# An Image Processing Application on QuickCog "Coin Recognition"

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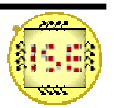


# Motivation

- Nowadays, instead of people machines are used in all parts of our lives and image processing applications are quite common in this machine based applications.

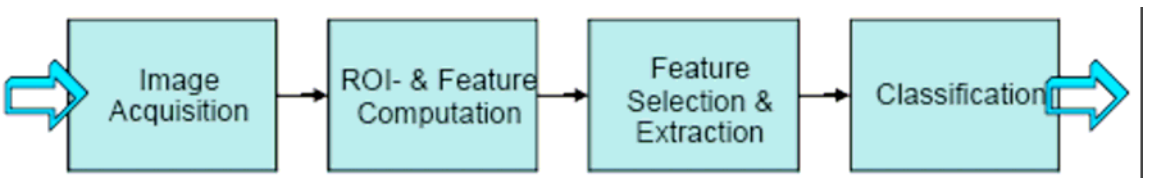

Drink Machine


Cigarette vending machine

Photo booth in a public building

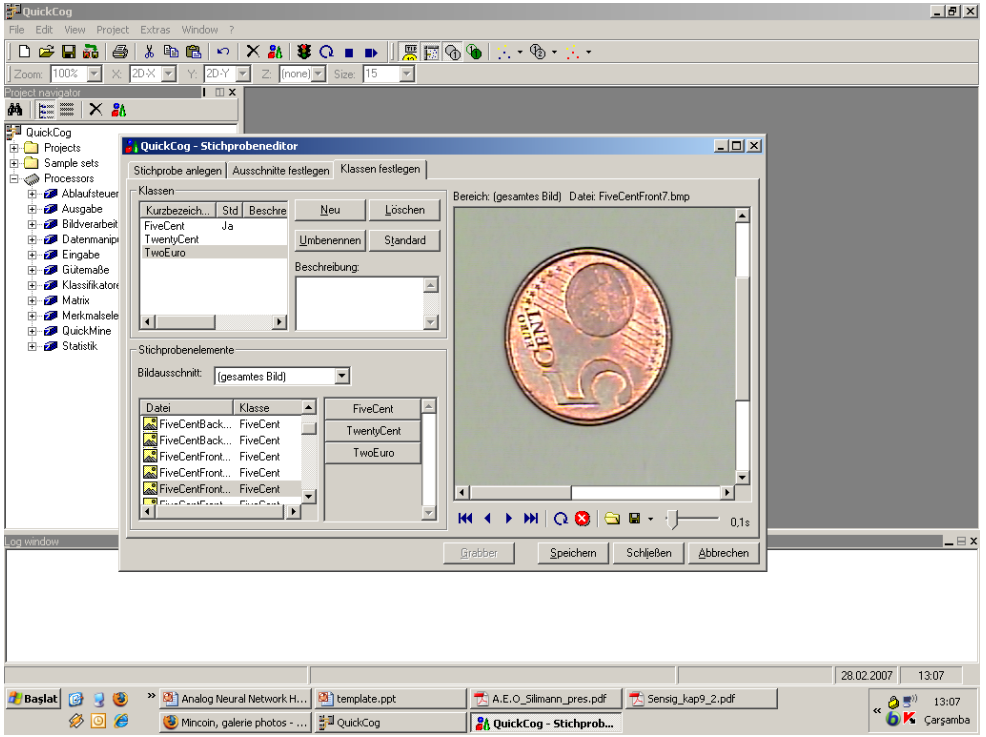
# Parts of Project

- Our project is also about one of these useful applications. Coin recognition by image processing using QuickCog.
- In this project, we have used both training and test part. We have followed the steps below during the learning process and test it with untrained data.



