# A Context-Aware Tour-Guide System for Group-Based Tourists

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**Abstract**
In this paper, a context-aware system is proposed to offer places for visit to a group of tourists. The proposed system takes into account the factors of the tourists' interests as well as the travelled distance and seeks to maximize their satisfaction. To this end, clustering of individuals is performed according to their interests. Therefore, by using the PSO algorithm, the proposed system offers the best places for tourists during their stay. The simulation and implementation results of the proposed system show that tourists are more quantitatively satisfied in comparison with three previous methods for a case study of the city of Isfahan.

**Introduction**
One of the ways for tourists to visit unfamiliar places is to use the tourist guide systems so that the they can get better suggestions. These systems often have a great deal of influence on the decisions they make by providing  information about attractions that are relevant to the needs of the tourists (Samany, 2012).
Today, people are interested in group trips. Nonetheless, most of the tour-guide applications seek support for a tourist and do not include services for social tourism (Buriano, 2006). On the other hand, tourists expect that if they want to travel with a group of people they can use the technology available in the tour-guide systems (Groh, 2015). In this paper, the subject of group tourism has been studied and a system is proposed that can support group of tourists.

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## Materials and Methods

Context-aware systems provide intelligent services by knowing the information of user situation and environment. These systems are used to remove unnecessary information by doing some sort of content filtering (Pessemier, 2014). "The context refers to any kind of information that describes the situation of an entity. An entity can be considered as a person, a place, or any object that interacts with the system" (Dey, 2001). In many cases, different tourists have different needs and preferences, so the use of contextual information plays an important role in providing special offers to them (Adomavicius, 2016).

In group tours, there is a shared desire for people to visit a place. To meet this goal, the proposed system has been designed to cluster people according to their interests. Placing people with similar interests in a group will allow the satisfaction of all members of the group to be met with a proposal tailored to the interests of the group. For this purpose, a DBSCAN-based clustering algorithm has been proposed. The proposed algorithm clusters people based on their interest dispersion.

In each day, the proposed system offers seven places with the highest personal and group priority to each tourist group. Given that the number of tourist attractions in a city may be high, the PSO particle swarm algorithm, which is one of the evolutionary intelligence algorithms for large space search, has been used. Each particle represents a selection of tourist attractions. Finally, due to the lack of familiarity with the important places such as hospital, pharmacy or restaurant in the city, there is a mechanism to suggest at any moment the nearest restaurant, hospital or pharmacy
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## Discussion and Results

The implementation of the proposed system is based on the C # programming language and MySQL database. In order to evaluate the results, the proposed system is compared with the previous three methods. The comparison results show that the proposed system has greatly succeeded in satisfying the groups of tourists.

## Conclusions

The proposed system has been instrumental in targeting the satisfaction of group of tourists through their categorization as well as the context-aware suggestions. The system could be extended by considering other types of context elements as well as specifying the groups with more details (e.g. Family, friendly or colleague's groups).

**Keywords:** Tourism, Tour Guide, Group Tour, PSO Algorithm.

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