

University of Central Florida
Department of Computer Science
CDA 5106: Fall 2020
Machine Problem 2: Branch Prediction

by

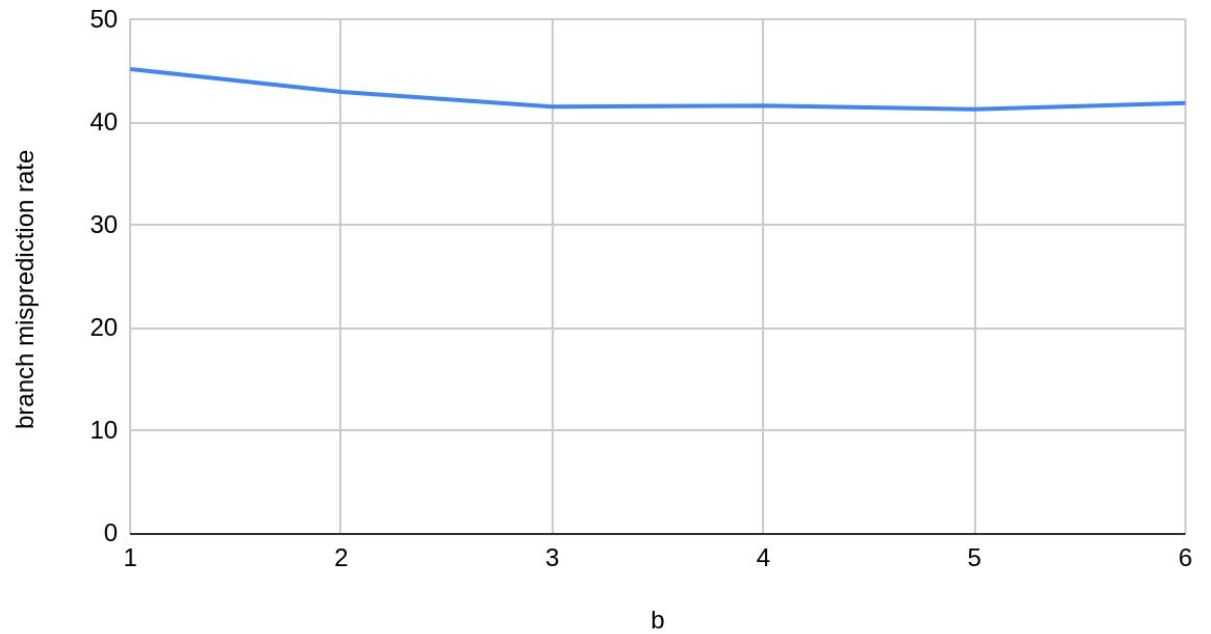
Sheikh Nabil Mohammad

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| |
| Honor Pledge: "I have neither given nor received unauthorized aid on this test or assignment." |
| |
| Student's electronic signature: _____ Sheikh Nabil Mohammad_____ |
| (sign by typing your name) |
| |
| |

Part 1: Smith N-bit counter Predictor ($1 \leq b \leq 6$)

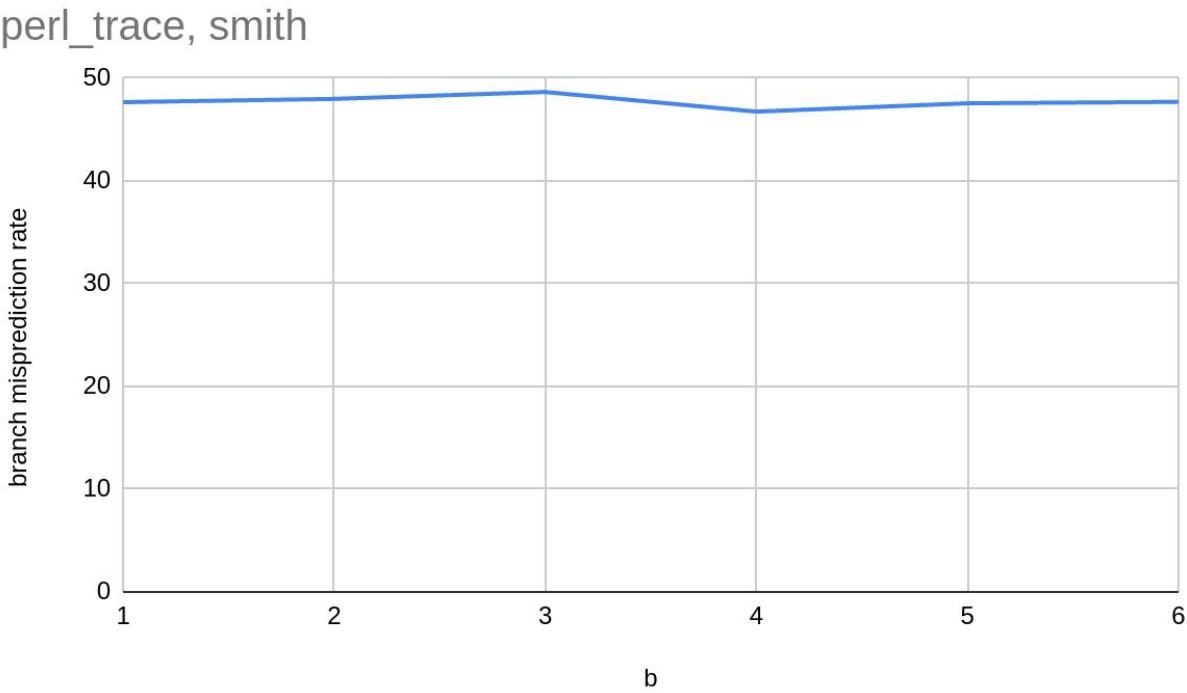
(1) gcc_trace:

