest possible similarity to other categories. As it can be seen in NumActiveColumnsPerInhArea=90 where Max-Corr-H I around 42 and the highest similarity to other categories, is sufficiently low and equals to Max-Corr-H-T =23%

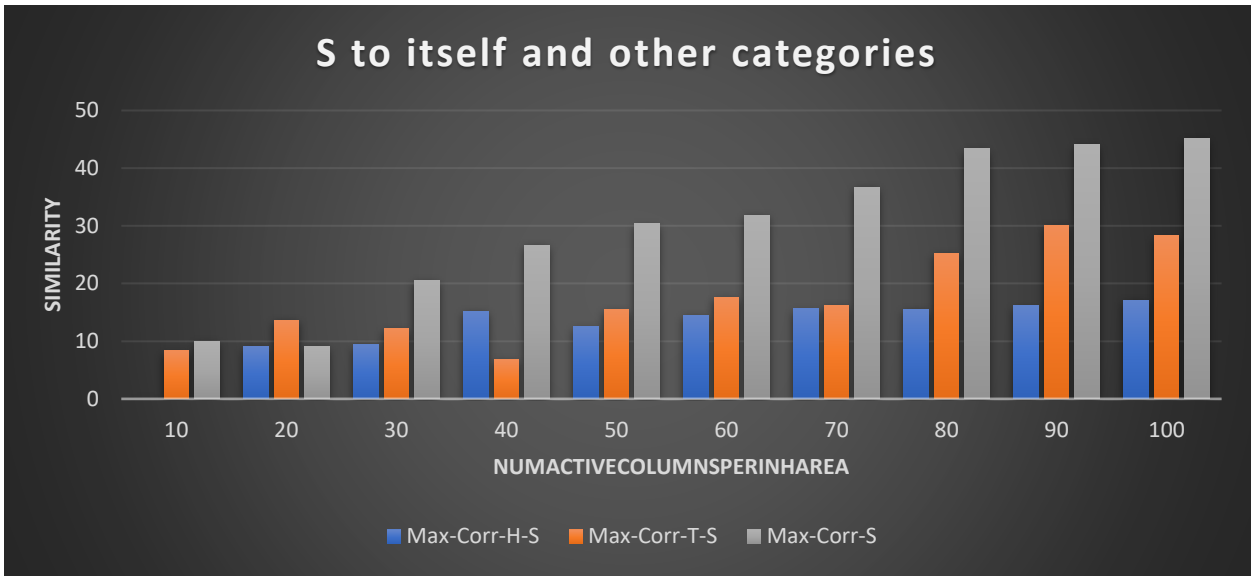

Figure 4: the Max-similarity of Straight cross category to itself compared to Max-similarity of Straight cross to other categories varying NumActiveColumnsPerInhArea from 10 to 100

similarity of Straight cross category to itself and other categories, shows us the increase of similarity to itself and other categories, as the NumActiveColumnsPerInhArea is increased, our desired NumActiveColumnsPerInhArea is actually a value, where the similarity of the Straight cross category to itself is high, and in the same time the similarity to other categories are as low as possible. Here the NumActiveColumnsPerInhArea= 90 or 80 are the best possibilities for us.

