IVR Coursework 1
Report

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1   Introduction

To recognise and count the coins in an image, Coinsy, have three subtasks:
1) Image processing, 2) Object recognition, and 3) Classifiation (and then
counting the coins).

For Coinsy to be a proficient counter, we have to first train it. The
processes that Coinsy goes through for training differs from evaluation as
described in figure Figure 1. We will describe her training in the next section
- methodology, and her evaluation results after. Lastly, we conclude with a
discussion on Coinsy performance.

In the following subsections, we give an overview of the operation pipeline
for each subtasks.

1.1   Image Processing

For all images that Coinsy receives, a series of preprocessing will be carried
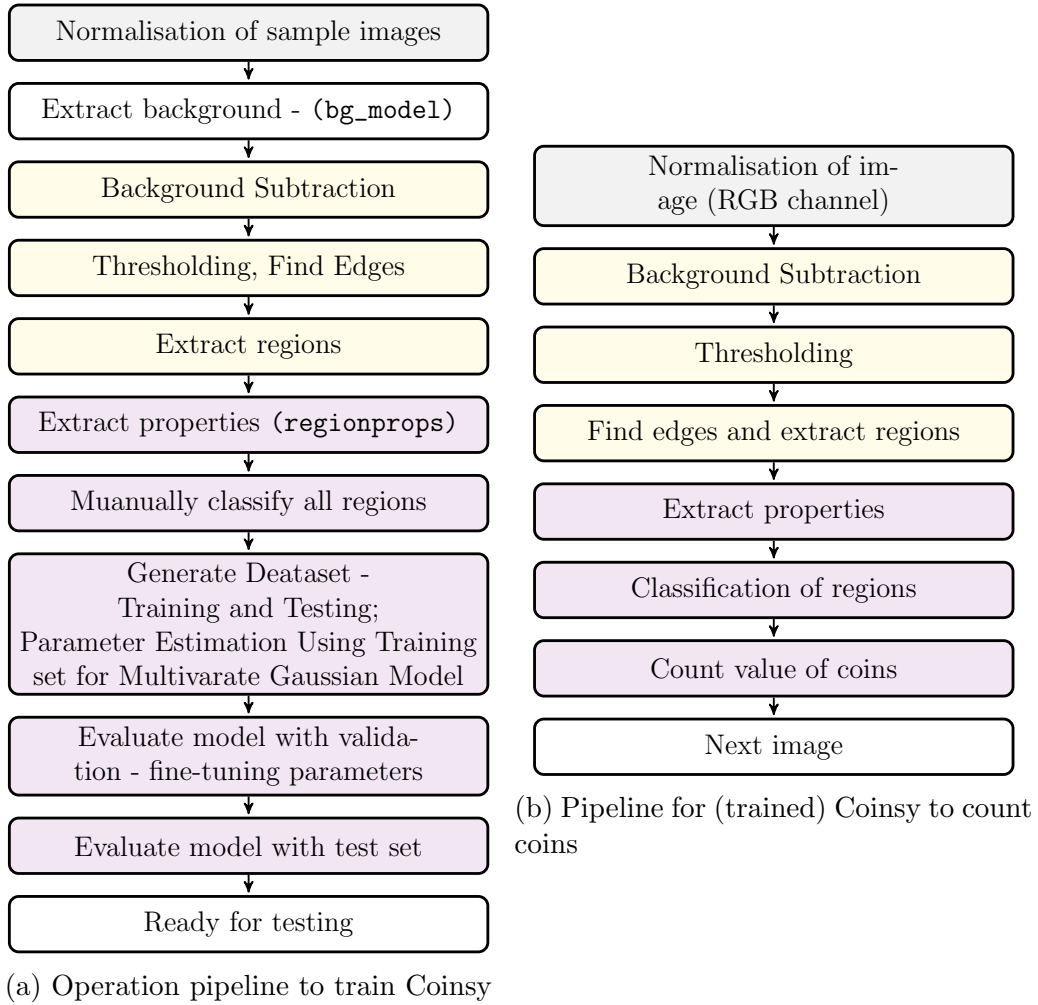our for images to be comparable, followed by background subtraction and

(a) Operation pipeline to train Coinsy

```
┌─────────────────────────────────────┐
│   Normalisation of sample images     │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│  Extract background - (bg_model)     │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Background Subtraction         │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│      Thresholding, Find Edges        │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│          Extract regions             │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│  Extract properties (regionprops)    │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│     Muanually classify all regions   │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│        Generate Deataset -           │
│        Training and Testing;         │
│  Parameter Estimation Using Training │
│  set for Multivarate Gaussian Model  │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Evaluate model with valida-    │
│       tion - fine-tuning parameters  │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│      Evaluate model with test set    │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│          Ready for testing           │
└─────────────────────────────────────┘
```

(a) Operation pipeline to train Coinsy

(b) Pipeline for (trained) Coinsy to count coins

```
┌─────────────────────────────────────┐
│      Normalisation of im-            │
│      age (RGB channel)               │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Background Subtraction         │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│          Thresholding                │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│    Find edges and extract regions    │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│        Extract properties            │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Classification of regions      │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│        Count value of coins          │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│            Next image                │
└─────────────────────────────────────┘
```

(b) Pipeline for (trained) Coinsy to count coins

Figure 1: Differences in Pipeline

image segmentation. The output of this task are the The background is built using

2) Image segmentation,

1.2 Object Recognition

1.3 Classification

2 Methodology

THIS IS THE TARGET

3 Result

Appendix here