NC State University

Department of Electrical and Computer Engineering

ECE 463/563: Fall 2019 (Dr. Huiyang Zhou)

Project #2: Branch Prediction

By

Viswanatha Kasyap Pasumarthy

NCSU Honor Pledge: "I have neither given nor received unauthorized aid on this test or assignment."

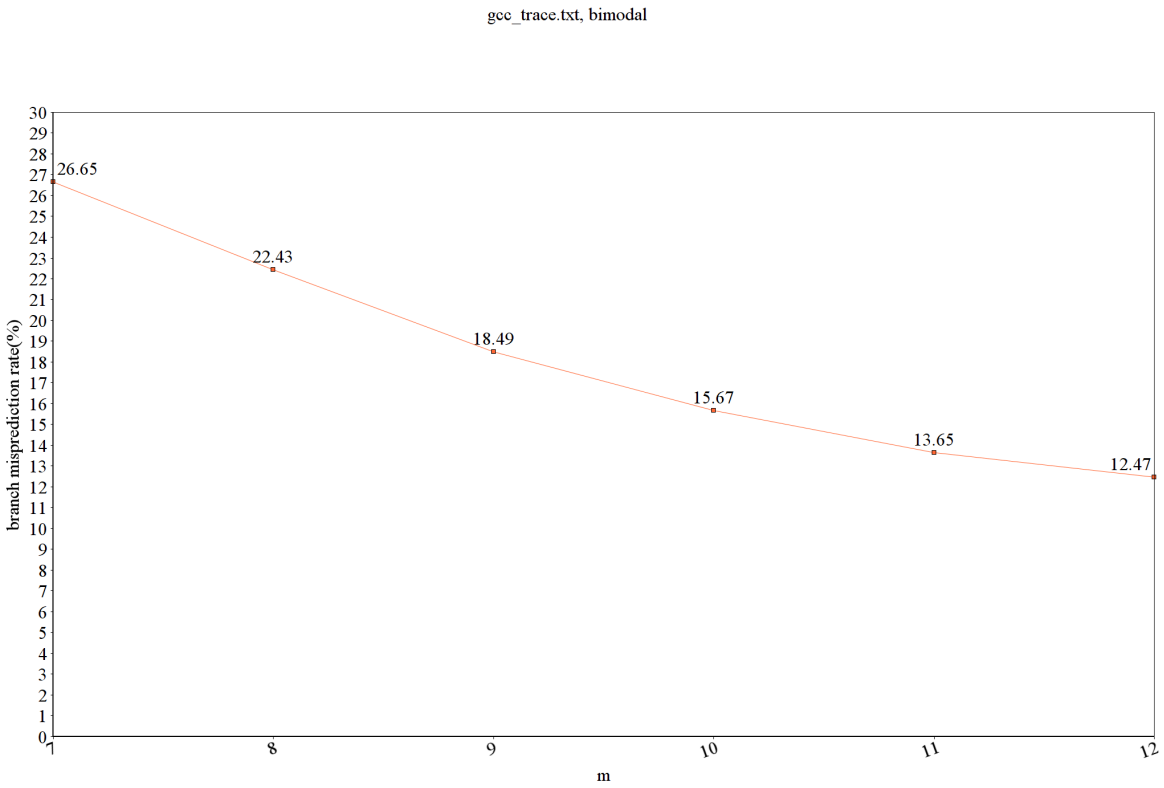
Student's Electronic Signature: Viswanatha Kasyap Pasumarthy
Course Number: ECE 563

Data spreadsheet -
https://docs.google.com/spreadsheets/d/1h5sMz7g85WhWCSMZvs_xdjlNfjbTmP60W4-iCJqsXI0/edit?usp=sharing

