Image Processing Project
Object recognition for coins calculation

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Contact details

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- Put in email subject → [UJM_IP] your_subject
- Rules: Ask, Cite, English, Work home!

Agenda

- Problem definition
- Methodology
- Time plan
- Image acquisition
- Image calibration
- Recommendations
- Conclusion

Problem definition

Image Processing

Coin Type
1 Cent
2 Cent
5 Cent
10 Cent
20 Cent
50 Cent
1 Euro
2 Euro

Problem definition

Problem definition

What are the features to identify each coin or group of coins discriminatively?

Problem definition

Color

- Copper (1,2,5 cents)
- Gold (10, 20, 50 cents)
- Interior silver and exterior gold (1 euro)
- Interior gold and exterior silver (2 euro)

Size

- Size 1 [smallest] (1 cent)
- Size 2 (2, 10 cents)
- Size 3 (5, 20 cents)
- Size 4 (50 cent, 1 euro)
- Size 5 [largest] (2 euro)

More …

- Your Ideas?!!

Methodology

Image Acquisition

- Photo capturing using your phone camera
- Photo editing using PC program

Preprocessing [optional]

- Noise removal
- Contrast / color enhancement

Segmentation

- Background isolation
- Objects splitting

Post-processing

- Object recognition
- Money calculation

Time plan

Session	Task
TP1	Introduction, Image acquisition & calibration
TP2	Pre-processing, segmentation
TP3	Post-processing
TP4	GUI, Questions, Report

Manage your project time **wisely**!

