

## **Evaluation and players' performance of the location-based game O-Mopsi**

Public examination of a doctoral dissertation in the field of Computer Science

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Language of the dissertation and the public examination: English

People share a huge number of geo-tagged digital content over the internet every day. Such content, especially photos with precise location information encourage the development of location-based games and trip planning applications. Subsequently, such games and applications are gaining popularity worldwide. The purpose of such games is to induce people to visit interesting near-by places.

O-Mopsi is an example application that brings the orienteering to your pocket. Similar to the classical orienteering, O-Mopsi games contain a set of targets to visit but they are mainly landmarks and educational objects instead of control points setup by the organizer. Another difference is that O-Mopsi players can freely choose the order of visiting the targets. One motivation of O-Mopsi is to provide a sightseeing tour platform to the players.

O-Mopsi was first released during SciFest 2010, the annual festival for promoting science, technology, and the environment in Joensuu. Since then, O-Mopsi has been a part of SciFest every year and been popular among the school children. A new game has been designed every year in SciFest and children love to play even multiple times and enjoy finding the targets.

O-Mopsi records the statistics of the players. The player who finished the game in the shortest time wins. To reduce the playing time, a player indirectly aims to minimize the traveling distance through the targets. In trip recommending applications, the system can also offer the shortest path, which includes the path optimization problem.

Finding the shortest path is an intriguing puzzle to a human being. An Irish mathematician, W. R. Hamilton, introduced a puzzle based on a similar problem in 1856. Since then, scientists have tried to find solutions to this type of problems.

In this thesis, we study the path optimization problems contained in O-Mopsi and how humans perform in solving them. Players are usually unable to optimize their paths during the playing, and typically follow a sub-optimal path. The findings of this thesis indicate that players need some strategies to select the best starting location. The difficulty of solving the best path not only depends on the number of targets; however, the difficulty level can be estimated by the number of branches in the so-called minimum spanning tree constructed from the targets. We also provide a new computer-algorithm for solving the path optimization problem.

Apart from O-Mopsi, our results can also be applied to tour planning, tour advisory applications, logistics, and transportation.

The doctoral dissertation of MSc (Tech.) Lahari Sengupta, entitled Evaluation and players' performance of the location-based game O-Mopsi will be examined at the Faculty of Science and Forestry. The opponent in the public examination will be Professor Vincent Charvillat, University of Toulouse, France, and the custos will be Professor Pasi Fränti, University of Eastern Finland.

