Summarising Wireless Network Datasets

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1 Introduction

(CURRENTLY JUST DOER DESCRIPTION) With such large quantities of wireless traffic now travelling through networks at ever increasing rates, processing of this data can be challenging. By introducing a summarisation step before any main processing the overall efficiency of information extraction from wireless network datasets may be increased. The aim of this project will be to create a summarised report from large datasets in order to enable more efficient onward processing of the data. This will mean using statistical approaches to maintain some identified information from the dataset while reducing the overall quantity of data that must be stored and processed. The output summaries created may utilise an existing format if my research can identify an appropriate one. My project will produce a command line application involving new approaches to summarisation to run over data collected in the CRAWDAD archives, the approach taken may (in this project or otherwise, dependent on time constraints) also be extended to work on datasets in real-time so as to eliminate the need for storing large datasets before summarisation.

2 CRAWDAD Usage

2.1 Research

When completing this research the focus has been on one particular dataset from the CRAWDAD archive, dartmouth/campus [9]. This dataset was chosen because it is one of the most popular datasets in the archive, having been cited by 374 papers at the time of writing [2]. The most frequently cited dataset however is cambridge/haggle, the reasoning for deciding not to focus on this instead is that the Cambridge dataset is comparatively small in size and would therefore benefit much less from the summarisation which this project hopes to provide.
The papers that have been selected for use in this research were chosen because they all cite the dartmouth/campus dataset. A Google Scholar [1] online search was used to retrieve the most "relevant" papers which used the chosen dataset, from these results the ones which have been most often cited in other work were selected. This selection process found papers which are relevant in the research community. As there are different versions of the dataset the search had to be repeated three times, once using the 2009 dataset, once with the 2007 dataset, and once with the 2005 dataset. For each search the five most cited results have been used. Table 1 shows a summary of the type of information each paper needed to use from the dartmouth/campus dataset. Papers in which the dataset was referenced but ultimately has not been used have been excluded.

2.2 Summary of Results

The usage of the Dartmouth University CRAWDAD dataset is primarily regarding network mobility and social interaction/encounters. As such, the most

		Properties Needed		
Paper	Topic	Device/AP Identification	Time of Transmission	Transmission Quality/Rate
Nextplace: a spatio-temporal prediction framework for pervasive systems, Scellato et al., 2011	Mobility	x	x	
Community-Aware Opportunistic Routing in Mobile Social Networks, Xiao, Wu, and Huang, 2014	Mobility	x	x	
On nodal encounter patterns in wireless LAN traces, Hsu and Helmy, 2010	Mobility	x	x	
Mobility models for systems evaluation, Musolesi and Mascolo, 2009	DTN	x	x	
Large-Scale Synthetic Social Mobile Networks with SWIM, Kosta, Mei, and Stefa, 2014	Mobility	x	x	
WAVEFORM DESIGN AND NETWORK SELECTION IN WIDEBAND SMALL CELL NETWORKS, Yang and Liu, 2014	Mobility	x		x
MAGA: A Mobility-Aware Computation Offloading Decision for Distributed Mobile Cloud Computing, Shi, Chen, and Xu, 2017	Mobility	x	x	
Flow-Based Management For Energy Efficient Campus Networks, Amokrane et al., 2015	SDN	x		x
Human behavior and challenges of anonymizing WLAN traces, Kumar and Helmy, 2009	Anonymizing WLAN Traces	x	x	
Automatic profiling of network event sequences: algorithm and applications, Meng et al., 2008	Profiling of Network Event Sequences	x	x	
Confidentiality of event data in policy-based monitoring, Montanari and Campbell, 2012	Policy-Based Monitoring	x		
Distribution of inter-contact time: An analysis-based on social relationships, Wei et al., 2013	Distribution of Inter-Contact Time	x	x	
Coverage and Rate Analysis for Facilitating Machine-to-Machine Communication in LTE-A Networks Using Device-to-Device Communication, Swain, Thakur, and Chebiyyam, 2017	Machine-to-Machine Communication	x	x	
Balancing reliability and utilization in dynamic spectrum access, Cao and Zheng, 2012	Dynamic Spectrum Access	x	x	
An Online Algorithm for Task Offloading in Heterogeneous Mobile Clouds, Zhou et al., 2018	Offloading	x	x	
State-of-the-Art Routing Protocols for Delay Tolerant Networks, Feng and Chin, 2012	DTN	x		x

Table 1: Table of the properties of CRAWDAD dartmouth/campus data used in various research projects in which it was cited. Papers are ordered by the number of other papers they have been cited by, with the most cited at the top.

often needed information seems to be identifiers for both mobile devices and access points, and the times of connections. I found that the majority of the papers I looked at used the movement [11] or syslog [10] tracesets as these are most tailored towards mobility research.

There are also some less frequent topics of research such as software defined networking and delay tolerant networking using the dartmouth/campus dataset. These uses seem to require a wider variety of information from the data, however these instances are much less frequent than those mentioned above. these less common cases are the only ones which mention bandwidth and quality of connection.

3 Format Selection

4 Design of Code

5 Implementation

6 Outcome/Evaluation

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