Image acquisition

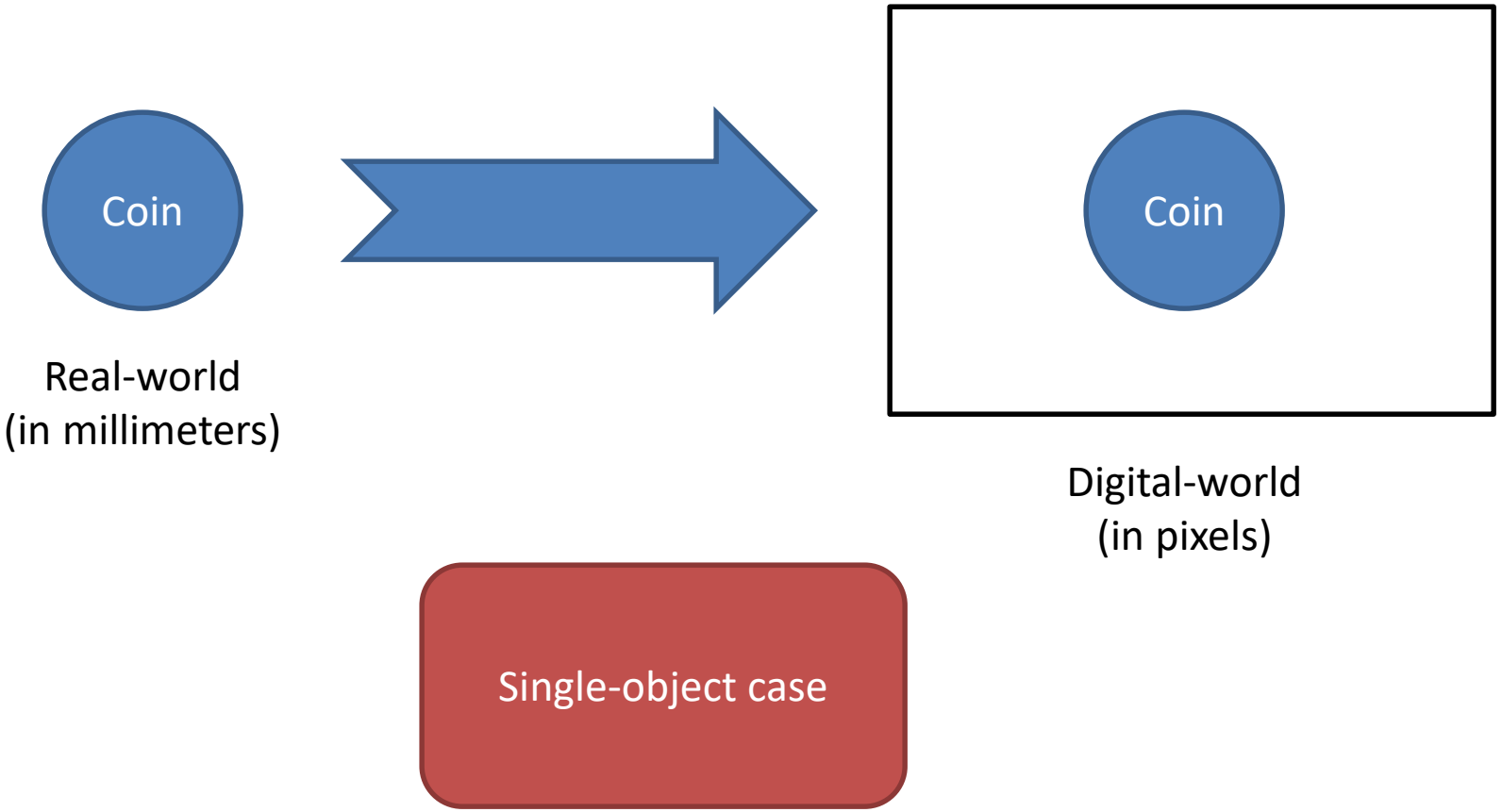
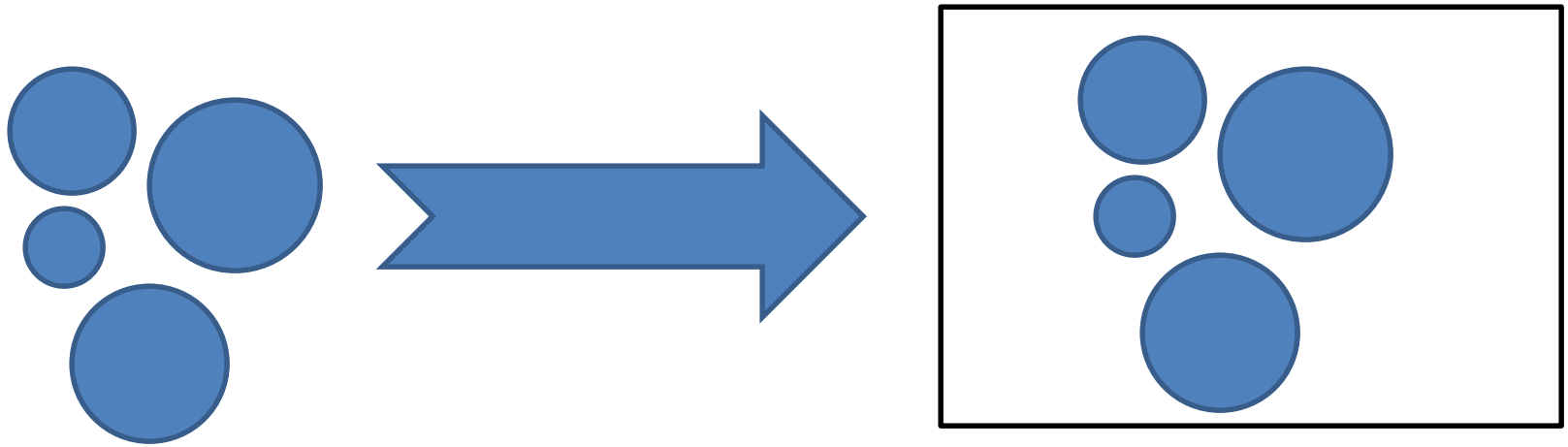
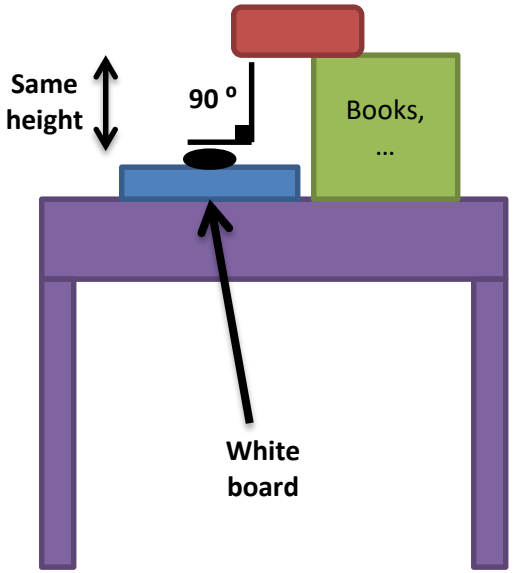


