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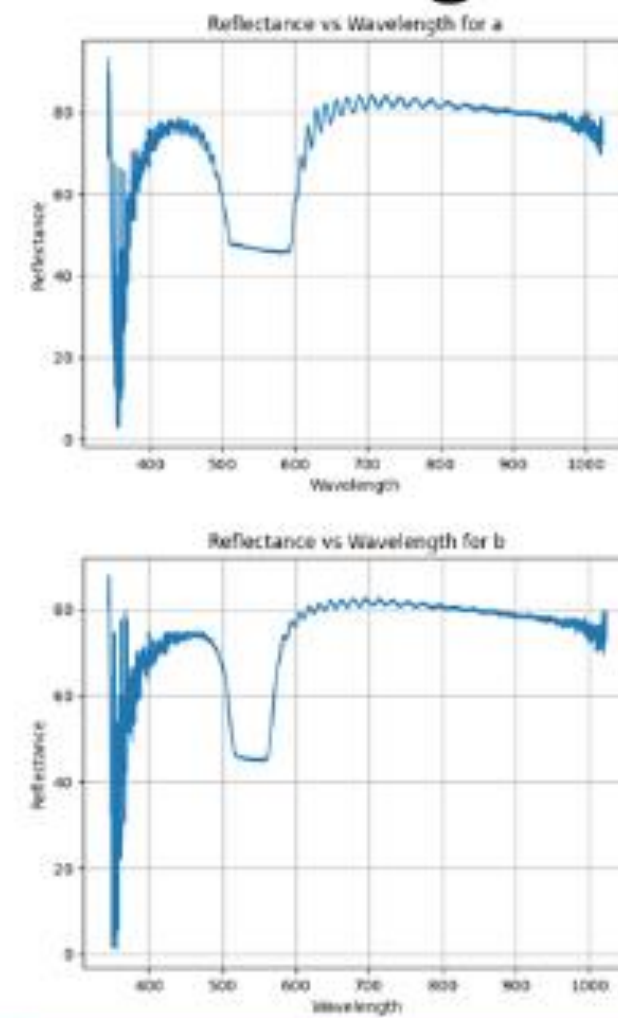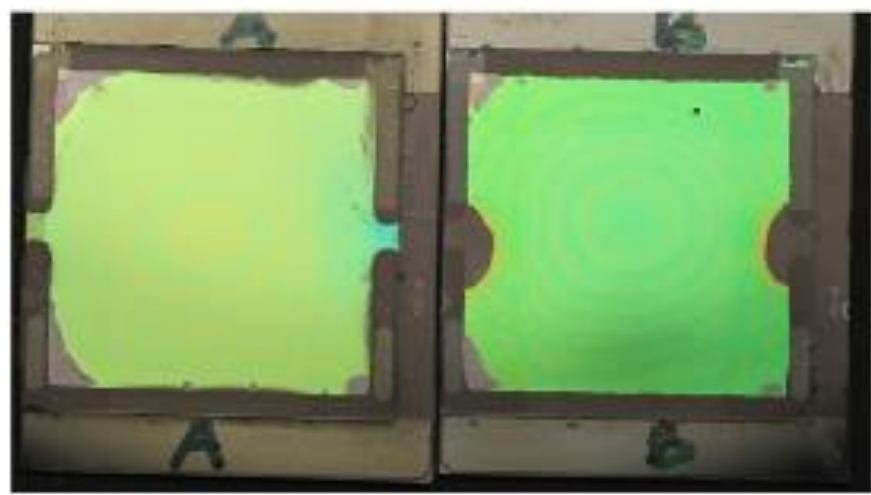# The power of machine vision in the analysis of liquid crystals

