

Statistical Modeling of USC Wireless Network

Abstract

An experiment was conducted in which 170 data samples were used. The aim of the experiment was to determine whether a Statistical Model can be generated to determine the Data Transfer Rate between a Client on USC Wireless Network and a Server on the Internet.

Based on this the following Multiple Regression Model was generated

$$E(y) = 3.067 + 0.190x_1 - 0.491x_2 - 0.367x_3 - 0.110x_4 - 0.470x_5 + 0.136x_6 - 0.147x_7$$

With emerging technologies like Webcasting and VOIP, determining the Data Transfer Rate is quite useful. Added to this, the dynamically changing Wireless Networks, makes it hard to estimate this parameter.

Therefore a sincere attempt was made to generate such model. Data of fixed size was transmitted between a Client and a Server and the Time Taken for this transfer was determined.

Hence Data Transfer Rate = Data Transferred / Time Taken

Following variables were chosen intuitively

X1: Day of the Week

X2: Time of the Day

X3: Location (The Wireless Access Point to which the client is connected)

X4: Square of the Time

X5: Signal Strength

X6: Uploading or Downloading

X7: Server (Located at different hops)

While modeling, these 13 independent variables were taken, and then merged into a single variable

X1: = 1 if Location = WPH; 0 otherwise

X2: = 1 if Location = LVY; 0 otherwise

X3: = 1 if Location = OHE; 0 otherwise

X4: Day (1 Mon, 2 Tue, 3 Wed and so on)

X5: Time (in minutes from 12:00 midnight)

X6: Signal Strength (1 being Poor and 5 being Excellent)

X7: = 1 if Server 1; 0 otherwise

X8: = 1 if Server 2; 0 otherwise

X9: = 1 if Server 3; 0 otherwise

X10: = 1 if Server 4; 0 otherwise

X11: = 1 if Server 5; 0 otherwise

X12: = 1 if Download; 0 otherwise

X13: = 1 if Upload; 0 otherwise

X14: Time – Square