Estimation of distance and angleeffects on the image

Maj-Brit Bech Johansen, DTU

PROBLEM: Moving a camera in a half circle around an object might hide some of the objects in the pictures and show those items in some of the other pictures. Same problem rises if you move the camera closer towards, or away from the object.

METHOD: The moving effect is going to be estimated by using SIFT-features of every picture and compare them to the other pictures.

CONCLUSION: The distance from an object to the camera becomes more important as it provides the best/most matching picture to occur. The best results are made by keeping the camera angle as close to the middle as possible.

This project will focus on the problems of depicture an object from different angles or distances from the “real” image/reference-image. The camera have been moved around the object (star) as shown in figure 1

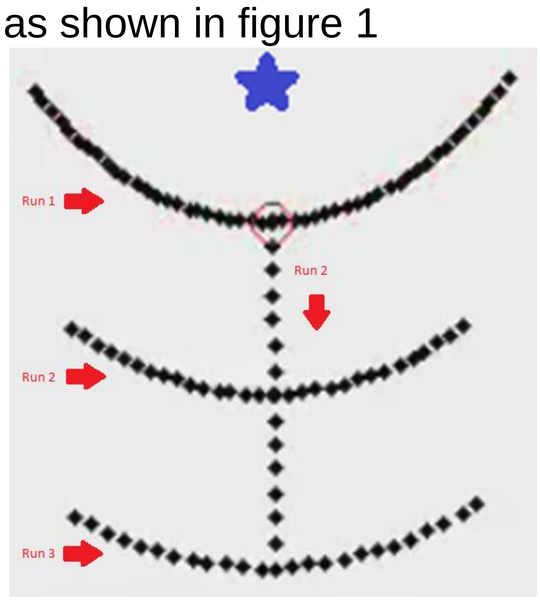


Figure 1

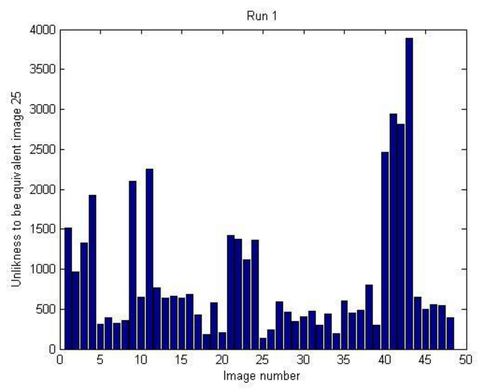
The points in figure 1 shows where the pictures have been taken and the point in the middle (marked with the red circle) is picture 25, which will be the reference-image of all other pictures in the work with the data..

Method

By using SIFT-feature-tracking, it is possible to locate the features in the picture looking most like the reference-image. Taking the distance from all the SIFT-features location in the reference and taking the norm to the other images will give a scalar, which will be used to compare the effects.

Results

From run 1 we expect that the two pictures, taken right before and right after the reference image, to be closest to the reference and the two in the ends to be the most diverging. The results from run 1 are shown in Figure 2.



Figur 2

Run 2 describe the movement of the camera from the image close up to the object and backward in a straight line with same angel to the object. Results from the calculations are shown in figure 3

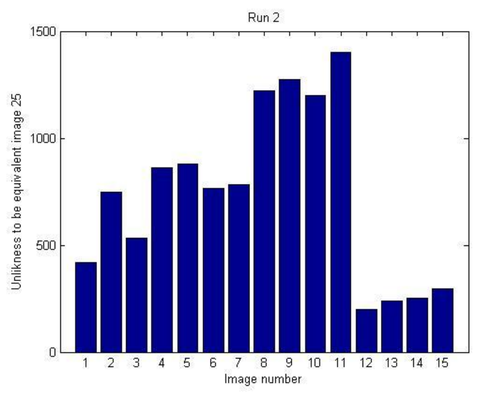


Figure 3

In theory, run 3 should show a combination of distance and angular variation. The results are shown in figure 4

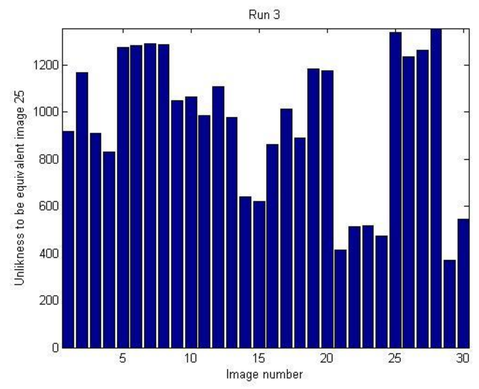


Figure 4

Run 4 shows the same as run 3, but with more focus on the distance-factor. Results from the calculations are shown in figure 5

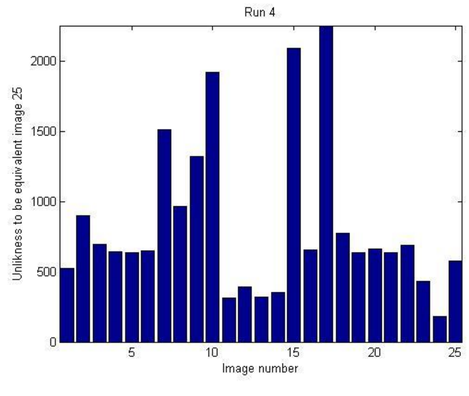


Figure 5

The overall image that would be most like the image 25 should be the one closest to where the reference-image was taken. The diversity between all the pictures and the reference picture are shown in Figure 6.

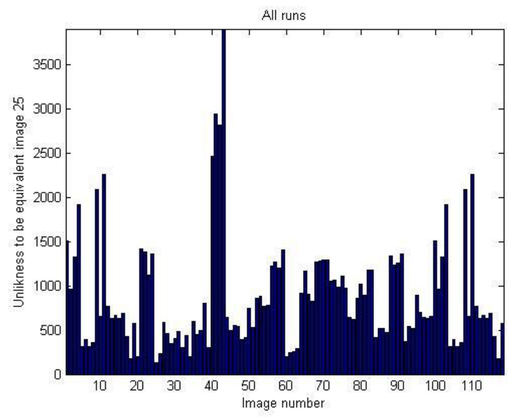


Figure 6

Conclusion

The image closest to the reference-image in run 1 and the overall image are image 26, placed next to the reference. The shape of the curvature of the results of run 1 shows that all pictures generally look alike, but some of the pictures have great values. These great values can be caused by the setting of the lens, because of writings at the object. This is going to get blurred, making the SIFT-features hard for the program to recognise.

Run 2 are just as expected in the first 11 samples. The 12th and later samples are increasing as we would expected, but they are lower than the 11th image’s result. This must be caused by sudden exploring of the upper or lower top of the image that, up to this point have been hidden, making the SIFT-features more likely to fit each other in the pictures.

Run 3 illustrates, that the angle of which the image have been taken are rather unimportant, when placed at the middle distance from the object.

Run 4 illustrates that at long distance, the best images are the ones orthogonally to the object. However, it seems that there is a tendency for the images in the outer angels have low values too. This must be caused by their better description of the shown SIFT-features.

In general, the distance from an object to the camera becomes more important as it increases for the best/most matching picture to occur. The best results is received by keeping as close to the middle as possible.