Real-Time Image Enhancer

Machine Vision Internship

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INTRODUCTION

Kapernikov is a belgian consulting company that specializes in machine vision, data science and cloud architecture.

Machine Vision is a field that is commonly applied to the medical, finance, technology and security industries.
It consists of a system that process, inspect and analyze visual inputs in order to train computers to interpret and recognize patterns in a similar way as humans do.

Kapernikov provides innovative solutions to real world problems for customers such as Infrabel, Umicore, Atrias and also the Department of Mobility and Public Works in Flanders.

Among the projects Kapernikov conducted, we can mention :

- Detection and prediction of areas of vegetation to be pruned at network level railways from LiDAR data.
- Default detection within the food industry through image segmentation algorithm.
- Precision and speed improvement of carrier robots through object tracking optimization.
- Automatic detection of winding faults during product production coiled (copper and iron coils).

PRACTICAL PURPOSE

Many companies turned to Machine Vision solutions since it brings additional safety and operational benefits by reducing human involvement.

Since it's real-time, the enhancer could take a continuous stream of images during the data acquisition step without slowing it down.

A dataset of images with better resolutions could lead to a more efficient context and information extraction, and therefore give better performances when training a model or applying it in real life.

It also opens up new perspectives for machine learning projects where a high-quality (resolution wise) dataset is crucial. (Eg : default detection, self-driving cars, face recognition)

Aside from machine learning projects, the enhancer could also be applied on other projects such as a video streaming service, a tool to improve the resolution of old images and videos (Eg: WWII videos).

The internship

MISSION

This internship proposal is a research task regarding the implementation of a Real-Time Image Enhancer using Machine Learning.

Its principle is simple yet consistent and requires reflection, especially in terms of optimizing the processing time, which makes it a consistent subject for an internship. The results provided by the intern will actually be used.

Note that this task will either fit within one of the research projects or withing a customer project. Kapernikov will select and form the project a few weeks before the internship starts in order to match project and intern interests.
This way we can ensure that the project is above Kapernikov's (or client's) priorities, so that we can garantee that the trainee receives the necessary coaching.

Context

After some research, it looks like there are no tools known/accessible that do this specific task. For Kapernikov, this tool could have a positive impact on previous, current and future projects.

To get started, we can begin by looking at the resources below :

- [Real-time Image Enhancer via Learnable Spatial-aware 3D Lookup Tables](#)
- [Deep Bilateral Learning for Real-Time Image Enhancement](#)

What we expect

- Can work on linux
- Good experience with Python and/or C++
- Notions in artificial intelligence
- Experience with ROS2 is a plus