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Clustering in Vehicular Networks

Seminararbeit im Fach Informatik

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Distributed Embedded Systems (CCS Labs)
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Clustering in Vehicular Networks

Seminararbeit im Fach Informatik

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**Distributed Embedded Systems
(CCS Labs)**

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(Gaurav Kumar Singh)

Paderborn, 21. Januar 2018

Abstract

This thesis captures an overview of ideas, techniques, results and future possibilities of clustering in vehicular networks. Clustering is a technique to group nodes based on a selected criteria which defines certain level of similarities among the nodes. Grouping the nodes together in such a way helps define or design a set of functionalities applicable only to the group and can be applied to the smaller sub-set. In a Vehicular Ad Hoc Network (VANET) environment clustering presents possibilities to group vehicles based on a parameter of interest and help to reduce the network traffic, achieve better network throughput, effective information dissemination.

The thesis presents a set of parameter and respective methodologies based on them for VANETs as a comparative study. First chapter presents the motivation behind the clustering and outlines the basic set of problems which is presented by vehicular Networks which the researches are trying to address. The second chapter describes the methodologies grouping them based on the main parameters used for clustering. The third chapter introduces the evaluation techniques used to evaluate the methods along with some important metrics used to compare the effectiveness of the algorithms. The fourth chapter captures a comparative study based on the results, highlighting benefits and drawbacks of different approaches based on simulation results. Finally the thesis captures some ideas which will give an overview of the future research work on the topic.

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Chapter 1

Introduction

Along with the advancement in wireless networking in the past two decades, there has been a lot of research targeted towards developing techniques to minimize the network overhead and achieve effectiveness within the system. A special class of wireless network, Wireless Ad Hoc Network (WANET), which allowed nodes to communicate with each other without the need of special infrastructure such as bridges and routers was developed. WANET lead to use of wireless communication for special applications with needs of distributed control. Shortly use of Mobile Ad Hoc Network (MANET) increased which allowed continuos movement of the nodes. This was followed by use of wireless networking among vehicles to create Vehicular Ad Hoc Network (VANET) which allows communication of various parameters among vehicular focussed towards application for safety and cooperative driving. The use of wireless networks in various domains has lead to a lot of research focussed towards improvements and optimization which are often valid for all domains.

Clustering in wireless networks involves grouping nodes together which are geographically close to each other based on a certain set of parameters. Parameter selection for clustering depends mostly on the type of application which would use the clustered network. In VANETs clustering of vehicles into groups provides a basis for limiting the networking overhead and interference by efficiently defining the target nodes and designing filters to limit the traffic. Due to the possibility of selecting huge range of parameters, there are a lot of solutions presented which target various scenarios in the VANETs. [1] and [2] presents a detailed overview of research work in this field in past years. In the following sections we would look at some of the important terminologies and parameters to create a general overview of clustering in VANET and help us to discuss and understand the methodologies better.

1.1 Terminologies

<Basic terminologies used in VANETs clustering>

1.2 Clustering Parameters

Chapter 2

Clustering methodologies

<overview of clustering methodologies and criteria for clustering>

2.1 Typical clustering steps

2.2 Method 1: Clustering using vehicular mobility

2.3 Method 2: Clustering using abstracted trajectory

2.4 Method 3: Clustering using vehicular density

2.5 Method 4: Hybrid clustering

Chapter 3

Evaluation techniques

<General simulation steps for evaluation>

3.1 Important metrics for evaluation

Chapter 4

Comparison of results

Chapter 5

Conclusion

foo [1] foo [3] foo [4] foo [5] foo [6] foo [7] foo [8] bar [9] bar [10] bar [11]
bar [12]

- summarize again what your paper did, but now emphasize more the results, and comparisons
- write conclusions that can be drawn from the results found and the discussion presented in the paper
- future work (be very brief, explain what, but not much how, do not speculate about results or impact)
- recommended length: one page.

List of Abbreviations

MANET	Mobile Ad Hoc Network
VANET	Vehicular Ad Hoc Network
WANET	Wireless Ad Hoc Network

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