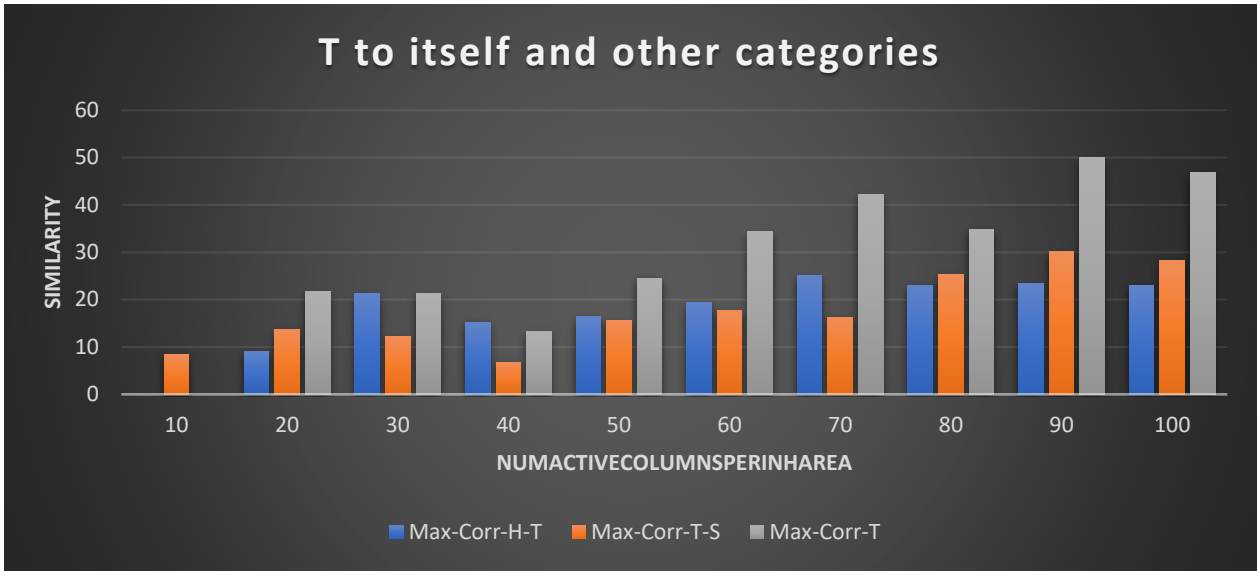

Figure 5: the Max-similarity of Triangle category to itself compared to Max-similarity of Triangle to other categories varying NumActiveColumnsPerInhArea from 10 to 100

As it can be seen raising NumActiveColumnsPerInhArea up to50 is not providing us a desired result, as in NumActiveColumnsPerInhArea=20 the safe margine(the difference of Max-Corr-T compared to other categories) is not large enough. And in NumActiveColumnsPerInhArea=30 or 40 , we are experiencing overlaps. But in NumActiveColumnsPerInhArea=70 or 90, the correlation of Triangle to itself is high enough, and also a reliable safe margin is provided.

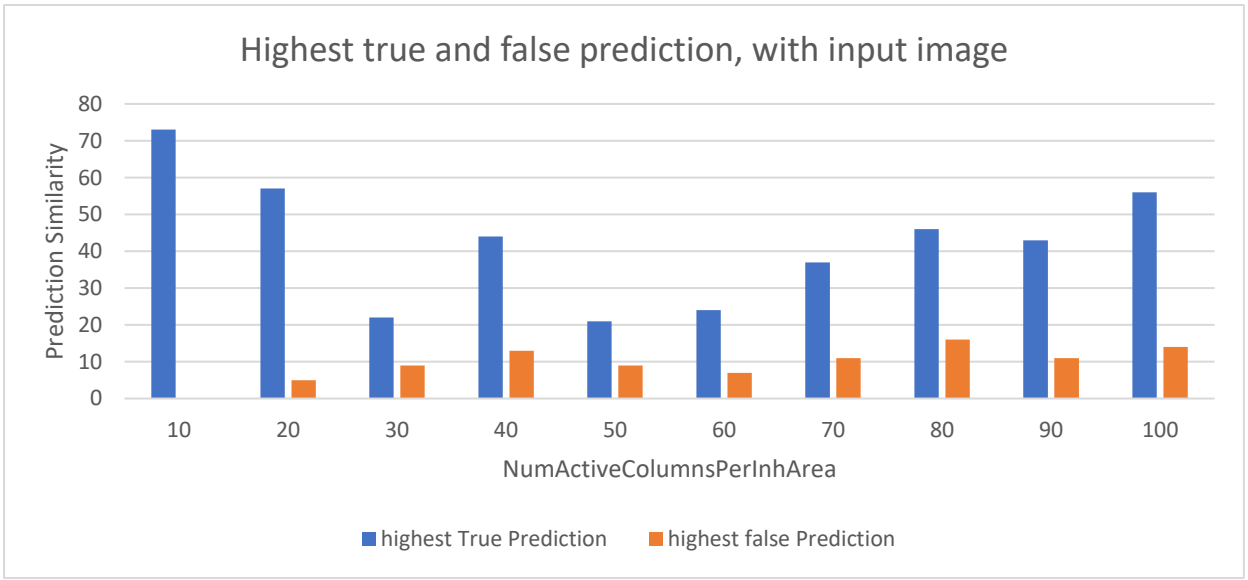

Figure 6: comparing the true prediction percent to the highest false prediction percent, in order to have a sight on reliability of prediction part of the system varying NumActiveColumnsPerInhArea from 10 to 100

The best prediction of 100% with a 0 false prediction happens in NumActiveColumnsPerInhArea=10 , but we can consider this extremely correct and accurate prediction, due to not educated system(probably when the NumActiveColumnsPerInhArea=10 I no trained ell enough) so we don't consider it as a good possibility. On the other hand, the prediction part of the system is showing great results in NumActiveColumnsPerInhArea=80 and 90. Also the safe margin is really good.

conclusion

when NumActiveColumnsPerInhArea =90 we can see a good performance of system not only in macro and micro correlations, but also the prediction is doing a good job. So we can consider the NumActiveColumnsPerInhArea= 90 as the best possible NumActiveColumnsPerInhArea value for a range between 10_100 when the localInhibition and NumActiveColumnsPerInhArea parameters are used.