1 – Bimodal predictions

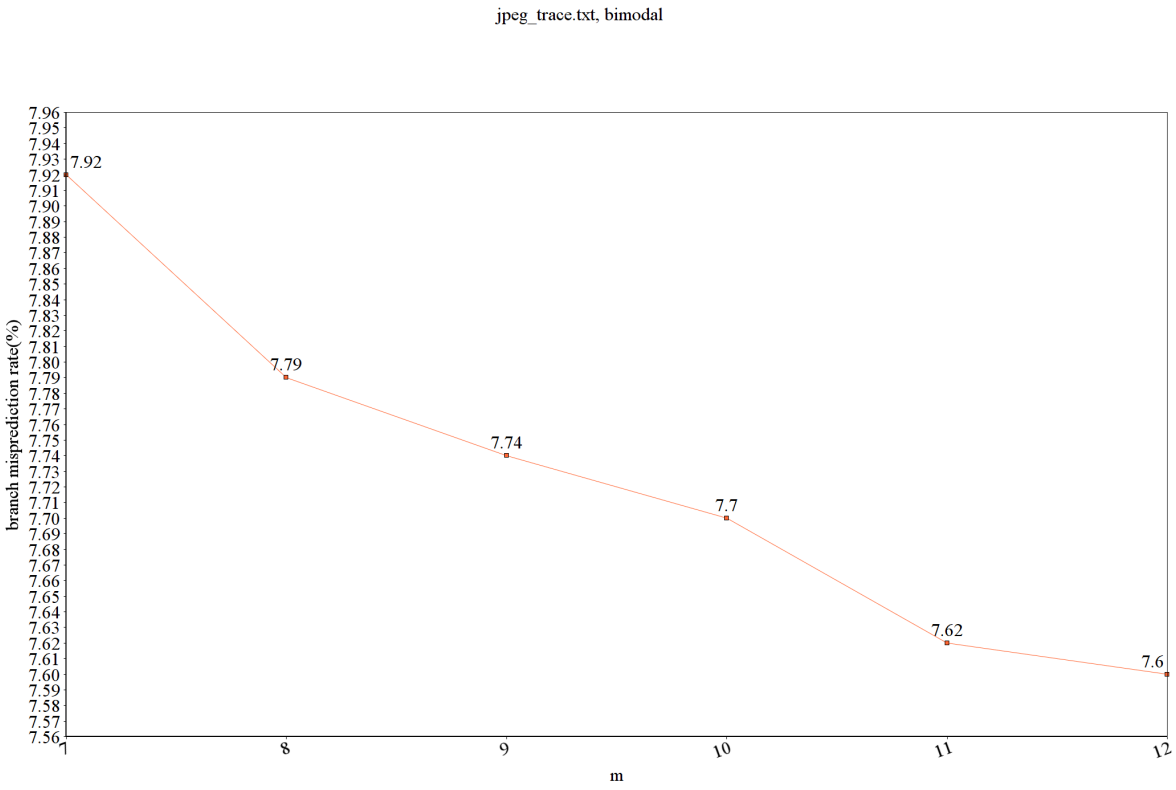
In each of the graphs we see a general trend of misprediction rate going down with increase in value of M. However, the improvement between two cases and the absolute value itself is vastly different for each of the traces. We also notice that overall improvement from M = 7 to M = 12 is reduced as the initial misprediction rate goes down. Thus, we can say that if a predictor is already optimized for a certain type of traces, then optimizing it further would require exponentially more resources.

