

NC State University
Department of Electrical and Computer Engineering
ECE 463/563: Fall 2021 (Rotenberg)
Project #2: Branch Prediction

by

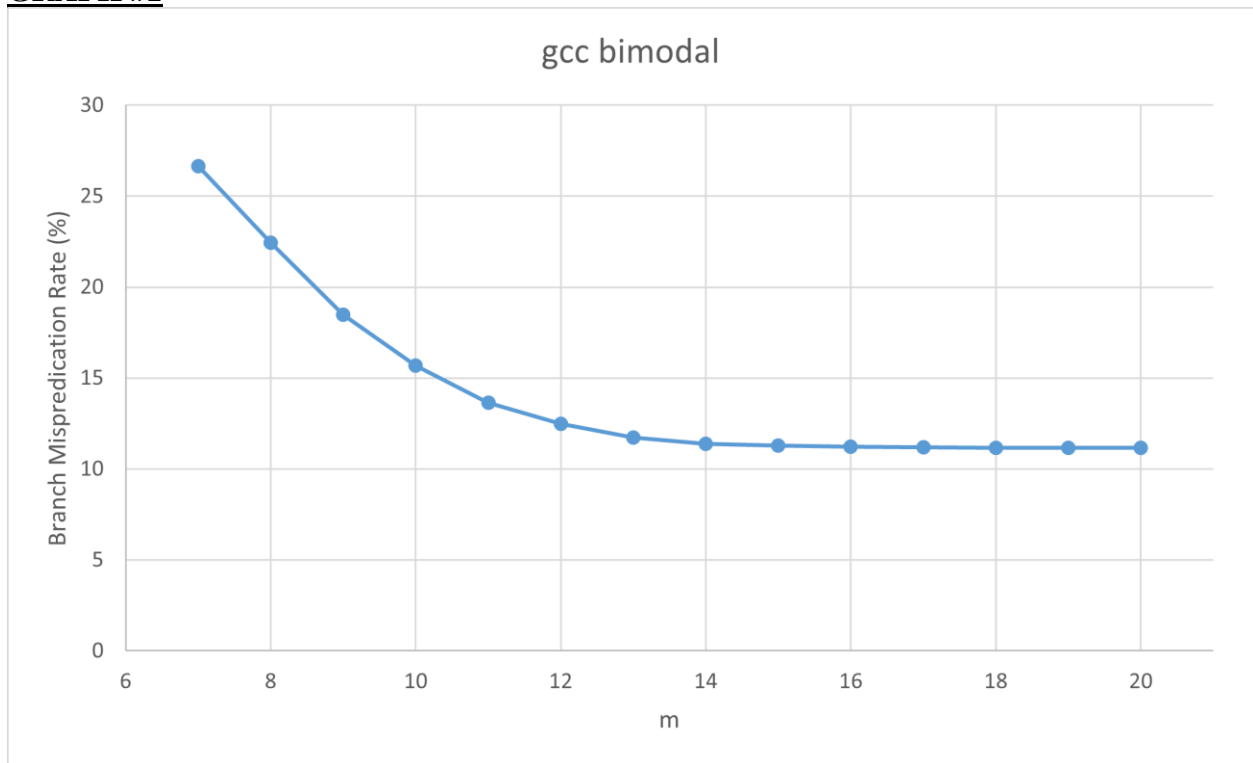
