Leveraging “Big” Data Analytics for Network Performance Monitoring & Trouble-Shooting

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The Hong Kong Polytechnic University

Abstract

As we become increasingly reliant on a variety of large-scale Internet services for our daily activities, providing as good a quality-of-experience (QoE) as possible to users become imperative. For example, even a small increase in response time can impact the monetization ability of service providers. It is thus extremely important for service providers to understand the key factors that impact performance and to quickly detect and diagnose any performance degradation. However, this is an extremely challenging task, as cloud computing and large-scale Internet services such as search engine and online video streaming services have necessitated a complex architecture of centralized data centers and distributed edge servers dispersed across a web of interconnected access and backbone networks to provide speedy response times to users. In this talk, we argue that it is important to develop a systematic framework to guide this process in order to cope with the vast complexity of network performance monitoring and trouble-shooting, where domain knowledge plays a crucial role. In particular, we will describe a framework based on statistical inference and machine learning techniques to first identify and quantify the major categories of factors that have major influences on system performance. We will use two real-world case studies to illustrate the utility of this framework: i) understanding the complexity of 3G UMTS cellular network performance; and ii) dissecting the search response time variations of a large web search engine as well as a comparative study of the impact of architectural design choices on the performance of two large web search engine services.

About the Speaker

Zhi-Li Zhang received Ph.D. degrees in computer science from the University of Massachusetts. He joined the faculty of the Department of Computer Science and Engineering at the University of Minnesota in 1997, where he is currently the McKnight Distinguished University Professor and Qwest Chair Professor in Telecommunications. He currently also serves as the Associate Director for Research at the Digital Technology Center, University of Minnesota. Prof. Zhang's research interests lie broadly in computer and communication networks, Internet technology, multimedia systems and content distribution networks, cyber-physical systems, and Internet-of-Things, and (applied) machine learning and data mining. Prof. Zhang has published more than 100 journal and conference/workshop papers, many of them in top venues in networking and related fields. He is co-recipient of several Best Papers awards including IEEE INFOCOM, ICNP, and ACM SIGMETRICS. Prof. Zhang has co-organized several major conferences including IEEE INFOCOM, ACM SOGMETRICS, IEEE ICNP, and ACM Internet Measurement Conference (IMC) and ACM CoNext. He has also served on the Editorial Board of several journals such as IEEE/ACM Transactions on Networking, ACM TOMPECS, and Pigm MACS. He is a Fellow of IEEE.

All are welcome!

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