

Description:

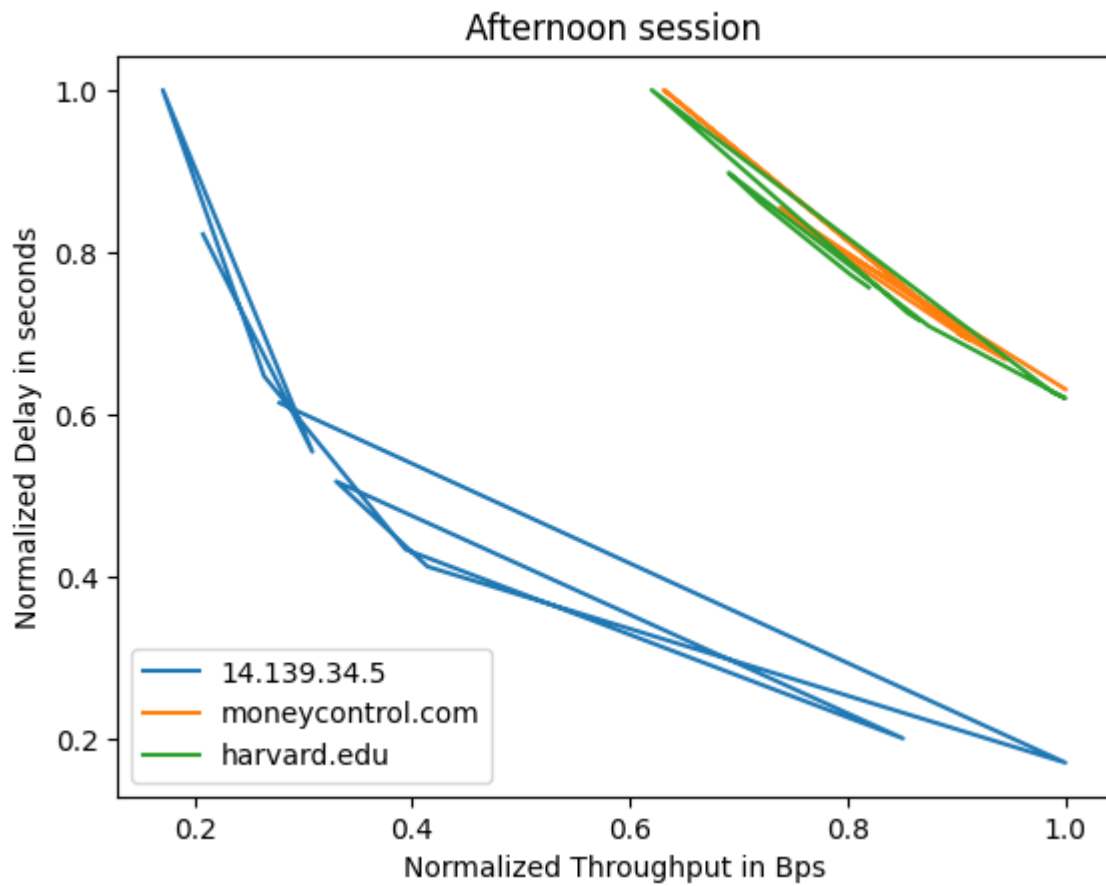
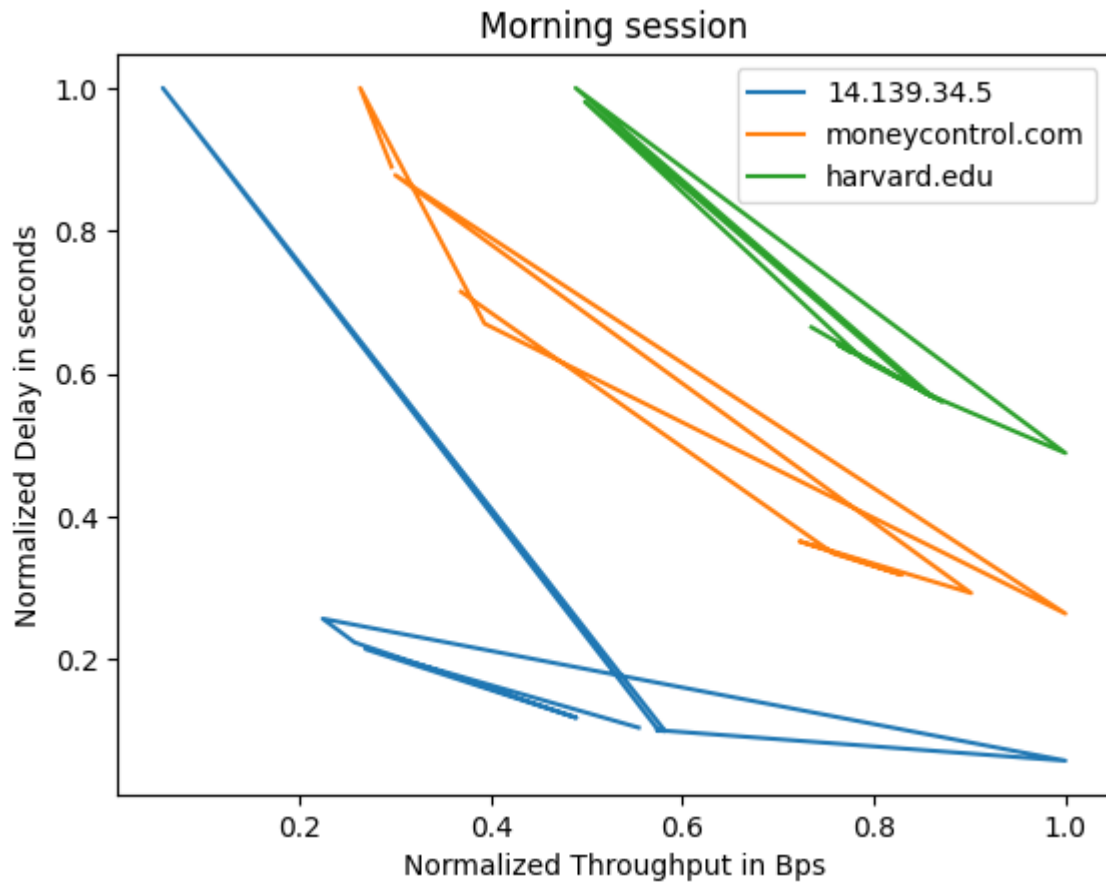
Github [repo](#) of code

