Measuring Web Speed From Passive Traces

Measuring Web Speed From Passive Traces

Martino Trevisan
Politecnico di Torino
martino.trevisan@polito.it

Idilio Drago
Politecnico di Torino
idilio.drago@polito.it

Marco Mellia
Politecnico di Torino
marco.mellia@polito.it

ABSTRACT

Understanding the quality of Experience (QoE) of web browsing is key to optimize services and keep users' loyalty. This is crucial for both Content Providers and Internet Service Providers (ISPs). Quality is subjective, and the complexity of today's pages challenges its measurement. OnLoad time and SpeedIndex are notable attempts to quantify web performance with objective metrics. However, these metrics can only be computed by instrumenting the browser and, thus, are not available to ISPs. We designed PAIN: PAssive INdicator for ISPs. It is an automatic system to monitor the performance of web pages from passive measurements. It is open source and available for download. It leverages only flow-level and DNS measurements which are still possible in the network despite the deployment of HTTPS. With unsupervised learning, PAIN automatically creates a machine learning model from the timeline of requests issued by browsers to render web pages, and uses it to measure web performance in real-time. We compared PAIN to indicators based on in-browser instrumentation and found strong correlations between the approaches. PAIN correctly highlights worsening network conditions and provides visibility into web performance. We let PAIN run on a real ISP network, and found that it is able to pinpoint performance variations across time and groups of users. Based on work published at Martino Trevisan, Idilio Drago, and Marco Mellia. 2017. PAIN: A Passive Web Speed Indicator for ISPs. In Proceedings of the Workshop on QoE-based Analysis and Management of Data Communication Networks (Internet QoE '17). ACM, New York, NY, USA, 7-12. DOI: https://doi.org/10.1145/3098603.3098605

CCS CONCEPTS

• **Networks** → **Network performance analysis**; **Network measurement**;

KEYWORDS

QoE; Passive Measurements; SpeedIndex; Unsupervised Learning.

ACM Reference Format:
Martino Trevisan, Idilio Drago, and Marco Mellia. 2018. Measuring Web Speed From Passive Traces. In *ANRW '18: Applied Networking Research Workshop, July 16, 2018, Montreal, QC, Canada.* ACM, New York, NY, USA, 1 page. https://doi.org/10.1145/3232755.3232780

ANRW '18, July 16, 2018, Montreal, QC, Canada

ACM ISBN 978-1-4503-5585-8/18/07.
https://doi.org/10.1145/3232755.3232780