

**CHENNAI – PONDICHERRY**

**Recognition of Group Mobility Level and Group Structure with Mobile Devices**

**Abstract:**

Monitoring group mobility and structure is crucial for understanding group activities and social relations. In this paper, we develop algorithms for fine-grained mobility classification and structure recognition of social groups utilizing mobile devices. First, we present a method that recognizes four levels of group mobility, including stationary, strolling, walking, and running. Second, using multiple types of mobile sensors, a novel relative position relationship estimation algorithm is developed to understand different moving group structures. We have conducted real-life experiments in which 12 volunteers moved in different small groups either in an office building or a shopping mall with various speeds and structures. Experimental results show that our approach achieves an accuracy of 99.5% in group mobility level classification and about 80% in group structure recognition.

**Existing System:**

We mainly focus on two typical group dynamics, i.e., group shape and group mobility level. Group mobility level can be stationary, strolling, running, etc; group shape or structure can be a queue, an irregular polygon, or a straight line side by side. Combining the two basic characteristics, we can describe mobile group activities with more details, such as strolling or stationary side by side, walking or running in a queue. The mobility patterns and structures of groups may be distinct in different scenarios. For example, a shopping group of two or three people usually walks in parallel with a low speed, whereas people in an indoor recreation center may run in a single line along the running track. Moreover, the group structure is also important for social relationship identification. In particular, a group structure can be described based on the members’ positions, which include the front, back, left, or right. The formation of group structure may imply how members communicate with each other.

**Proposed System:**

Recognizing group mobility level and group structure poses several interesting challenges. First, group mobility level recognition requires the consideration of the mobility of all group members. Different from individual mobility detection, recognizing group mobility level focuses on the entirety of a group, for which the object to be classified is the data combined from all group members. Second, group structure recognition is an issue involving each member’s position in the same group. Accurate localization has been a difficult problem. Due to privacy, precision, or energy consumption concerns, Bluetooth or GPS-based positioning is not suitable for structure recognition of small groups with two to four members. Therefore, we decided to explore the solution for structure recognition without knowledge of absolute positions. To our delight, there is no need to localize each member as our problem only requires knowing the relative position relationship.