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A MULTI-AGENT SYSTEM APPROACH FOR FEATURE-DRIVEN GENERALIZATION OF ISOBATHYMETRIC LINE

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INTRODUCTION

Generalization is an important branch in cartography. This process abstracts a map for emphasizing important items and increasing its legibility. On a nautical chart, the purpose is also to emphasize navigational hazards and main navigation routes. Therefore, the cartographer not only adapts the amount of information to the scale of the chart but also selects the information according to the types of features on the seabed and their importance to the navigator. Features are characterized by the isobaths. Methods usually applied on contours for topographic maps cannot be applied on isobaths as they do not take information about features into consideration and a new strategy coordinating different generalization operators must be defined for nautical charts.

OBJECTIVE

This paper focuses on isobaths generalization and introduces a new approach based on a multi-agent system.

METHOD

It first introduces the characteristics and constraints of isobath generalization. In order to keep the seabed spatial information such as peak, pit and so on, isobaths are divided into different features based on its information. The features characteristic (peak or pit) will influence the chosen of constraints, generalization operators, evaluation constraints.

Multi agent model is a concept of Artificial Intelligent. The agent in this system can chose the actions for themselves and the system will evaluate the best combinations of actions of each agent to achieve the final aim. This model will be used for coordinating the different generalization of isobath and features. The paper presents the multi agent model where features and isobaths are represented by agents at different levels. Based on the constraints of isobath, detail constraints used in multi agent system are proposed on isobath and feature level of agent with measures the geometric quantities such as distance and area. Possible actions (generalization operators) performed on both two level agents are listed. For selecting the best plan of actions, evaluation model in multi agent system is proposed which calculates how much the agents obey the constraints tolerance. System calculates the amount of violation and chooses a set of actions which has minimum violation.

PRELIMINARY RESULT

The preliminary result presents the features structure described by the contours. Depending on the type of features, features can be removed if they do not satisfy the legibility constraint. The data set presents the results which are limited as only selective omission is considered.

CONCLUSION AND FURTHER WORK

This article dealt with the problem of isobath generalization for nautical charts. This paper introduced an approach where generalization is feature-driven and operations on features and lines are coordinated by an agent model.

Further work is still required. Two directions are identified for future work. First, because the feature definition is based on the analysis of a contour tree, mistake may appear when dealing with open contours on complex terrains. In further, it should classify the relation between contours and describe the feature accurately. Second, work presented here only considers isobaths. In further work, more items in nautical chart should be added.