

A New Routing Area Displacement Prediction for Location-Based Services based on an Enhanced Ant Colony

Mohammad Sh. Daoud

Aladdin Ayesh

Management Information System, Al Ain University

Abu Dhabi, UAE

Adrian A. Hopgood

Sheffield Business School, Sheffield Hallam University

Sheffield, UK

Mustafa A. Al-Fayoumi

College of Computer Engineering and Sciences, Salman bin Abdulaziz University

Riyadh, Saudi Arabia

Hani M. Mimi

Faculty of Information Technology, Al Zaytoonah University of Jordan

Amman, Jordan

Abstract—In location-based services (LBSs), the service is provided based on the users' locations through location determination and mobility anticipation. Most of the current location prediction research focuses on generalized location models, where the geographic extent is divided into regular shape cells. One such technique is the Mobility Prediction based on an Ant System (MPAS), which depends on the earlier Ant Colony Optimization (ACO) that suffers from problems such as search stagnation and pheromone update. In this paper, a New Routing Area Displacement Prediction (NRADP) is introduced, which works on the routing-area level instead of the cell level. Experimental results show that the NRADP offers improved effectiveness, higher prediction rate, and a reduced search stagnation ratio in comparison with the MPAS.

Index Terms—Ant Colony Optimisation, LBSs, Mobility Prediction, Cellular Network, UMTS, Routing Area.