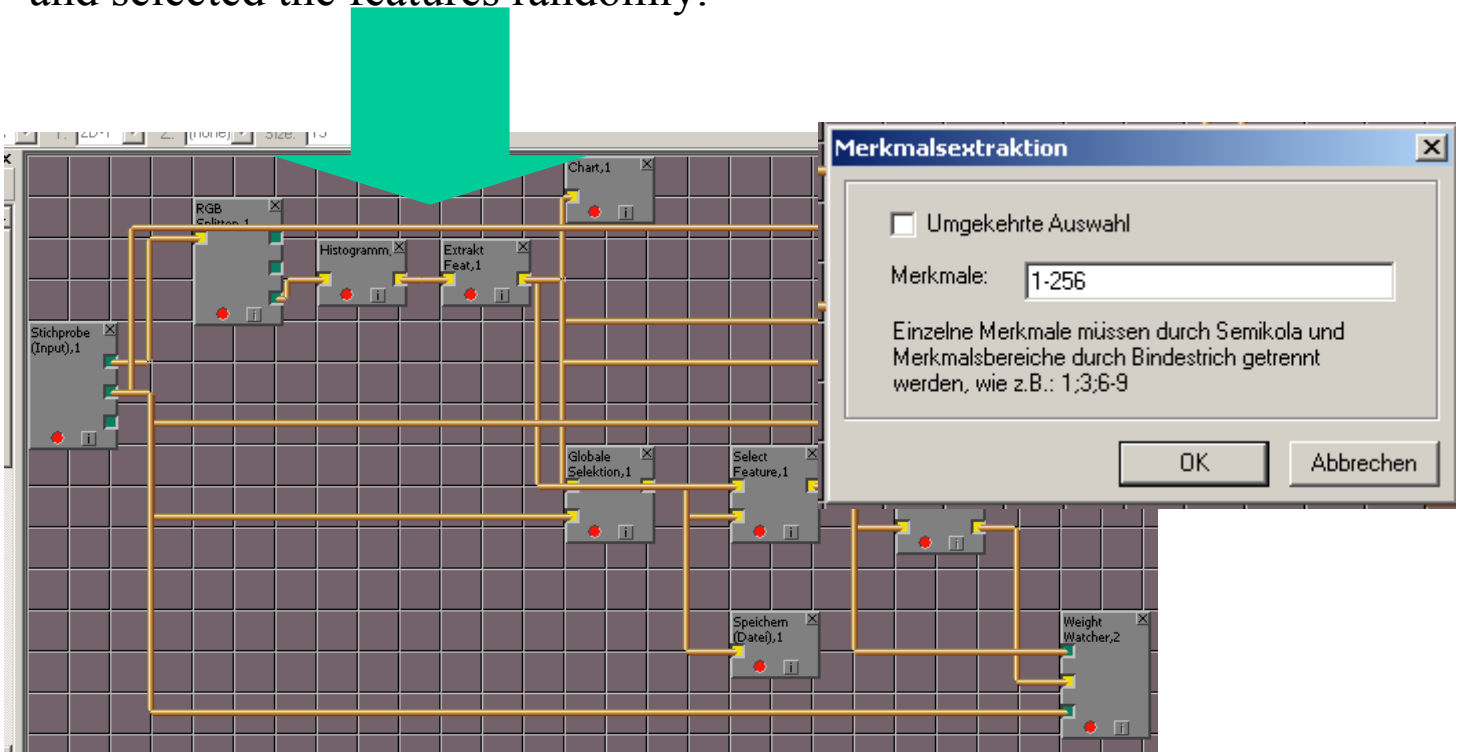
# 1. Image Acquisition

- Firstly, We have collected the photos of there different coins and classified them in QuickCog Stichprobeneditor.