1.1 – gcc_trace



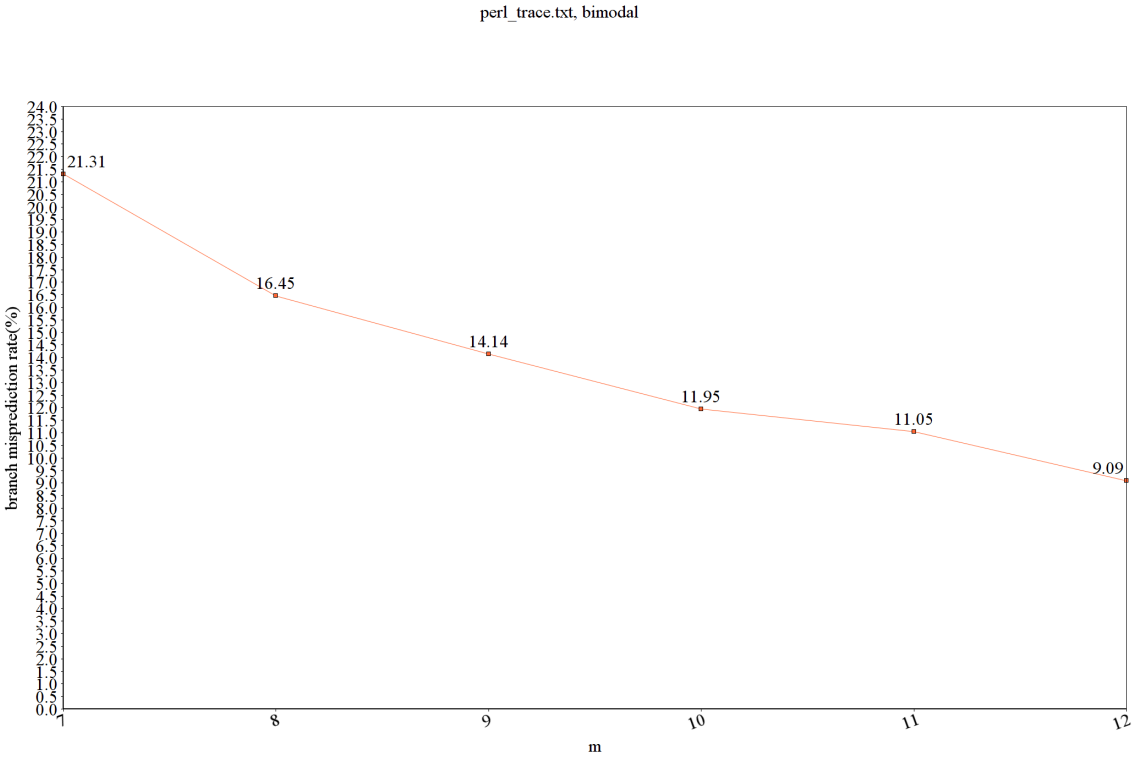
Most optimal – M = 10. After this point we get minimal returns for increase in M.

1.2 – jpeg_trace



Most Optimal – M = 11. after this point, we get decreasing returns for increase in M

