Abstract

The German Federal Institute for Geosciences and Natural Resources (BGR) is trying to find indicators for the availability of precious metals by analysing the extracted drill cores. To achieve this, the images of the drill cores, which are taken by mutiple sensors, should be jointly analysed to obtain the different information. This thesis proposes an automatic coregistration of the available Energy Dispersive X-ray Fluorescence (EDXRF), Laser induced breakdown spectroscopy (LIBS) and hyperspectral images (HSI) of the same drill cores and analyze the accuracy. At first, since there are different channels corresponding to different chemical compositions, the suitable channels of each pair of image are selected for matching. Then, feature detection and matching are carried out. Existing methods, e.g. Scale-invariant feature transform (SIFT) and Speeded up robust features (SURF) are investigated and compared to each other. SIFT shows the ability of extracting more feature matches. After that, the transformations between images from LIBS, HSI and EDXRF are determined. The parameters of the transformation are jointly estimated involving image triplets and compared to the setting involving only two images. Also, an appropriate geometrical model for relating the respective sensors to each other is investigated. The affine transformation and projective transformation have similar performance in both image pairs and image triplets. They have better performance than the similarity transformation between HSI and EDXRF.