Software Development Opportunity:
Computer Vision for Chemistry Research

Details of Position

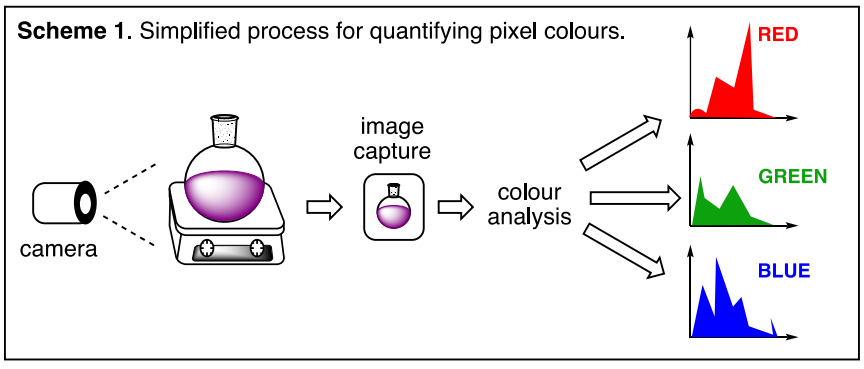
Supervisors: Dr Marc Reid (website)
Dr Martin Goodfellow (website)
Project Length: 4 – 12 weeks (flexible, depending on level of experience)
Project value: £3,000
Start Date: Flexible
Key words: *software design; Python; computer vision; chemistry; cameras; industry*.
Application Deadline: 5pm, 8th March, 2019

Project Overview

Chemistry research is dominated by colour changes.

With the rise of digital camera technologies, there are boundless opportunities to develop user-friendly colour analysis tools based on computer vision. Digital imaging techniques are attractive to chemists and biologists due to the simplicity, portability, and low cost of such techniques. Quantification of real-time colour changes also creates opportunities to bring machine learning and Big Data techniques to Chemistry research in previously unexplored ways.

This software design project focuses on **using colour analysis tools that can operate in real-time to study catalytic chemical reactions** (**Scheme 1**). This will involve analysis of video footage at different frame-rates, with flexible region-of-interest selection, and application of different colour spaces (e.g. CIELAB, HSV or RGB). Graphing of colour changes versus time and exploration of web-based graphical user interfaces will also be important. As this is a multidisciplinary project, interaction with chemistry researchers and computer scientists at the University of Strathclyde, as well as industrial scientists (end users of the software) will form an integral part of the project.



Scheme 1. Simplified process for quantifying pixel colours.

Responsibilities

The key intellectual challenge will be to lead a project to upgrade and add key functionalities to an emerging computer vision software platform.

In this multidisciplinary project between Chemistry and Computer Science, there is invested interest from industrial partners such as Fujifilm, GlaxoSmithKline, and the Centre or Process and Analytical Control Technologies (CPACT). You will thus have the opportunity to collaborate directly with end users of the software. You will also have access to a vibrant range of interactions with analytical chemists, synthetic chemists, computer scientists, and

industrialists, to whom project dissemination will be important. With emerging interests from other companies such as AstraZeneca and Johnson Matthey, the commercial potential of this project will allow you to make defining contributions to the proof-of-concept necessary to pursue entrepreneurial sources of future funding. Overall, this project will provide a rare combination of experience in cross-departmental collaboration, industrial technology development, and entrepreneurial vision.

Essential Skills and Interests

- Object oriented programming
- Software design
- Full stack Python (essential)
- Computer Vision (OpenCV, Scikit Image)

Desirable Skills (not essential)

- C++
- Using software on big data servers / supercomputers

How to Apply

Interested candidates should provide:

- a brief email cover letter
- CV (PDF, 2-page max.)
- GitHub repository link (if applicable)

Application details should be emailed to **both** Marc Reid and Martin Goodfellow at the following addresses before the above-stated deadline.

Marc Reid: marc.reid.100@strath.ac.uk
Martin Goodfellow: martin.h.goodfellow@strath.ac.uk

Thank-you for your interest. We look forward to hearing from you.