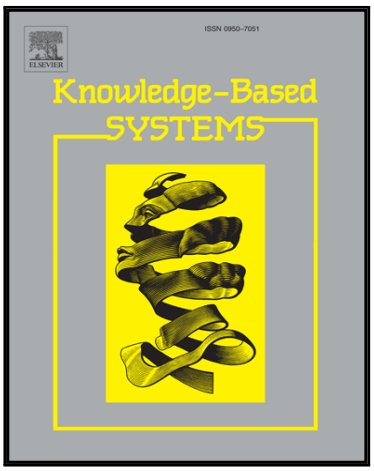

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Shortest Path Computation Using Pulse-Coupled Neural Networks with Restricted Autowave

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Abstract

Finding shortest paths is an important problem in transportation and communication networks. This paper develops a Pulse-Coupled Neural Network (PCNN) model to efficiently compute a single-pair shortest path. Unlike most of the existing PCNN models, the proposed model is endowed with a special mechanism, called *on-forward/off-backward*; if a neuron fires, its neighboring neurons in a certain forward region will be excited, whereas the neurons in a backward region will be inhibited. As a result, the model can produce a restricted autowave that propagates at different speeds corresponding to different directions, which is different from the completely nondeterministic PCNN models. Compared with some traditional methods, the proposed PCNN model significantly reduces the computational cost of searching for the shortest path. Experimental results further confirmed the efficiency and effectiveness of the proposed model.

Keywords: Shortest Path, Pulse-Coupled Neural Networks, Restricted Autowave,on-forward/off-backward

1. Introduction

Finding the shortest paths is a classical combinatorial optimization problem. It plays an important role in many practical applications, such as vehicle rout-

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