Cristian Hellmer

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

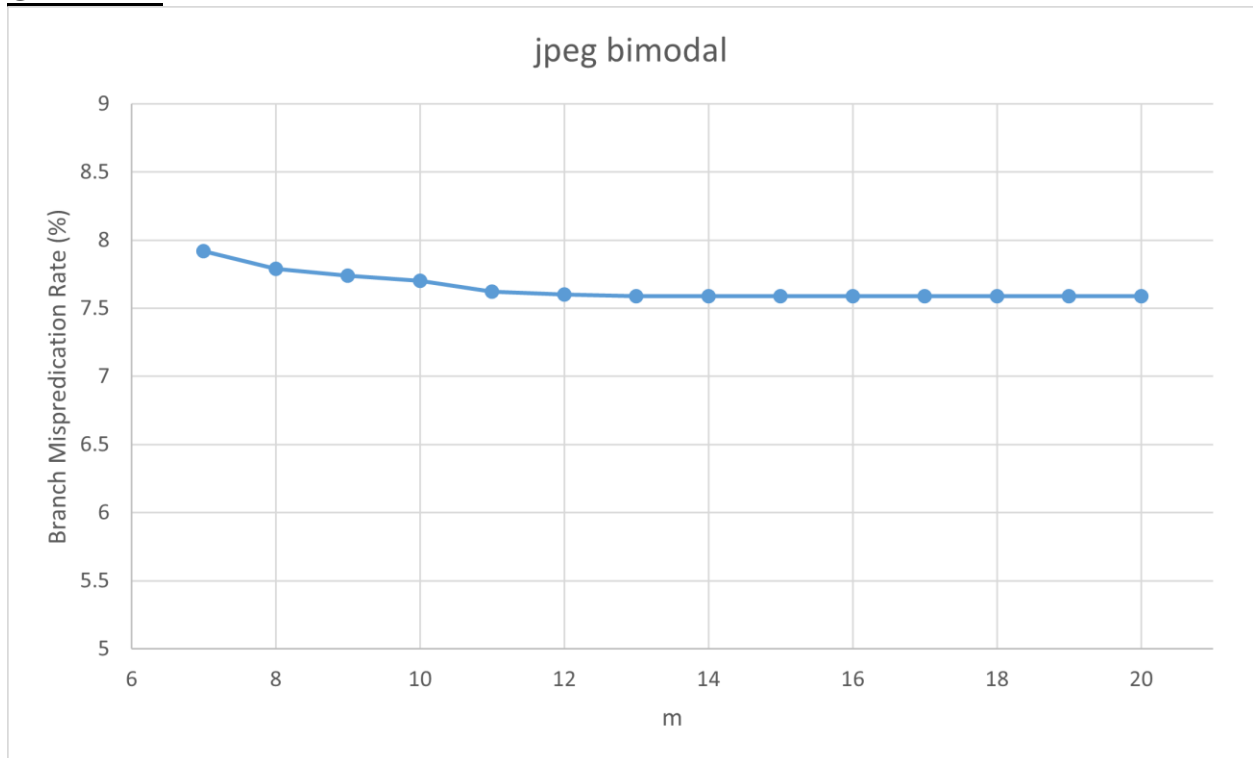
Student's electronic signature: _____Cristian Hellmer_____

