CHAPTER V

The EXPERIMENT OF CACHE SIZE

5.1 Introduction

This chapter describes the experiment of Cache size and hit rate in one selected candidate Candidate Nodes a LAN that link to a campus network. This experiment is tested on real situation of Internet usage in order to analyze and propose the suitable Cache size with high hit rate. The utilization of Internet is also varied by the behaviors of users who use World Wide Web. This experiment is not concerning behavior of users and limit of the number of tests in the period and data collection.

Both cache size and hit rate correspond to the utilization of users that the result of this experiment can be changed depends on any environment.

5.2 Experimental Cache size

The network in candidate Node is studied, in order to simulate that number of users who navigate Internet by World Wide Web usage, access through Proxy with various cache size in real situation. The Cache size is shown in Table 5.1

Table 5.1 Real situation test of Cache size in the Candidate Node.

Cache size usage		
Time	Cache Size (Mbyte)	Hit Rate (%)
1	80	0.15
2	100	0.2
3	200	0.22
4	300	0.27
5	370	0.29
6	500	0.33
7	600	0.32
8	800	0.21
9	1000	0.24

5.3 Analysis for the suitable Cache size

In this chapter, it is to analyze the relation between Cache size and hit rate with the Regression Analysis.

Hit rate means the hit rate is generally a percentage ratio of document obtained through using the caching mechanism versus the total documents requested. In addition, if measurement focuses on byte transfer efficiency, weighted hit rate a better performance measurement.

Response time / access time means the response time is the time it takes for user to get a document.

In this experiment is tested with a single variable, shown in the formula 1.

Assignment:

$$Hit\ Rate = f(Cache\ Size) \tag{1}$$

Assign to giving and other variances such as the density of RAM, CPU, etc are to be constant.

$$\beta = \frac{\Sigma x_i y_i}{\Sigma x_i^2} \tag{2}$$

β is a coefficient in a formula 2

To analyze the independent variable and dependent variable, the independent variable can have a relation to the dependent variable more or less. The value of R Square is considered in the Table 5.2.

Analysis in Table by SPSS program

Table 5.2 Analysis of R Square and Significant F of various Functional Form

Functional Form	R Square	Standard Error	F Test	Sig. F
Linear	0.09871	0.06194	0.76662	0.4103
Logarithm	0.32993	0.05341	3.44664	0.1058
Quadratic	*0.73202*	*0.03648*	*8.19485*	*0.0192*
Inverse	0.51726	0.04533	7.50060	0.0290
Power	0.37807	0.21821	4.25525	0.0780
Exponential	0.12566	0.25873	1.00600	0.3493

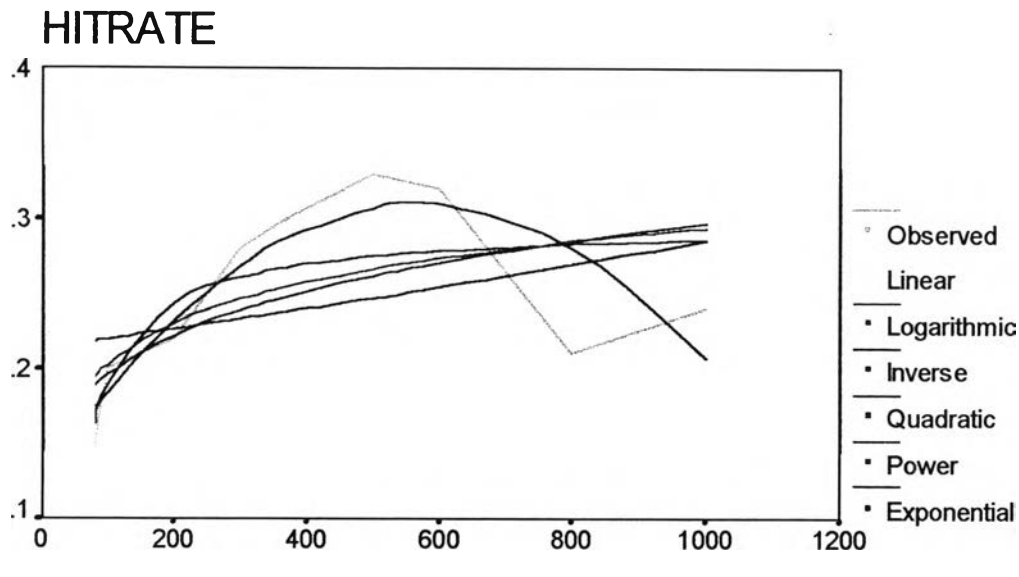

Figure 5.1 Graph demonstration of Functional Form

In the Table 5.2, to consider a value of R Square that present variable of X, can be able to effect to dependent variable of F(X). The result of R Square is the highest at Quadratic Function at 0.73202 or more than 70%

In the Figure 5.1, it shows the comparison of Quadratic Function and Observation of this experiment. As a result, the Quadratic Function is useful and appropriate to test for Cache size, then consider to the Sig. F (a value of testing in F test), it test whether independent variable of X into a formula, relative to dependent variable of F(x) or not.