Image acquisition



Multi-object case

Image acquisition



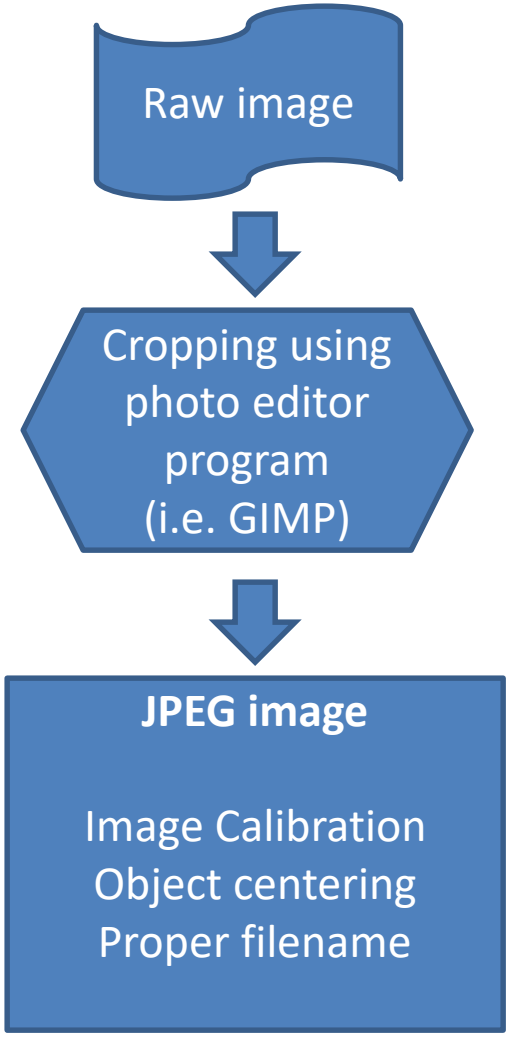
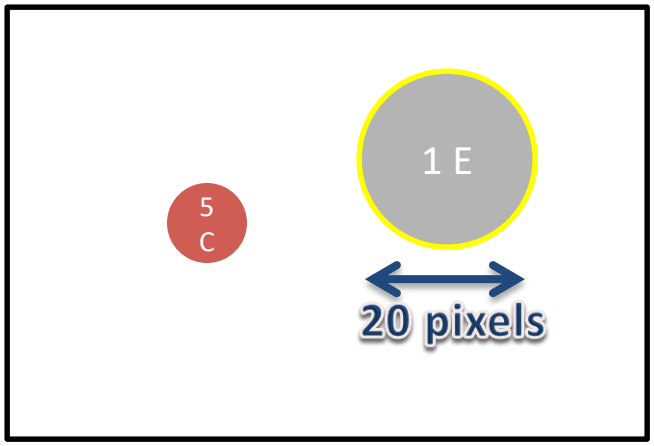


Image calibration

- Scaling factor

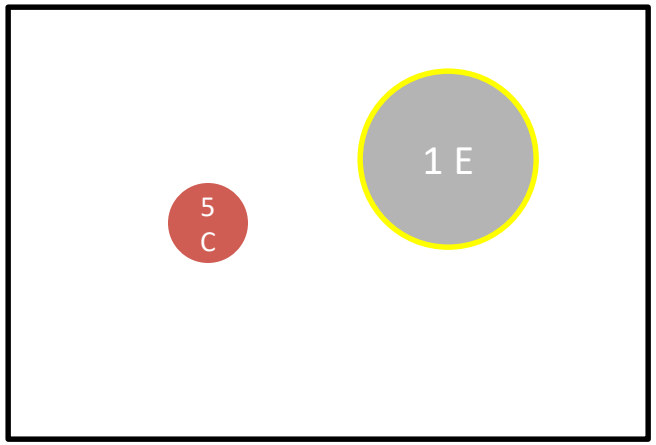


SF = diameter in millimeters / diameter in pixels
= 23.25 / 20
HINT: use ‘imtool’

Coin Type	Diameter in mm
1 Cent	16.25
2 Cent	18.75
5 Cent	21.25
10 Cent	19.75
20 Cent	22.25
50 Cent	24.25
1 Euro	**23.25**
2 Euro	25.75

Image calibration

- Mean color value



Object	Color	Mean (R,G,B)
Foreground	Copper	
	Gold	
	Silver	
Background	White	

HINT: (in MATLAB)
•Use 3D plotting method for point cloud visualization
•Use clustering method for calculating center value for each cloud

Recommendations

- Non-overlapping gap = 0.5 mm.
- Scaling Factor = around 0.1 mm / pixel.
- In case of large-size images, subsampling is required (target: small resolution images).
- Try to develop auto-calibration way.
- File naming [CoineType_CoinNum.jpg] (i.e. E1_02.jpg) {No spacing is allowed!!}.

Conclusion (1/2)

- Single - object case: 32 images
  - 2 images per side per coin
- Multi - object case: 20 images
- Total images = at least 52 images!
- Notes:
  - Non-interleaving objects
  - No flash / natural light
  - MATLAB practice!

Conclusion (2/2)

- Calibration parameters (Excel sheet file)
- Project evaluation (Excel sheet file)
- Setup of image acquisition (JPEG file)
- Sample photos (JPEG files)
- Show cases from last year studies
- Demo for manual calibration

- **Group Selection** (Group of 2)!