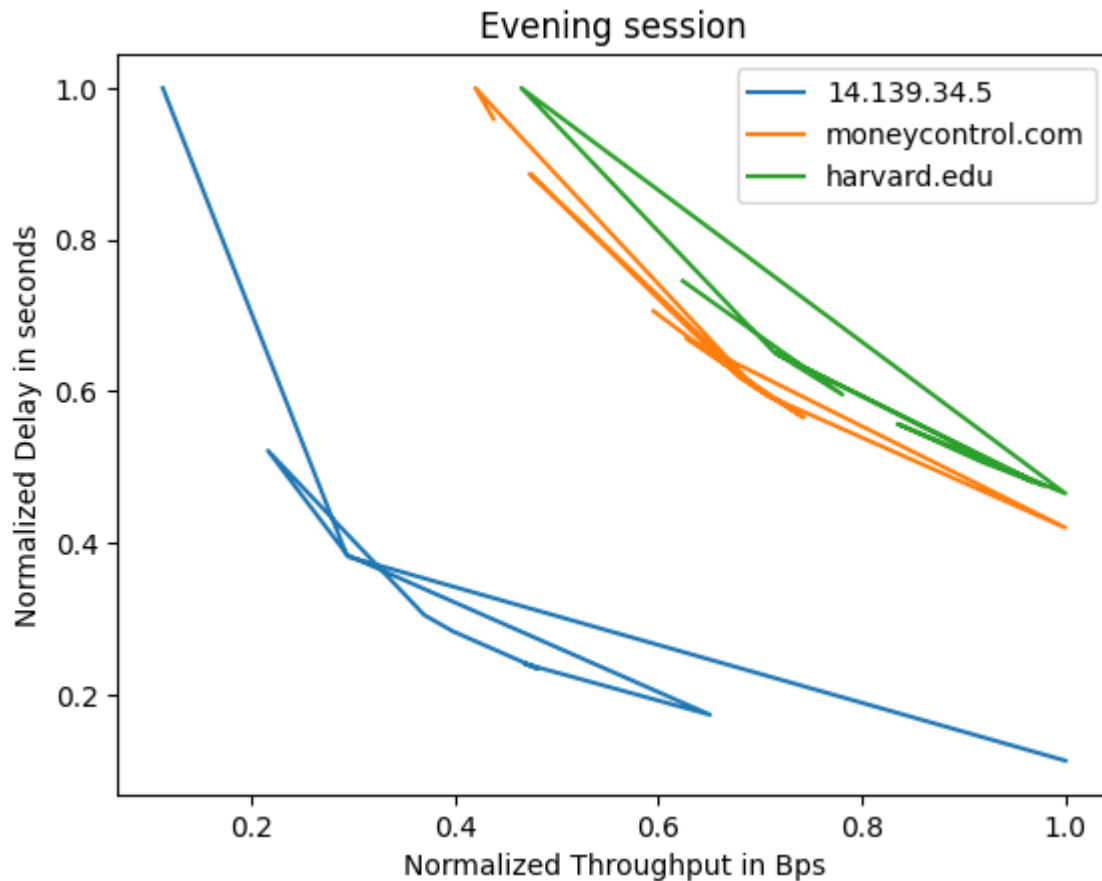
The experiment aims to calculate average delay of a packet and throughput, during various time of the day for different servers. Three time periods are used to perform the experiment ie. Morning , Afternoon and Evening sessions. For each session we plot throughput vs average delay for three different servers located in different parts.