Comparing the similarity of pictures based on varying the “local area density” variable, while using GlobalInhibition

In order to get advantage of globalInhibition, we have to set its valu to True, and because of using local areaDensity, we should turn NumActiveColumnsPerInhArea to a negative value

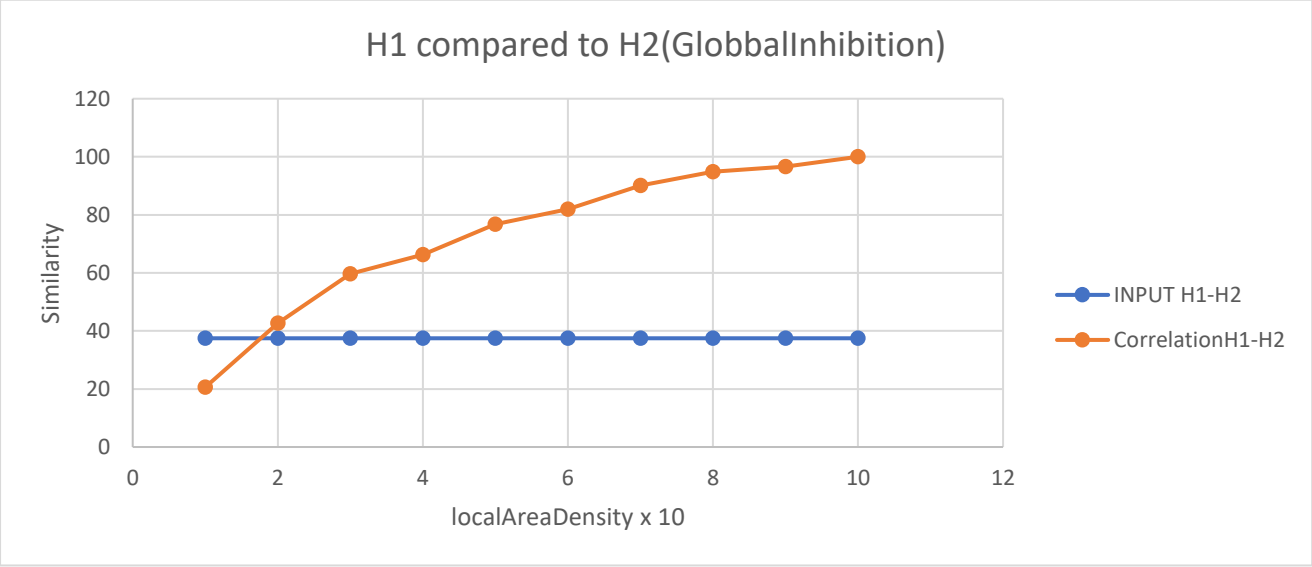

Figure 7 : Comparing Hexagon1 to Hexagon2, varying the localAreaDensity from 10 to 100

By increasing the localAeaDensity the H1 and H2 are looking more and more similar for the system, but even in the beginning of this increment the speed of similarity growth of these two is really high.