Course number: _____563_____

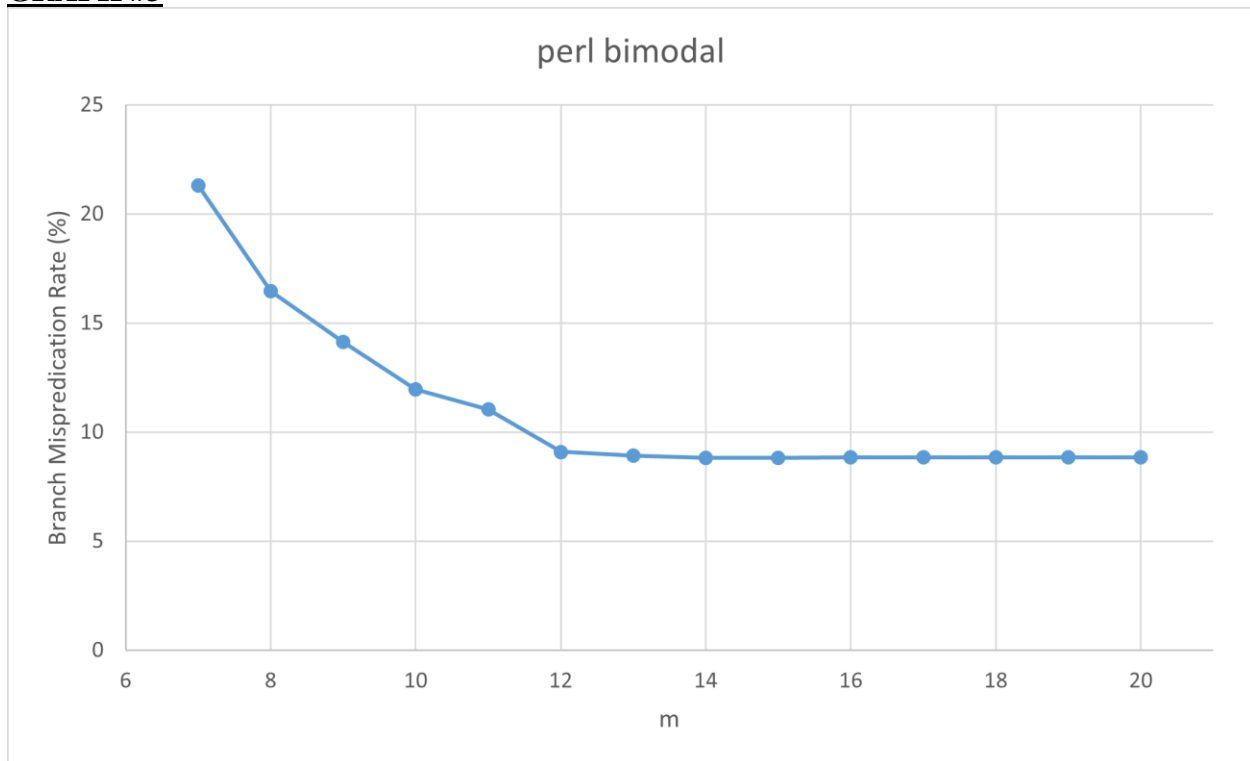
GRAPH #1



GRAPH #2



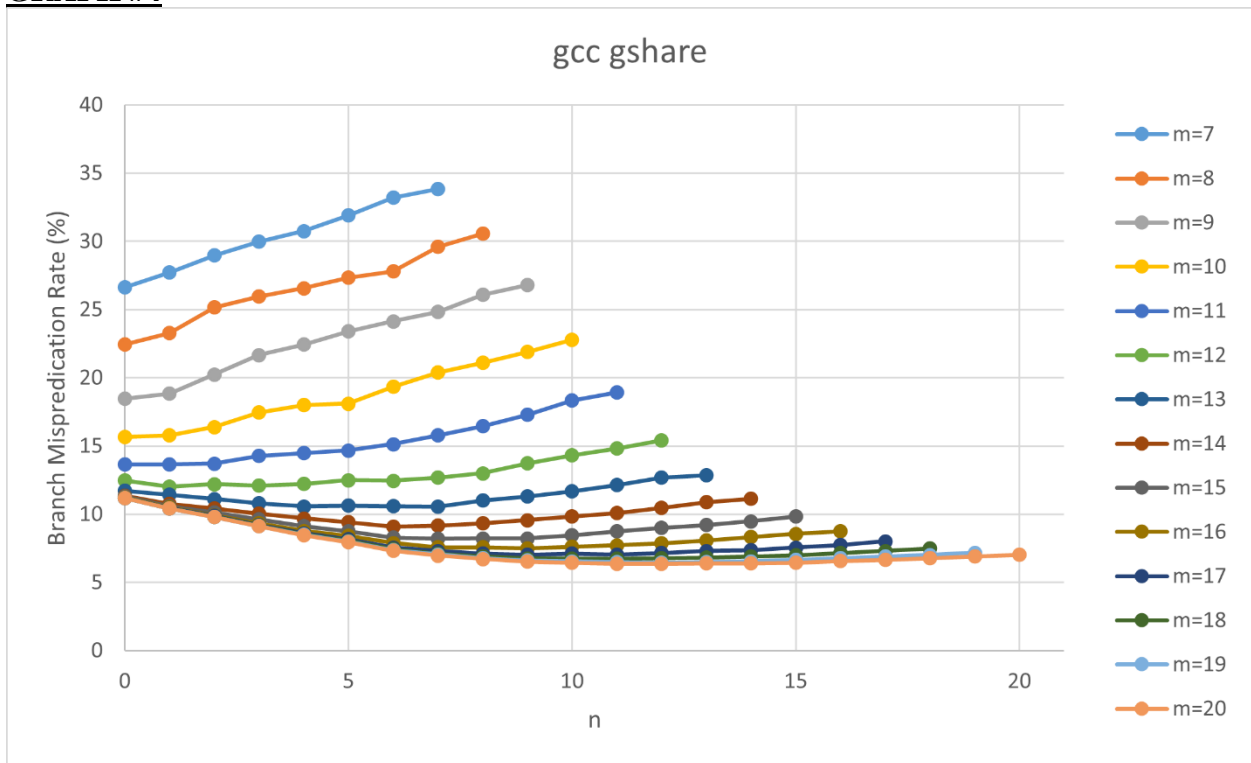