1.3 – perl_trace

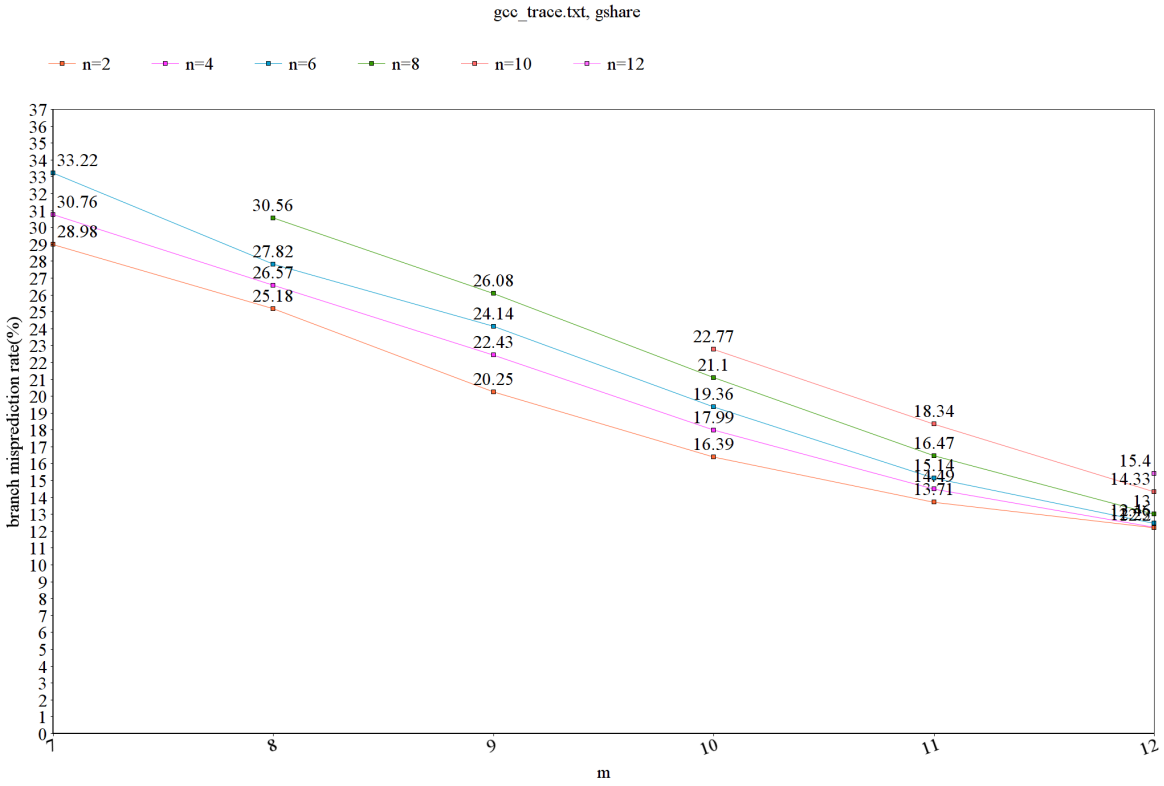


Most optimal = M = 10. We get diminishing returns after this point.

2 – Gshare predictions

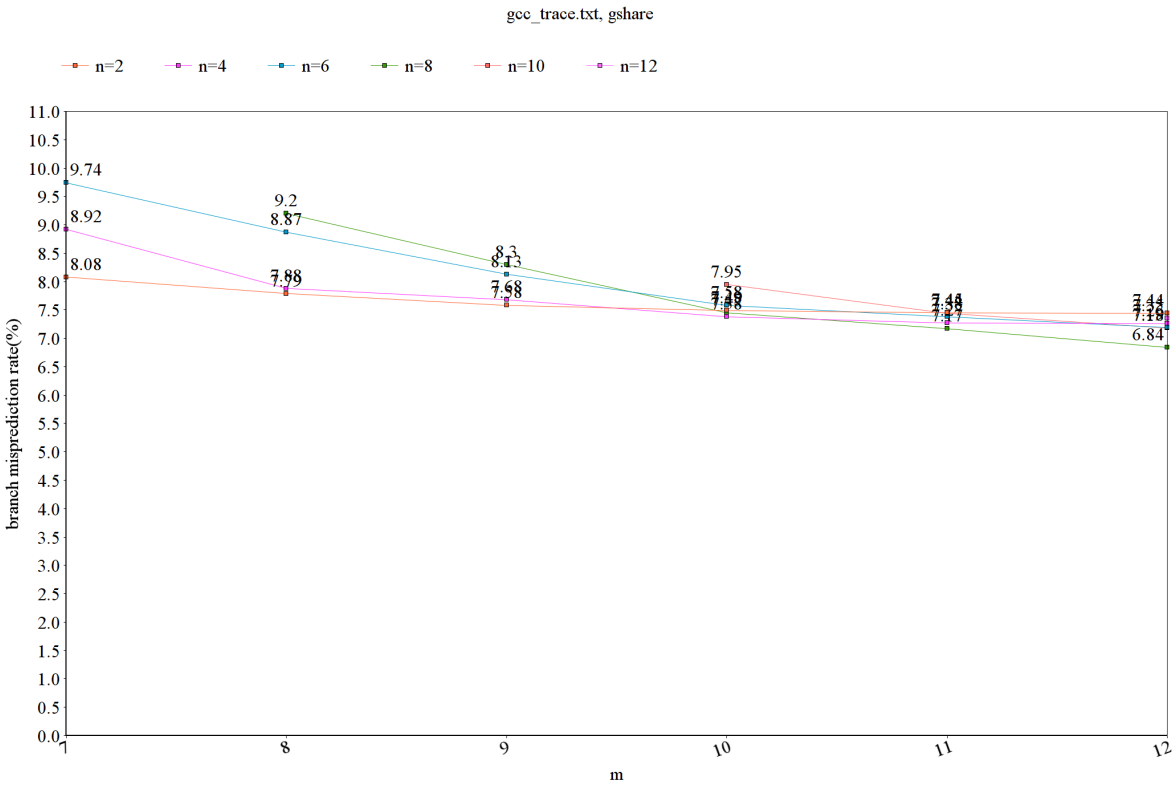
In each of the graphs, we see a general trend of misprediction rate going down for increasing value of M for a fixed value of N. and the misprediction rate is generally higher for increasing value of N, for a given value of M. As discussed before with the bimodal predictions, the amount of improvement for a given N is dependent on the initial misprediction rate and is another example of how we need exponentially increasing resources to optimize beyond a certain threshold and that certain techniques will only optimize to a certain extent and no more than that.