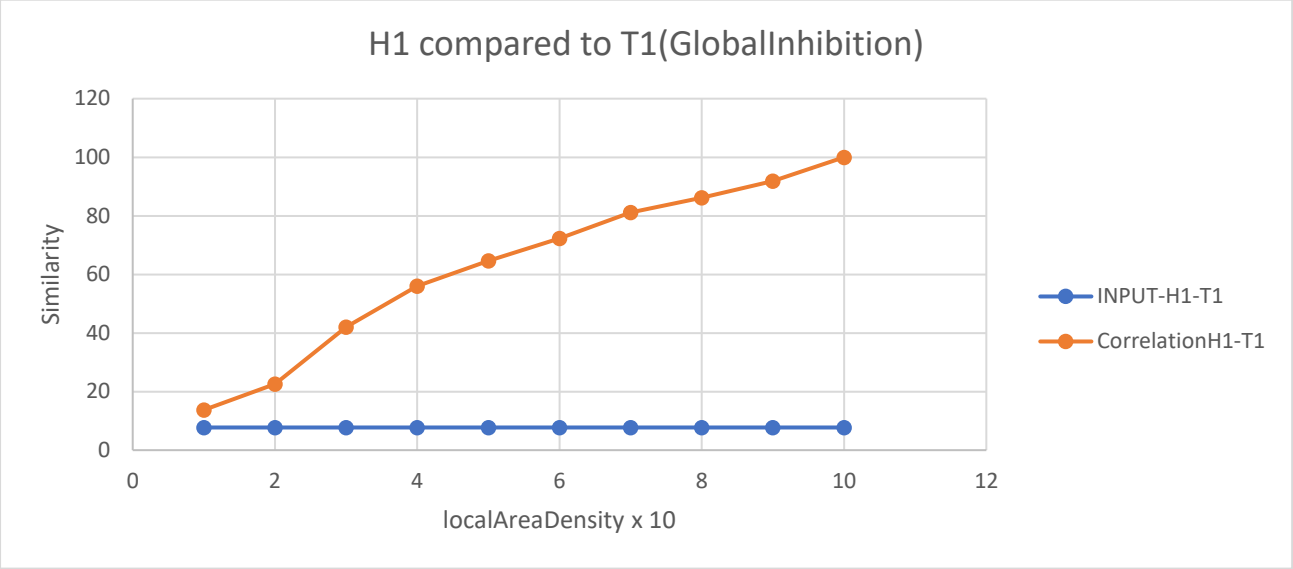

Figure 8 : Comparing Hexagon1 to Triangle 1, varying the localAreaDensity from 10 to 100

By increasing the localAeaDensity the H1 and T1 are looking more and more similar for the system, though the similarity growth I the beginning is not as high as the similarity growth in last part (comparing H1-H2) this means the higher localAeaDensity values couldn't be a good choice , as the system sees different shapes similar to eachother

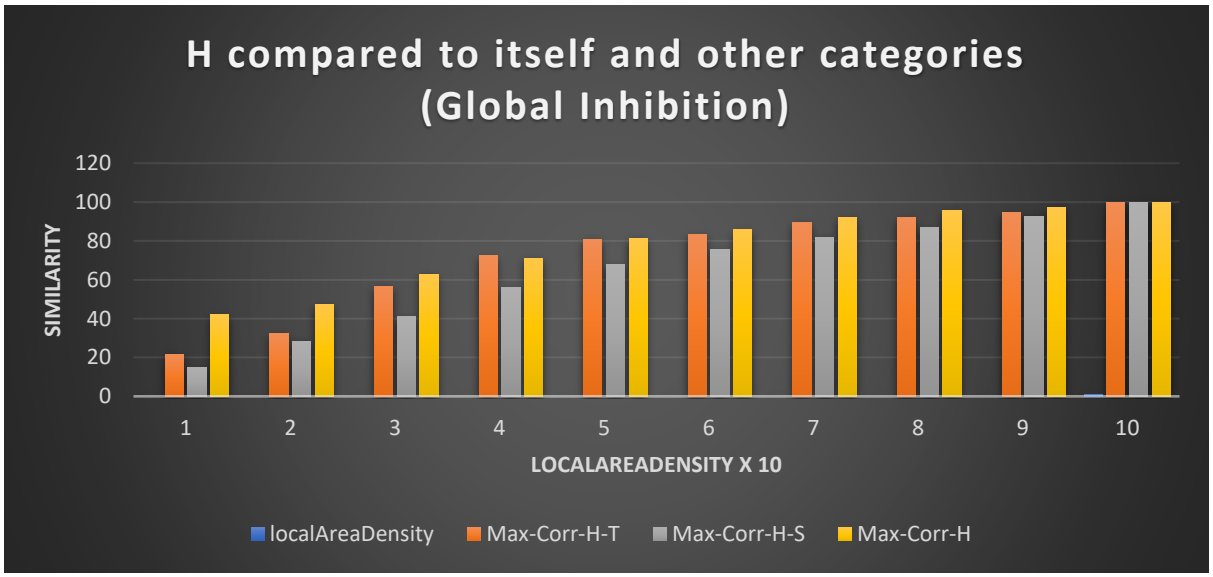

Figure 9: the Max-similarity of Hexagon category to itself compared to Max-similarity of Hexagon to other categories varying localAreaDensity from 0.1 to 1

