ABSTRACT

In the modern era, the availability of reliable Internet connectivity is paramount. As it moves into the digital age, the Internet has become indispensable for a wide range of activities, including e-commerce, corporate meetings and education. Many applications and services, such as video conferencing, media streaming and online gaming, depend on high-quality network performance. Metrics such as round-trip time (RTT) are used to assess network quality. RTT measures the time it takes for packets to be sent from the sender to the receiver and for an acknowledgement to be received, indicating that the data has been received intact.

RTT is critical for assessing network performance and identifying delays in packet delivery. High RTT values indicate sub-optimal network performance and inefficient traffic, resulting in poor user experience. As a result, accurate RTT estimation is essential for optimizing Retransmission Timeout values, which determine the amount of time to wait before a packet is considered lost and retransmitted. An incorrect Timeout can result in either unnecessary retransmissions or delays in detecting lost packets, compromising network efficiency.

This thesis proposes to develop an improved RTT estimation model that overcomes overfitting and incorporates practical algorithms. Specifically, the research employs the Regularization Extreme Learning Machine (RELM) method to handle outliers and improves efficiency by developing a regularization constant selection algorithm. By focusing on these improvements, this research aims to contribute to more efficient and reliable network performance management.

Keywords: Network Quality, Round-Trip Time, Retransmission Timeout, Regularized Extreme Learning Machine, Estimation