2.1 – gcc_trace



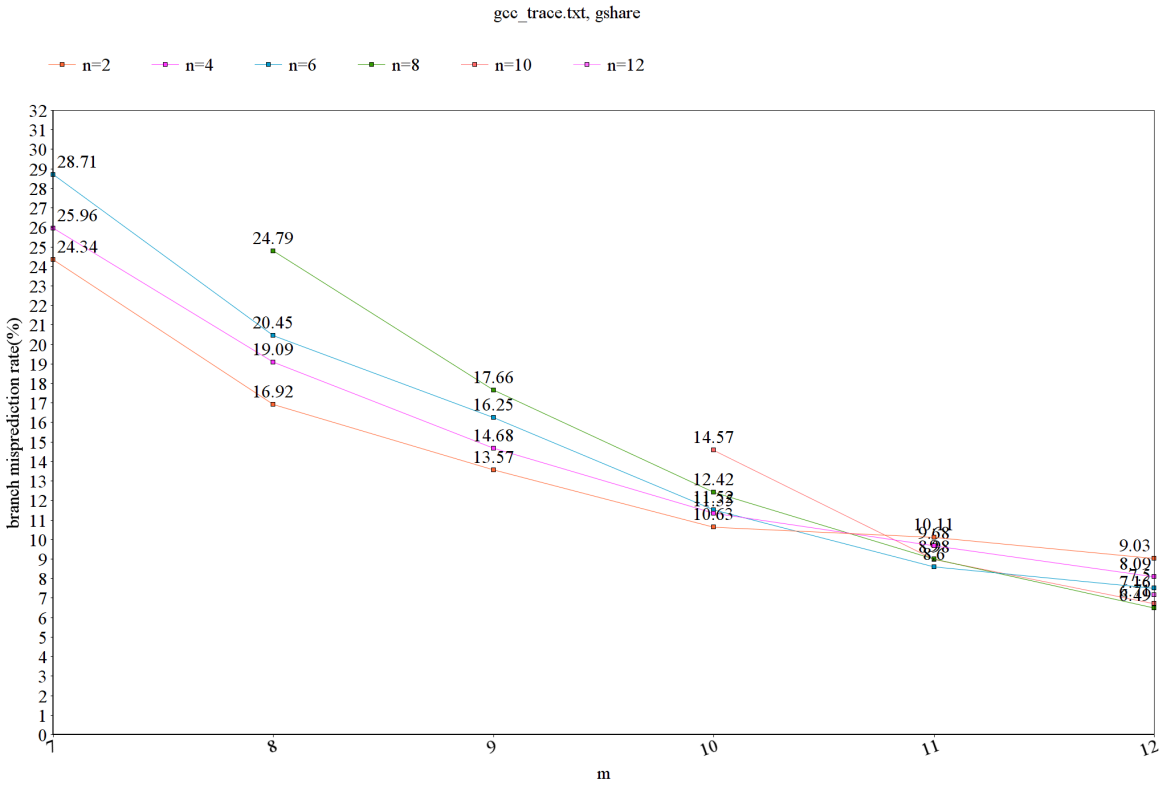
Most optimal – M = 10, n = 2

2.2 – jpeg_trace



Most optimal = M = 10, N = 4

2.3 – perl_trace



Most optimal – M = 11, n = 6