Introduction

The purpose of this placement was to hopefully speed up the analysis of liquid crystals. By removing the need for expensive lab equipment and automating the process
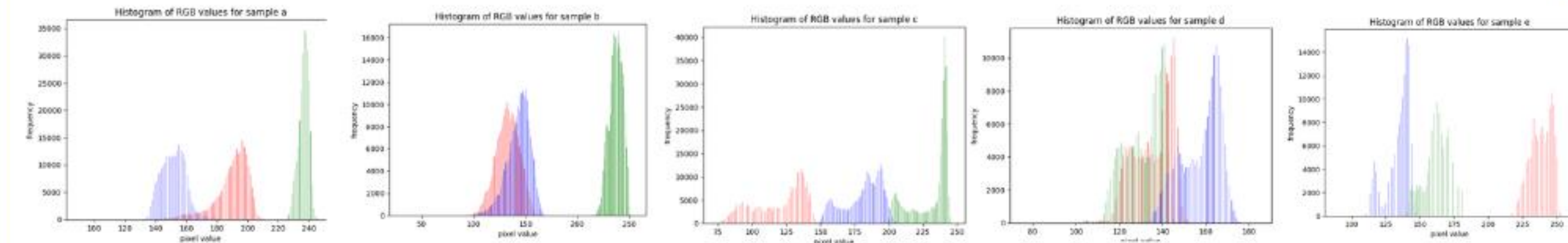

The Method

In order to achieve this project I did the following:

1. Take a photo of the crystal in question and crop them such that the only the crystal took up the frame
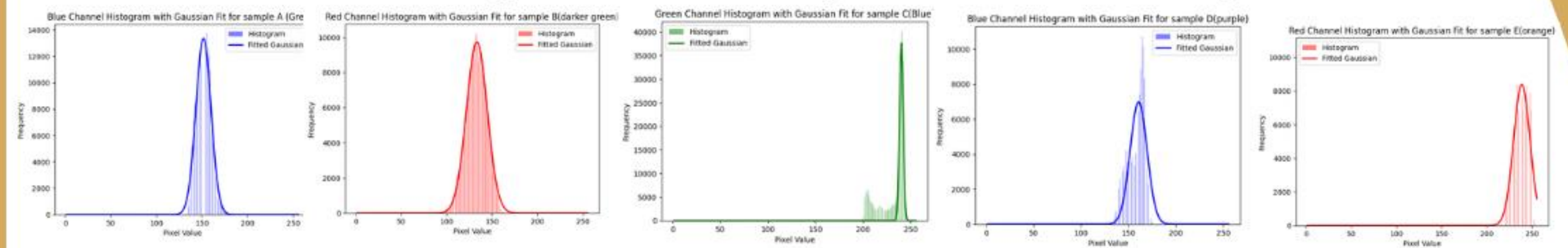

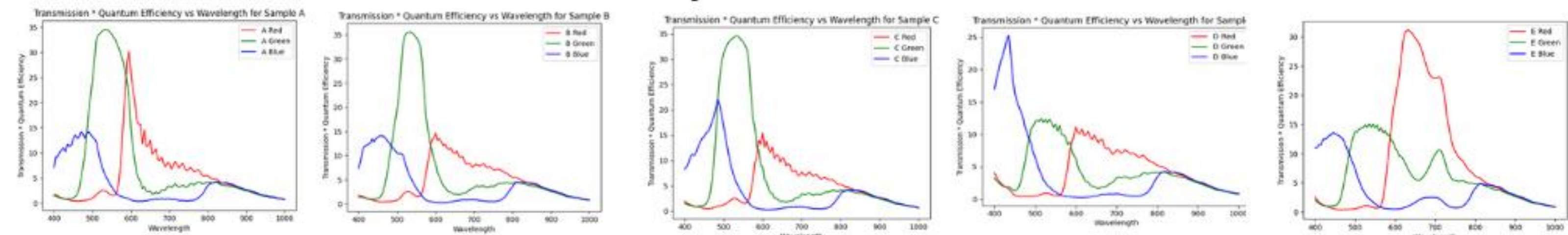| Sample A: light green | Sample B: dark green | Sample C: turquoise | Sample D: purple | Sample E: orange |

2. Create a set of rgb histograms for all the samples relating frequency and pixel value

3. Create some statistical fittings and collect summary data for each of the histograms

4. Correct the data in accordance to the bayer filter data

5. From all the data acquired, train a machine learning model to try and predict the central position of the wavelength of the light emitted from the crystal

The model

The model chosen was a gradient boosting algorithm. It was chosen for a few reasons. The qr code explains how the model works:

1. The dataset was fairly limited. Since there was only 5 samples to collect data from
2. The data wasn't following a linear relationship as seen by the none of the graphs being linear. Instead opting for a more gaussian shape
3. Due to how this model works. It usually has high accuracy. Although this can come at the cost of overfitting

Conclusions

The Model was quite successful , However for how small the sample size was. overfitting is likely so a bigger sample is needed.

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