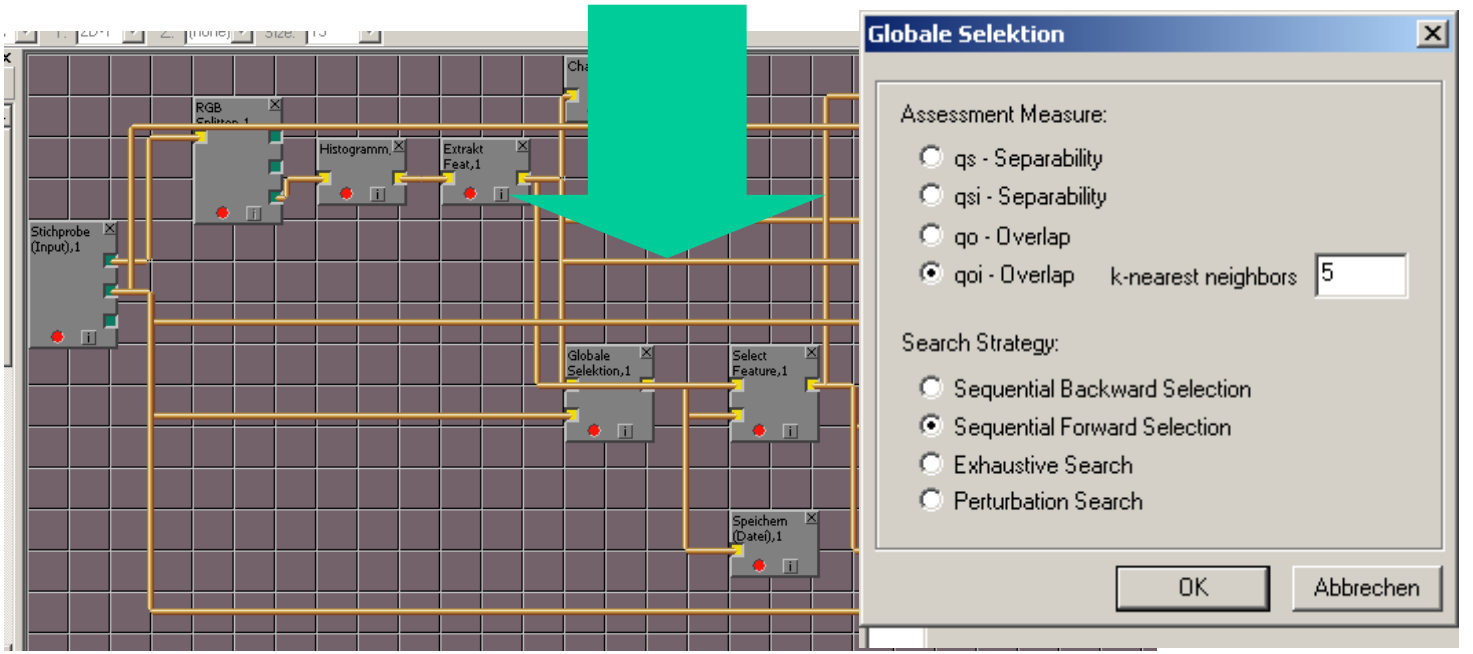

# 2. ROI & Feature Computation

- After data aquisition, we used histogram according to three different colours (red, blue, green) in order to get some statistics about the features of the data and selected the features randomly.