GRAPH #3



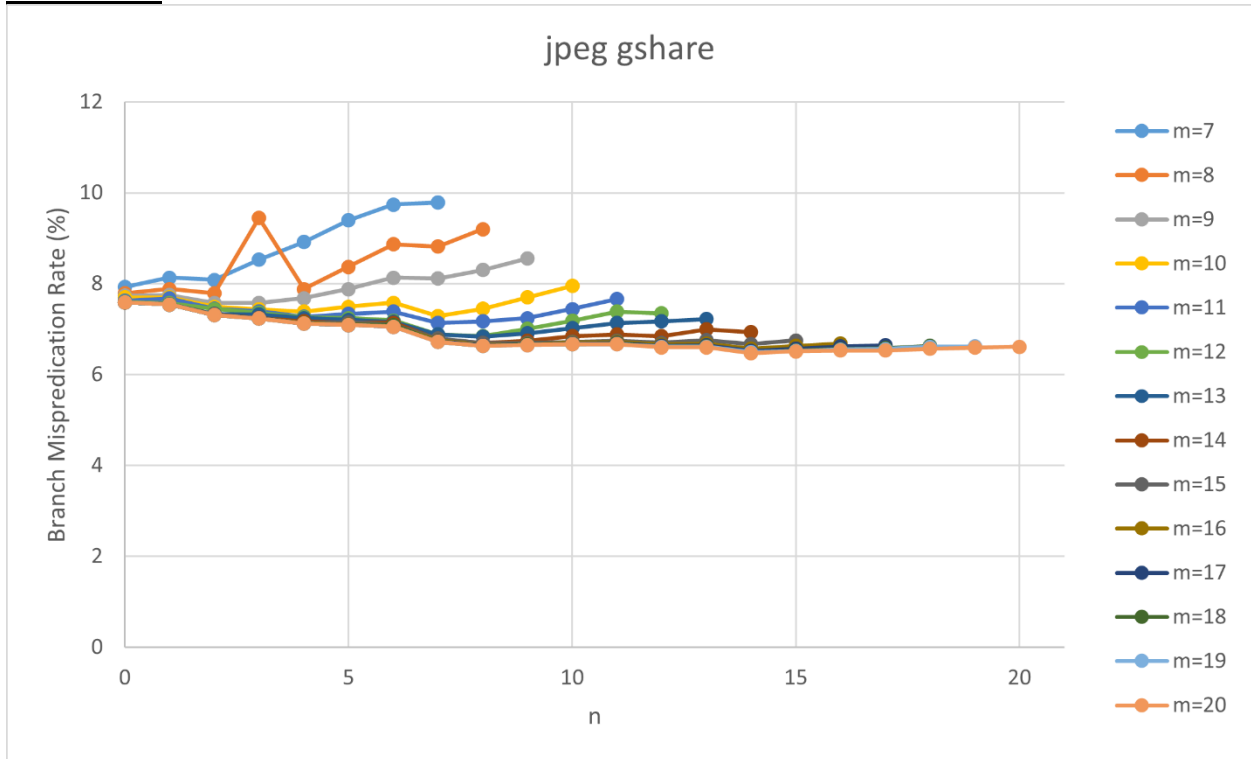
1. Draw conclusions and discuss trends. Discuss similarities/differences among benchmarks.