Though the increment of localAeaDensity leads to higher similarities of hexagon to itself, its also increasing similarity of other categories to hexagon too. This means a lower reliability in higher localAeaDensity values. In this case the best amounts of localAeaDensity are 0.1 and 0.2 where an almost good safe margin is observable

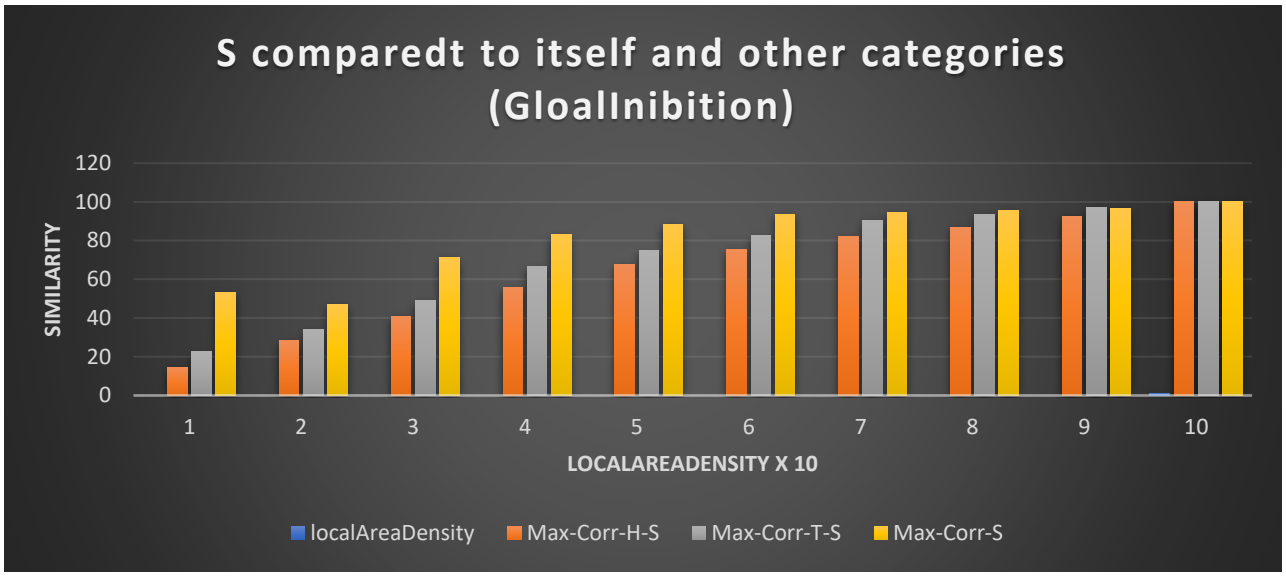

Figure 10: the Max-similarity of Straigh cross category to itself compared to Max-similarity of Straight cross to other categories varying localAreaDensity from 0.1 to 1

The same unwanted growth of similarity of other categories to Straight cross category is observable here too. The best safemargines (the difference of Max-Corr-S compared to other categories) happens when the localAeaDensity is equal to 0.1 and 0.2 and 0.3