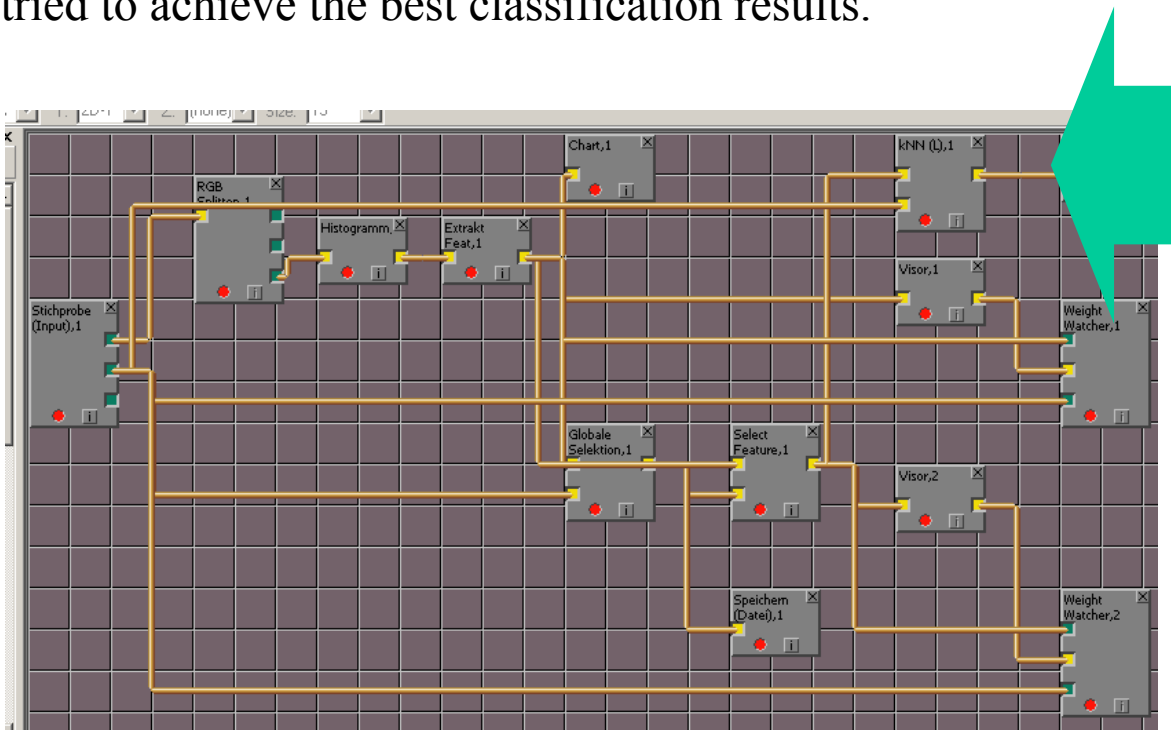
# 3. Feature Selection & Extraction

- In this part, we have selected reduction methods in terms of separability, overlap, Sequential Backward and Forward selection, etc. in order to reduce the dimensionality and get compact data.



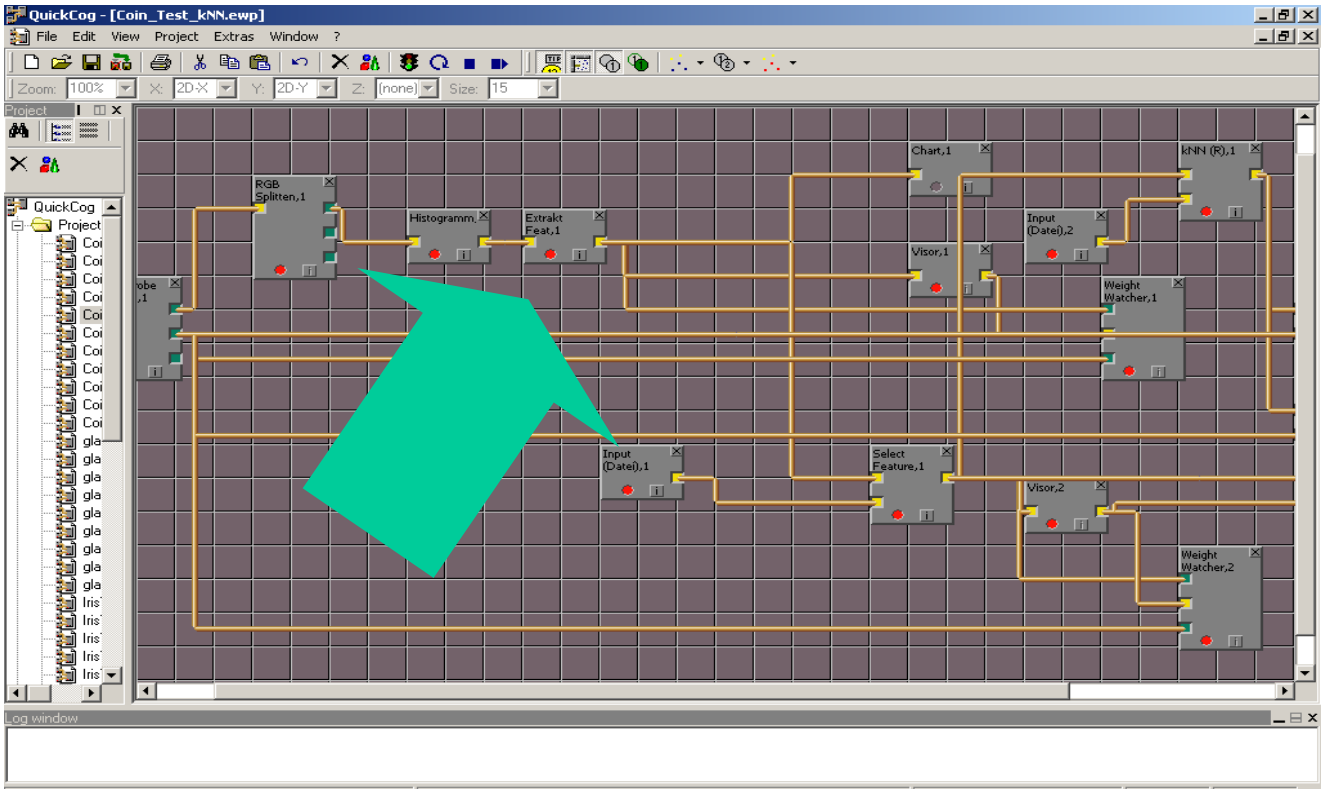
# 4. Classification

- And the last part, to finialize the study, we used different classification methods in terms of RNN, kNN, Eucledian Distance Clasifier(EAK), etc. and tried to achieve the best classification results.