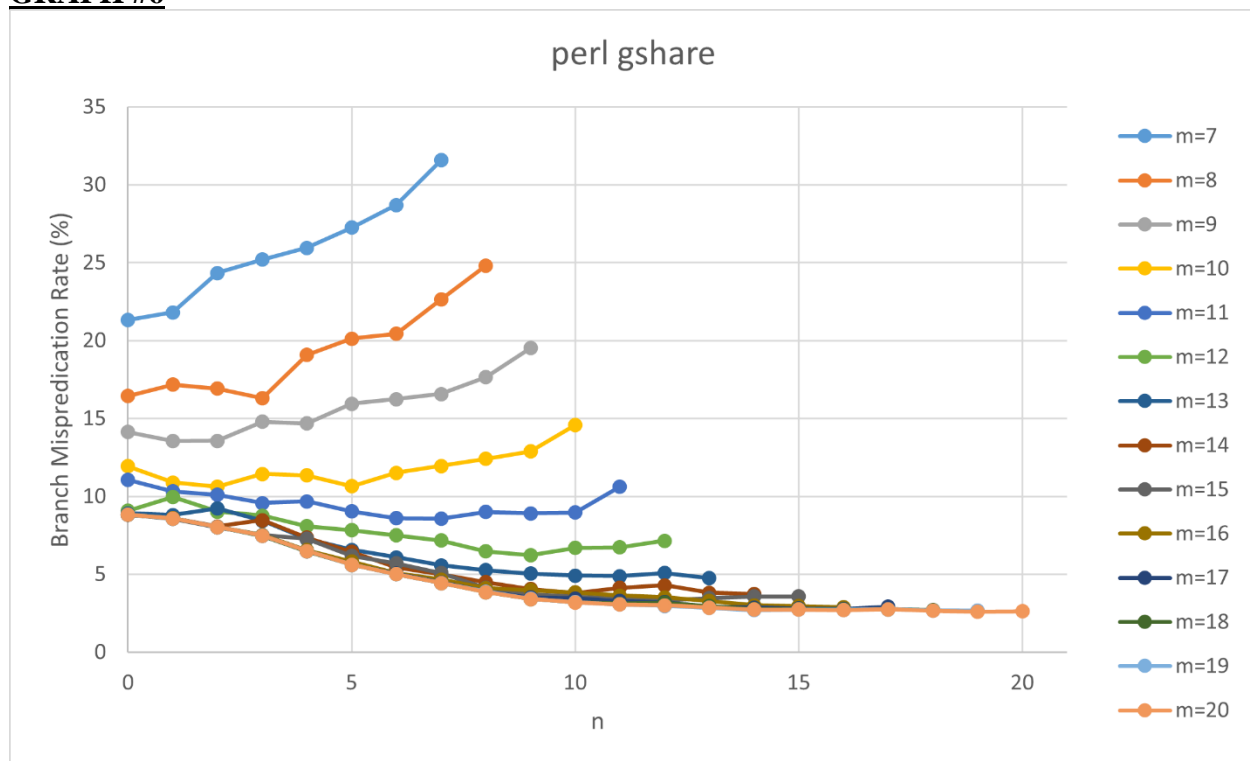
The trend in the perl and gcc benchmarks were essentially the same, but the performance of the perl benchmark was better than the gcc benchmark for all points. The jpeg benchmark was unique because the amount of lower-order PC bits didn't have much of an effect on the success of the bimodal branch predictor. For the perl and gcc benchmarks, the performance of the predictor got better as the number of lower-order PC bits increased. There did seem to be diminishing returns as the number of bits increased. A conclusion that can be made is that generally adding more PC bits will increase the accuracy of the bimodal branch predictor.

GRAPH #4



GRAPH #5



GRAPH #6

1. Draw conclusions and discuss trends. Discuss similarities/differences among benchmarks.

As with the bimodal branch predictor, the jpeg benchmark didn't show a strong reduction in misprediction rate compared to the perl and gcc benchmarks when the number of lower-order PC bits was increased. In the jpeg benchmark, there was this strange outlier when m equaled 8 and n equaled 3 where the misprediction rate was much higher than the surrounding datapoints. This is probably caused by an unlucky trace and configuration combination which leads to lower accuracy. For all the benchmarks, increasing the bits in the global history register led to increases in misprediction rate when the number of lower-order PC bits was lower and led to decreases in misprediction rate when the number of lower-order PC bits was higher.