Bachelor assignment polarized light microscopy for rheumatology diagnostics

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Introduction

For the diagnosis of acute gouty arthritis, (chronic) cartilage calcification and degenerative joint diseases such as osteoarthritis, identification of crystals in joint fluid aspirates is of importance. Joint crystals are birefringent and can be imaged with polarized light microscopy. In a joint project between the University of Twente, VieCuri Medical Centre (Venlo) and ReumaNederland, an effort is made to validate a novel type of microscope for clinical care: a Raman spectroscope which is integrated in a polarized light microscope. In the current setup, only the Raman spectroscopic data is used for diagnostic classification of crystals, while the polarized light microscope is only used for localization of particles. The images however do contain very relevant information for classification, which is now disregarded completely.

The assignment

In this assignment you will work with a large set of data retrieved from patients with several rheumatic diseases. This data set contains images of crystals with classifications. You will investigate which features from these images are relevant for the identification of crystals.

Requirements

This assignment is largely focused on image processing and will require affinity with programming. MATLAB is suggested but other platforms can be used when preferred by the student.