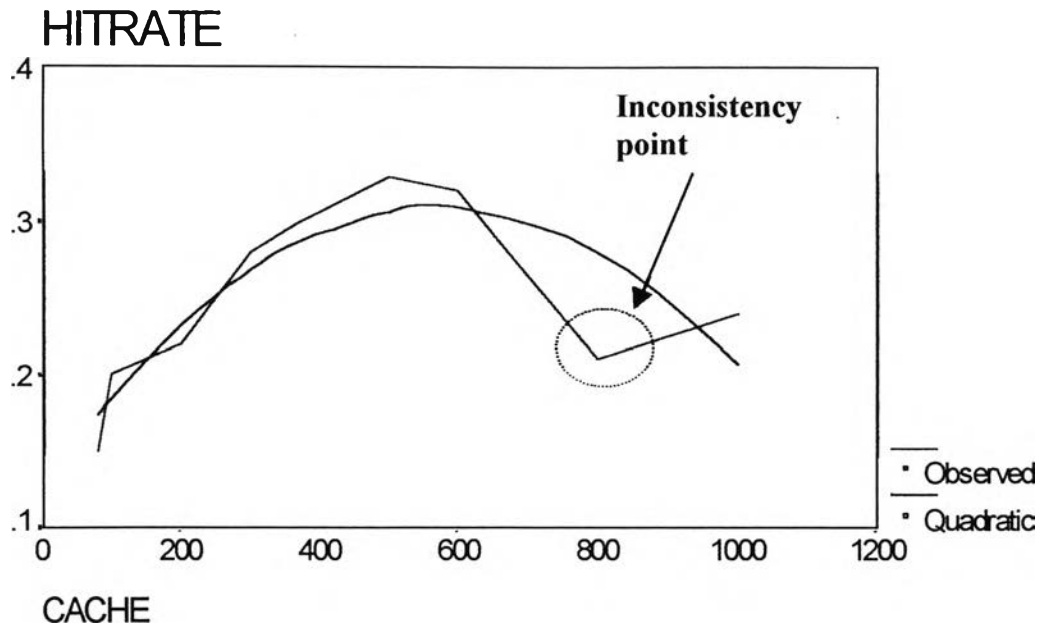

Figure 5.2 The comparison of Quadratic Function and Observation

Set hypothesis;

$$H_0 : \beta_1 = \beta_2 = 0$$

$$H_1 : \beta_1 \neq \beta_2 \neq 0$$

A value calculated is about 0.0192 that is less than 0.05 at confident 95% level, independent variable of X is relative to F(x), reject H_0

When consider the statistic in summary, to consider and test the various coefficients, whether it is zero or not. By testing T test;

Set hypothesis;

$$H_0 : \beta_i = 0$$

$$H_1 : \beta_i \neq 0$$

$$I = 1,2$$

The value of Sig. T is less than 0.01 at confident 99 %, the coefficient is not zero shown in the Quadratic Function of the Table 11. There is inconsistency point of this experiment that is explained in the result.

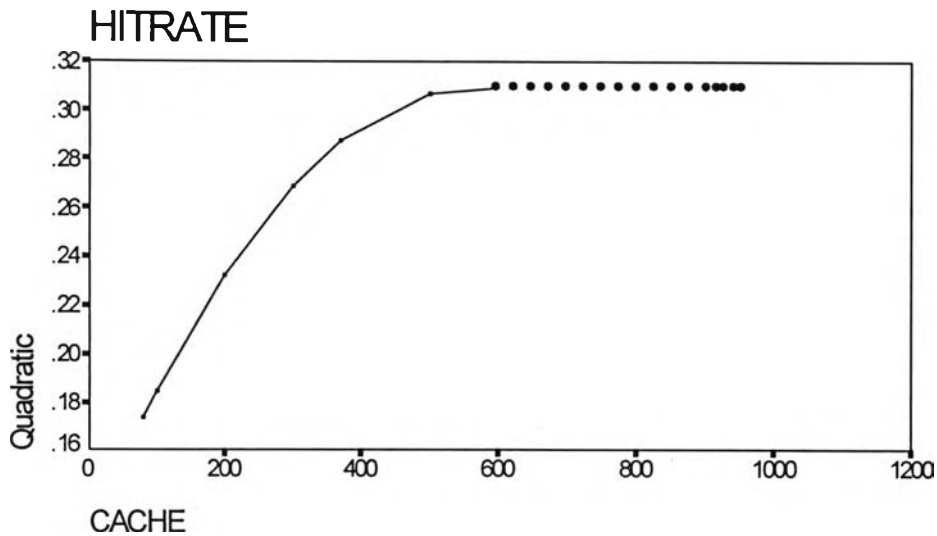

Figure 5.3 The result of The suitable Cache size at hit rate is 0.31

5.4 Results

From the limitation of data collection, the result of experiment finds that the suitable Cache size can work corresponding high hit rate at 571 MB at that time. The hit rate is about 31% that is over than before. The curve of the result possibly trends to the stable state curve that is consistency with the research of Model-driven Simulation of World Wide Web Cache policies—Ying Shi, Edward Watson, and Ye-sho Chen [6].

But there is some inconsistency point at 800 MB of cache size that reflects to the hit rate at 21% under this observation. Under expectation and other research, the hit rate of 800 MB should be not fell dramatically. This experiment is tested on the real situation during the period of Internet usage that there is a limitation of data collection process such as the behavior of users, period of time collection and other variances. So it is possible to happen the error point in the observation

5.5 Conclusion

Following the research of simulation test of Model-driven Simulation of World Wide Web Cache policies [6].

This research has simulated test under Lab control and come up with the some graph between cache size and hit rate. It is demonstrated how the curve movement when the utilization changing.

If this experiment have going to continue testing, the curve between cache size and hit rate should be moved to the stable state. Technically, even through Cache size and hit rate are tested in the real situation or simulation test in a Lab control under a limitation, the result is trend to similar curve which run to the stable state. Because whenever the Internet usage is changed increasingly by the behavior of users, the cache size and hit rate will be changed to the upper point at the stable state. However this result can be applied into any environment, to calculate the suitable cache size under the Internet utilization. The conceptual of this calculation, can study going on with more factors to different environment.