



An Experimental Study on the Min-Image Production for Determination of Mineral Percentages

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Determination of mineral percentages of rocks is performed traditionally by point counting method on thin sections. Point counting method is applied manually by using a microscope, and it has to be repeated as much as number of minerals occur in the thin section. As can be seen, it is time consuming, requires high effort and includes the risk of high error rate. TSecSoft presented by Yesiloglu-Gultekin et al. (2012) is an image processing tool developed for the mineral recognition on thin sections. In TSecSoft, minimum image (min-image) is produced from a series of thin section images, some preprocessing operations are applied on the min-image, and the automatic segmentation (JSEG is used) is applied. The final and optional stage is getting user feedback from researcher for checking and correction of the segments.

Yesiloglu-Gultekin et. al. (2012) presents three angle (2° , 5° , 10°) which are used to produce image set as an input for min-image production. In this study, the answer to the question of "how many images are enough to produce min-image without losing performance" is investigated. Experiments are organized on the same data set presented in Yesiloglu-Gultekin et al. (2012) and the angles are selected as 20° , 30° , 45° , 60° . In other words, total image number used in the experiments are 9, 6, 4, 3. For this purpose, a thin section was fixed to microscope table, and polarizer was rotated at the specified angles. At each these angle, three randomly selected regions on thin section were captured, and image sets were produced for that thin section. By using TSecSoft, mineral percentages of quartz, plagioclase, orthoclase, amphibole, biotite and accessory minerals were determined, and mineral percentages were compared for 2° with other rotating angles.

Total performance of the angle is calculated with the summation of the three correlation coefficients sourced from three randomly selected region, and error is calculated by subtracting of total performance from 3. The reason of 3 is that if all correlation coefficients were 1, total performance would be 3 and the error would be 0. The results of this experimental study shows that, the quality of the min-image is decreasing gently from 20° to 60° . The error of the angles 20° , 30° , 45° , 60° are 0.0151, 0.0181, 0.0200 and 0.275 respectively. As a conclusion, it is possible to advise 20° for min-image production to determination of the minerals listed here.

References

Yesiloglu-Gultekin, N., Keceli A.S., Sezer, E. A., Can, A.B., Gokceoglu, C. and Bayhan, H., 2012, A computer programme (TSecSoft) to determine mineral percentages using photographs obtained from thin sections, *Computers & Geosciences*, DOI 10.1016/j.cageo.2012.01.001.