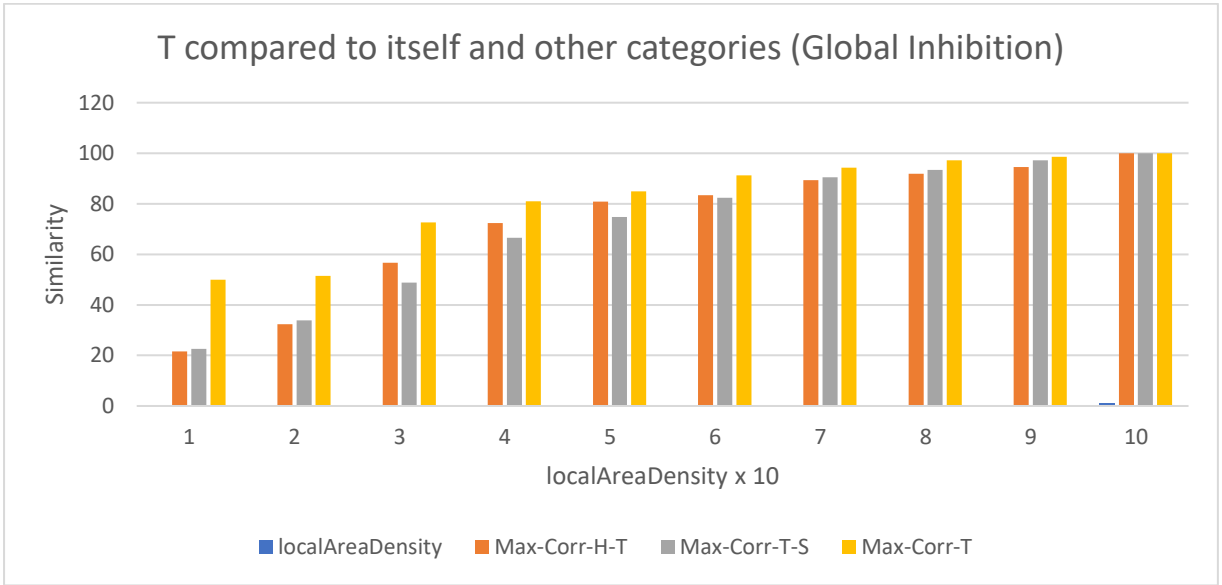

Figure 11: the Max-similarity of Triangle category to itself compared to Max-similarity of Triannge to other categories varying localAreaDensity from 0.1 to 1

The best safe margins are happening in localAeaDensity of 0.1 and 0.2 and 0.3 here too.

Actually the higher the localAreadensity, the higher amount of sparsity in our SDRs , this means we get more 1s. the localAeaDensity of over 60 reduces the ability of system to produce an extremely unique SDR for each image, this couses the system to see different shapes pretty similar to eachother, as the produced SDR of each image is similar to other ones

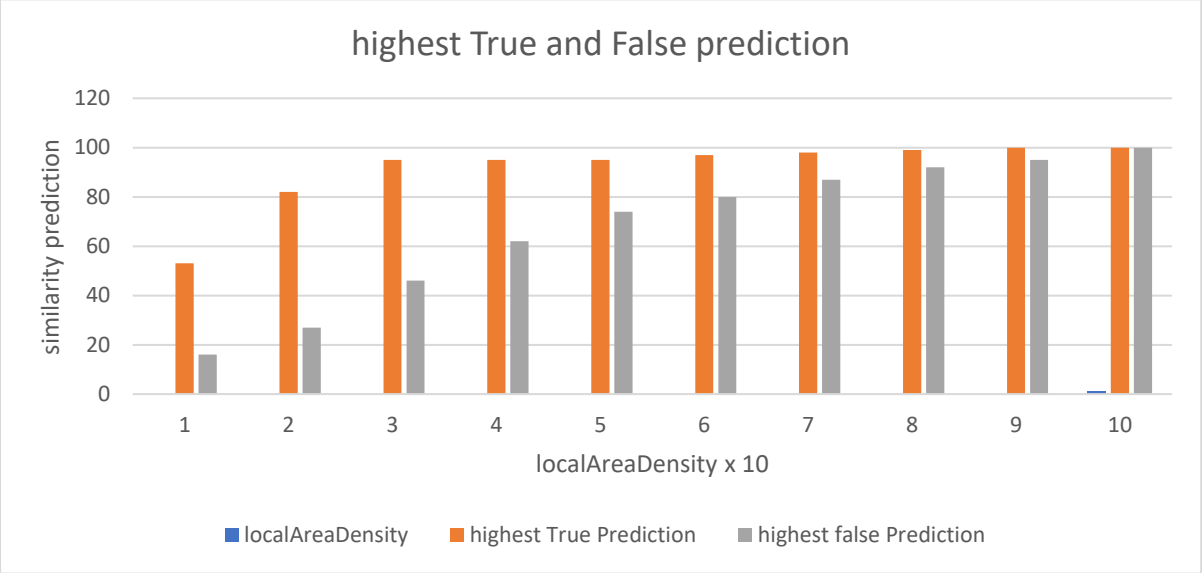

Figure 13: comparing the true prediction percent to the highest false prediction percent, in order to have a sight on reliability of prediction part of the system varying localAreaDensity from 0.1 to 1

The higher our localAeaDensity, the higher the percentage of false prediction.

this figure shows us too that we should avoid higher localAeaDensity values. And we gotta concentrate on higher margins as higher reliability is more desired
so the best local area denity for a good prediction would also be : 0.1 – 0.2 – 0.3