A Chi-Square Statistic for Checking Satisfactory Edge Matching of Maps and Diagrams that Depict Adjacent Areas

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ABSTRACT

This paper describes a statistical method that can be used to determine whether two or more maps produced by independent surveys and cover adjacent areas match each other satisfactorily. This situation often arises when adjacent areas are mapped by different surveyors or at different times, using different sets of geodetic control measurements. The method is based on comparing differences in the coordinates of points that are well identified on pairs of adjacent maps (or diagrams). These differences are used to calculate a statistic that is suitable to determine whether the joint observed differences in the coordinates could be attributed to random error or not. It is shown that the statistic follows the *Chi-square* distribution and, therefore, it is amenable to treatment by the standard statistical methods. The use of the method in practice is demonstrated through indicative examples from Hellenic Cadastre Project. Indeed, within the context of the Quality Control procedure of the Hellenic Cadastre Project, the 1:5000 scale orthophotomaps, which are produced by different contractors and are based on different sets of geodetic control computations, are checked for satisfactory edge matching. The results of the procedure are described and discussed for a case study at the island of Chios, Greece.

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