Understanding Latency in Online Gaming: Insights from 'Analyzing Internet Latency through Gaming Footage'

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Abstract. This report refers to the written essay relating to the curricular unit "Quality of Service on the Internet", where we will make a brief analysis of the article "Using Gaming Footage as a Source of Internet Latency Information"[1]. We will begin with some background information about this article, followed by an analysis and evaluation of the results presented. Finally, our opinion and conclusion regarding this topic will be presented.

Keywords: Quality of Service · Gaming · Latency · Gaming Footage · Internet Performance · Network measurement · Passive Measurement

1 Introduction

The goal of this practical work will be to expand our knowledge of quality of service in IP networks, and the first step in that direction will be to select an article. We came across an article in which it evaluates latency in gaming through gaming footage and we were "curious" how it would be possible because our group thought that this way would only add latency. For these reasons, we ended up choosing this article which, in addition to meeting the objectives of this practical work, we also wanted to try to understand what made this possible. Therefore, throughout this essay we will explore a little the background behind this article and then analyze the results.

2 Background

Nowadays, a gamer is growing more demanding [2] in games such as League of Legends or CSGO, and one of the requirements is to have the lowest possible latency in order to provide a superior gaming experience and, ultimately, increase the chances of winning the game, especially experienced players suffer from this latency [3].

These games are often built to minimize latency and follow a server-client architecture, in which the client performs computation and rendering and then

sends small updates to the server, while the server calculates latency based on the round-trip time between the client and server, in many games it is possible to see this value in the upper right corner. To reduce latency, a game provider such as Eletronic Arts SPORTS has multiple servers throughout the world, and the player plays on the server closest to him[4].

3 Tero Platform

3.1 System Overview

Very briefly, this platform, which is named Tero, is a system made up of four main modules: a **Download Module**, a module that continuously obtains video thumbnails from Twitch's CDN; a **Location Module**, a module that organizes streamers by geographic location; a **Image Processing Module**,this module will extract the latency measurements from thumbnails; and a **Data Analysis Module**, which cleans data and calculates latency statistics.

3.2 Results

In figure 1, it is possible to observe the latency distribution for the League of Legends game, however it is possible to separate this figure into two: a) it indicates the locations with the best and worst latency, on average, for each of the servers and b) It also indicates the locations with the best and worst latency, but instead of being an average, it is distance-normalized from the same sites.

In each of these boxplots the locations are noted, as well as the location of the primary server and the corrected average distance between the server and the streamers. An example of this is Ecuador-Miami (3,008 km), this means that these 3008 km is the distance between the server location, which in this case will be Miami, and all the streamers playing in Ecuador.

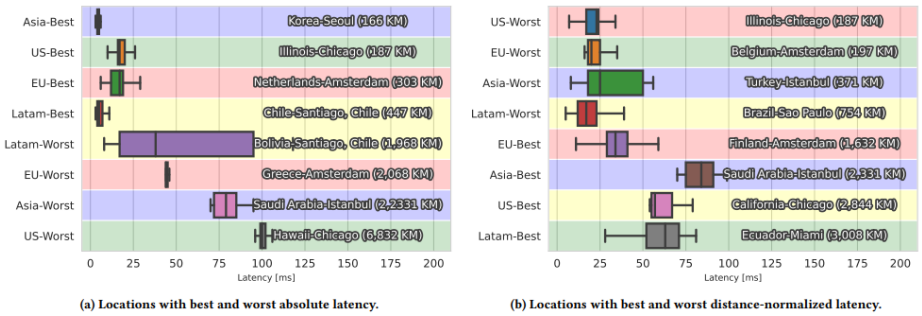

Fig. 1. Latency in League of Legends Across Different Locations.

Based on Figure 2, it is also crucial to note that there are various gaps. As an example, in b), the greatest 75th percentile latency (North Carolina) is over 45 ms, while the lowest is approximately 21 ms (Texas). This is due, in part, to the fact that League of Legends is a game with a global player base and that variations in latency experienced by players or streamers from different states or nations when connecting to the same League of Legends server can be attributed to two main factors: the players' internet service providers (ISPs) and the game provider's backbone infrastructure.

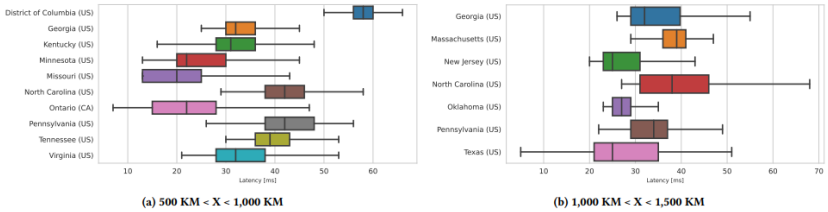

Fig. 2. League of Legends Latency in USA Countries.

The corrected distance between a streamer and a server is the sum of the distance between their geometric centers and the average distance from any point in the streamer's location to the geometric center. This is necessary to compensate when the streamer and server are in the same location, preventing a distance of zero.

3.3 Challenges and Limitations

This platform, like any platform, will have its flaws:

Errors One of the most critical errors on this platform is calculating the location when it receives the streamer's profile as input. This error can happen in two ways: either the tools that the location module uses extracted a wrong location for this streamer or the streamer advertised a wrong location.

Lack of Information One of the most significant issues with this platform is the vast amount of games, many of which we do not know how latency is calculated. For example, TTR is used to calculate latency in the game Genshin Impact, but this does not imply that it is the same for FIFA or CSGO.

Lack of control over measurement points All measurements are carried out on game servers, the location and numbers of which may be unknown.

4 Discussion and Conclusion

Throughout this essay we focus more on the results analysis part and on the one hand these results obtained make sense and help to have a more real idea of the existing latency. We would have liked to have also explored more of the graphs demonstrated in the article, but due to the limits of this practical work we were unable to do so.

Overall, we think this study demonstrates the potential for innovative methods to understand and improve Internet connectivity, paving the way for future research and development in this area.

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