The three servers used are located at IIT mandi, money control (hosted in India) and harvard university (located outside India).

Procedure:

1. Generate a list of servers to be tested on
2. For each of the server do the following
 - a. Define a delay and throughput list that will contain delays and throughputs of the server for different iterations
 - b. Run the following process for , let's say 100 iterations
 - i. Make a ping request with 10-20 packets to the server using the command '**ping -c 10 <server>**'
 - ii. Extract the average delay from the response of the ping request
 - iii. Calaculate the throughput using the formula (size of packet * number of packet)/average delay
 - iv. Append the values of average delay and throughput to the corresponding lists
 - c. Normalize both the throughput and delay lists to better compare the results while plotting
 - d. Plot the graph with throughput as the x-axis and delay on the y-axis





Inference:

From the graph, it is evident that delay and throughput are inversely related. Also if for a particular session we fix the throughput of all the servers, then the sever closer to the source will have less delay as compared to the servers located far from the source.

Optional:

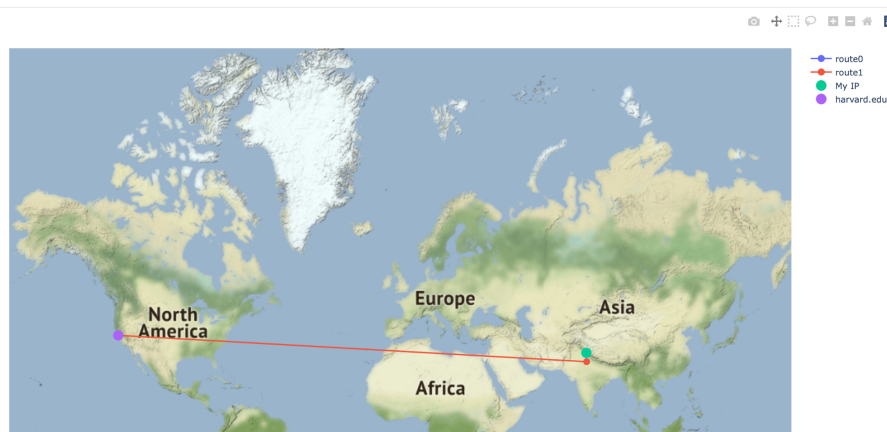
Using traceroute to track the IPs of the intermediate hops and plot it on a geographical map. Traceroute sends UDP probe packets with a small maximum time-to-live, then listening for an ICMP **TIME_EXCEEDED** response from gateways along the way. Probes are started with a *Max_ttl* value of one hop, which is increased one hop at a time until an ICMP **PORT_UNREACHABLE** message is returned. The ICMP **PORT_UNREACHABLE** message indicates either that the host has been located or the command has reached the maximum number of hops allowed for the trace.

Procedure:

1. For every server in the list, perform traceroute command
2. Extract all the IPs located by traceroute, by performing a regular expression search on the traceroute IP.
3. Now we have, IPs of the hops which traceroute took inorder to reach the destination
4. For each of the IP, send a request to '<https://ipapi.co/json/>', which returns the latitude and longitude of the specified IP.
5. Use the coordinates received to plot the location of the hops on a geographical map using the `plotly` library of python.



Path taken by packet for the moneycontrol server



Path taken by harvard server