# 5. Classification Results

- Now we can continue second part of our project. Test Case. The only but most important think we have to do is selecting the same features with training part.



# Results

| | Stichprobe | RGB | Extrakt Feature | Global Selection | Classification Method | Training | # Features | Test |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 1 | Coin | Blau | 1-256 | Separability | RNN | 1.00 | more | 100% |
| 2 | | Blau | 1-256 | Overlap-5 | RNN | 0.988 | | |
| | | Blau | 1-256 | without | RNN | bad | | |
| 3 | | Blau | 1-170 | without | RNN | bad | | |
| 4 | | Rot | 1-256 | Overlap-5 | RNN | 1.00 | 4 | 100% |
| 5 | | Rot | 1-256 | Separability | RNN | 1.00 | 2 | 100% |
| 6 | | Rot | 1-170 | Separability | RNN | 1.00 | 2 | 100% |
| 7 | | Grün | 1-170 | Separability | RNN | 0.933 | 2 | |
| 8 | | Grün | 1-170 | Overlap-5 | RNN | 0.9907 | more | |
| 9 | | Grün | 1-256 | Overlap-5 | RNN | 1.00 | more | 100% |
| 10 | | Grün | 1-256 | Separability | RNN | 1.00 | 2 | 100% |
| | | | | | | | | |
| | | Grün | 1-256 or 1-170 | without | kNN | Bad | | |
| | | Rot | 1-256 or 1-170 | without | kNN | Bad | | |
| | | Blau | 1-256 or 1-170 | without | kNN | Bad | | |
| | | Grün | 1-256 | Overlap-5 | kNN | 1.00 | more | |
| | | Grün | 1-170 | Overlap-5 | kNN | 0.99 | more | |
| | | Grün | 1-171 | Separability | kNN | 0.93 | 2 | |
| | | Grün | 1-256 | Separability | kNN | 1.00 | 2 | |
| 12 | | Rot | 1-256 | Separability | kNN | 1.00 | 2 | 93.33 % |
| 13 | | Rot | 1-256 | Overlap-5 | kNN | 1.00 | 2 | |
| 11 | | Rot | 1-170 | Separability | kNN | 1.00 | 2 | 93.33 % |
| | | Blau | 1-170 | Overlap-5 | kNN | 1.00 | more | |
| | | Blau | 1-256 | Overlap-5 | kNN | 1.00 | more | |
| 14 | | Blau | 1-256 | Separability | kNN | 0.98 | more | |
| | | | | | | | | |
| 15 | | Rot | 1-170 | Overlap-5 | EAK | 1.00 | 4 | 80% |
| 16 | | Rot | 1-170 | Overlap-7 | EAK | 0.998 | more | |
| | | Rot | 1-256 | Overlap-7 | EAK | 0.99709 | more | 86.67 % |
| 17 | | Rot | 1-256 | Separability | EAK | 1.00 | 2 | 93.33 % |
| | | | | | | | | |
| 18 | | Rot | 1-170 | Overlap-5 | BP (error = 0.122) | 1.0 | 6 | |
| 19 | | Rot | 1-170 | Overlap-5 (backward) | BP (error = 0.122) | 1.0 | 6 | |
| | | Blau | 1-170 | Overlap-5 | BP (error = 0.122) | Shut down twice | | |
| | | | | | | | | |

# Conclusion

What have I learned from this project?

- In an image processing aplication, all methods may give better solutions, so even it is tedious, researchers must continue with different methods or features until getting a sufficient result
- In an image processing application histogram should be used
- The result of the training part are not always the same with the test part. A perfect classification can give not sufficiently qualified results in test part. So, we cannot say anything before testing.

# Thank You for your attention!