

Coin Recognition

Image Understanding LU

First Handin

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1 Group members

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2 Proposed Solution

As a first step for segmentation, we perform edge detection on the image. For every edge pixel found, Hough-Transformation is used to detect circles in the image. We're not searching for ellipses, which will limit our algorithm to images taken in a 90 degree angle to the coins. We accept this limitation in order to achieve a faster running time of our algorithm. In case of ellipses, three parameters need to be detected by the Hough-Transformation, whereas regarding circles, only one parameter needs to be detected.

Regarding the recognition process itself, we're not totally sure, how exactly to perform. The recognition will be based on a neural network (backpropagation network). In [1], a algorithm with rotation invariance is presented. This algorithm uses the Fourier coefficients of the image (transformed to polar coordinates) as input for the neural network. In [2] recognition is based on the SIFT-descriptor. If the usage of one of these methods does not lead to a sufficient result, improvements based on the other literature (or gathered by an additional literature search) will be made.

3 Work plan

The segmentation part of our algorithm is already finished. The neural network should be finished until the end of december. In the first two weeks of january, the final report and presentation are finished. In case our algorithm isn't working properly at the end of december, there's enough time left to develop some improvements in january.

4 Assignments

The segmentation code is already developed by Roman and Christoph. Andreas did some literature search. Martin also did some literature search and produced the interim presentation and the handin.

Future tasks are:

- Development of a neural network

- Creation of test/training data
- Decision of which image parameter to use for the NN
- Implementation of gathering this parameter
- Testing our system, gathering result images
- Writing final report and presentation

Literatur

- [1] **CHEN Cai-ming et al.**, „A coin recognition system with Rotation invariance“, *Proceedings of the 2010 IEEE International Conference on Machine Vision and Human-machine interface*, pp. 755 - 757, 2010
- [2] **KAMPEL M., Zaharieva M.**, „Recognizing ancient coins based on local features“, *Proceedings of the 4th international symposium on visual computing*, pp. 11-22, 2008
- [3] **MITSUKURA Yasue et al.**, „Design and evaluation of neural networks for Coin recognition by using GA and SA“, *Proceedings of the IEEE-INNS-ENNS International Joint Conference on Neural Networks*, pp. 178-183 , 2000