PITCH: COUNTERFEIT DETECTION

Introduction

The current anti-counterfeiting software of MagnaVersum App Services is able to recognize counterfeit products, but only under specific camera angles and lighting. This feasibility study is set up to determine whether there is a more robust way of detecting counterfeit products that is less dependent on the conditions of the current software. The main focus in this feasibility study will be on the use of Machine Learning to do the counterfeit detection.

To minimize the risk of the project there will be three milestones. These milestones can be used to determine how the project progresses. Based on the progress or lack of it, it can be decided to stop the project prematurely.

Objectives of study

- Determine whether counterfeit detection can be achieved robustly using Machine Learning and Computer Vision techniques.
- Train a model that can accurately perform counterfeit detection:
  - Under various camera angles.
  - Under various lighting conditions.
  - Using various capture devices

Milestones

We will evaluate the capacity of various Deep Learning models to learn how to do counterfeit detection. This includes trying out various Deep Learning models to make the evaluation as complete as possible. The milestones defined below are of increasing complexity, starting at the most controlled environment up to the consumer environment. For every milestone it is specified what the objectives and prerequisites are.

Milestone 1 - Controlled environment

For the first milestone we will focus on the counterfeit detection in a controlled environment. This means that the lighting conditions will be kept the same (TL) and that the images used to train and test are high resolution and taken with the same camera . By keeping these conditions the same we can determine whether the counterfeit detection using Machine Learning works in the most simple situation.

This milestone will provide a good indication about the feasibility of using Machine Learning and Computer Vision for automatic counterfeit detection in general. If this milestone is successfully completed chances of this technique being feasible greatly increase.

Objectives

- Counterfeit detection reaches a correct percentage of at least 90%
- Detection works in well-lit environments (TL)
- Detection works for high resolution images taken with the same camera

Prerequisites

- Sufficient data under one lighting condition taken with one type of camera
- Knowledge about the printing methods used to create the real and counterfeit products

Milestone 2 - Business environment

For the second milestone we will focus on enabling the counterfeit detection in a business environment based on high-end mobile devices with a high quality camera.

This means that the lighting conditions are close to ideal and that the user has proper training how to take the optimal picture using its mobile device. The mobile device used for this milestone will be able to provide images that are high resolution and sharp.

The outcome of this milestone will help to determine whether the current state-of-the-art techniques enable doing the counterfeit detection in a real world scenario. Completing this milestone successfully will help determine the likelihood of turning these techniques in a real world application for industrial usage.

Objectives

- Counterfeit detection reaches a correct percentage of at least 90%
- Detection works in well-lit environments (TL or indirect sunlight)
- Detection works on high-end mobile devices

Prerequisites

- Milestone 1 was successfully completed
- Images taken under the conditions specified
- Well-lit environments (TL or indirect sunlight)
- High-end mobile device is used
- Images are taken in a way similar to a trained user
- Insight into conditions of a typical business environment

Milestone 3 - Consumer environment

For the third milestone we will focus on enabling the counterfeit detection in the consumer environment based on various mobile devices with a high quality camera.

This means that the lighting condition can vary and that the user has not had proper training how to take the optimal picture using its mobile device. The mobile devices used for this milestone will be able to provide images that are high resolution and sharp.

Completing this milestone successfully will provided a solid fundament for turning the researched techniques into a product that can be used by consumers around the world, making intelligent counterfeit detection a reality. If it fails, the results will help improve the results of milestone 2 increasing the chance of turning the techniques into a stable business application.

Objectives

- Counterfeit detection reaches a correct percentage of at least 90%
- Detection works in well-lit environments (TL or indirect sunlight)
- Detection works on high end mobile devices

Prerequisites

- Milestone 2 was successfully completed
- Images taken under the desired conditions
- Images are taken by a consumer (or somebody without exact knowledge about the ideal picture)

Project Risk Management

Since the feasibility study is a research project, there is a high level of uncertainty which in turn leads to a high level of risk. To avoid a situation in which the project drags along indefinitely, a number of milestones have been introduced in this document. During monthly meetings we will discuss the progress of the project and whether or not the milestones have been completed. If the progress is not in line with expectations and the results are unsatisfactory, the project can be terminated.

In the case that the project is terminated before completion, all the research done for the project must be turned over to MagnaVersum for potential future research ventures into counterfeit detection.