Comparion of different Algorithms for Urban Land-Use Classification using four Kinds of Medium-Resolution Satellite Images

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The purpose of this paper is two folds: 1. by comparing different classification methods, answer which method (a group of methods) are better for urban land use. 2. evaluate four different kinds of medium-resolution satellite images, three of which are from China's own satellites - CBERS-02B; Beijing-1 data: HJ-1 data. The study area is Guangzhou, Guangdong Province, China. Data from the three China's earth observation (EO here after) satellites are all from January 2009. The classification methods we chose include Maximum likelihood classification (MLC), Support Vector Machine (SVM), C4.5, CART, QUEST, K-nearest neighbor (KNN), Logistic, Back Propagation (BP), radial basis function networks (RBFN), Random forest, logistic model tree (LMT), Bagging, Adaboost and vote.

The results show: 1) To some extent, more training samples can improve the classification accuracy, but the MLC and logisitic algorithms are not sensitive to the size of the training sample. 2) MLC, logistic, SVM, QUEST can achieve the better accuracies. However, if taking the time into accounts, MLC and logistic are the best. 3) The integrated methods (such as RF and LMT) can also produce good results. The Bagging algorithm can improve weak classifiers (e.g., C4.5) especially when there are not enough training samples.

Among the four satellite data, Landsat-5 data and CBERS-02B can achieve the best accuracy with the logistic classifier, HJ-1 data can achieve the best accuracy with RF and MLC, Beijing-1 data can achieve the best accuracy with QUEST. Landsat-5 data outperforms the remaining Chinese satellite data, while CBERS-02B data takes the second place. The maximum difference of them is less than 0.03 kappa value. CBERS-02B data can be easily obtained with higher spatial resolution. Therefore, it can be used as auxiliary data for land use mapping.