gcc_trace, smith



| b | branch_misprediction_rate |
|---|---------------------------|
| 1 | 45.24 |
| 2 | 43.01 |
| 3 | 41.57 |
| 4 | 41.68 |
| 5 | 41.33 |
| 6 | 41.94 |

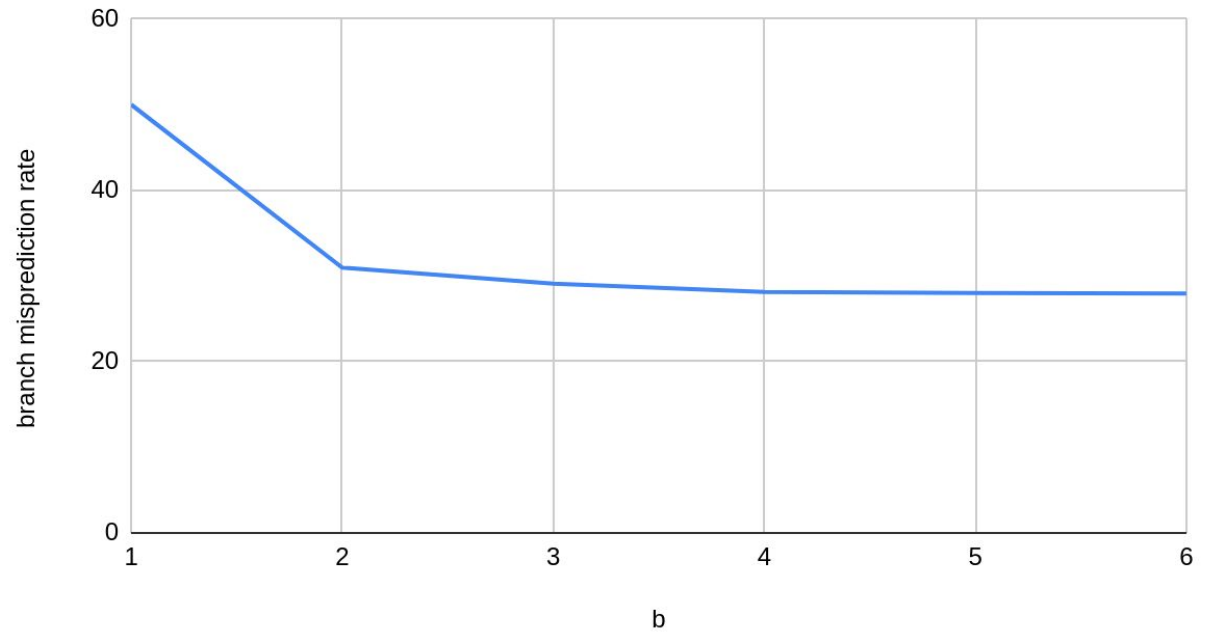
(2) perl_trace:



| b | branch_misprediction_rate |
|---|---------------------------|
| 1 | 47.66 |
| 2 | 47.98 |
| 3 | 48.65 |
| 4 | 46.74 |
| 5 | 47.55 |
| 6 | 47.69 |

(3) Jpeg_trace:

jpeg_trace, smith



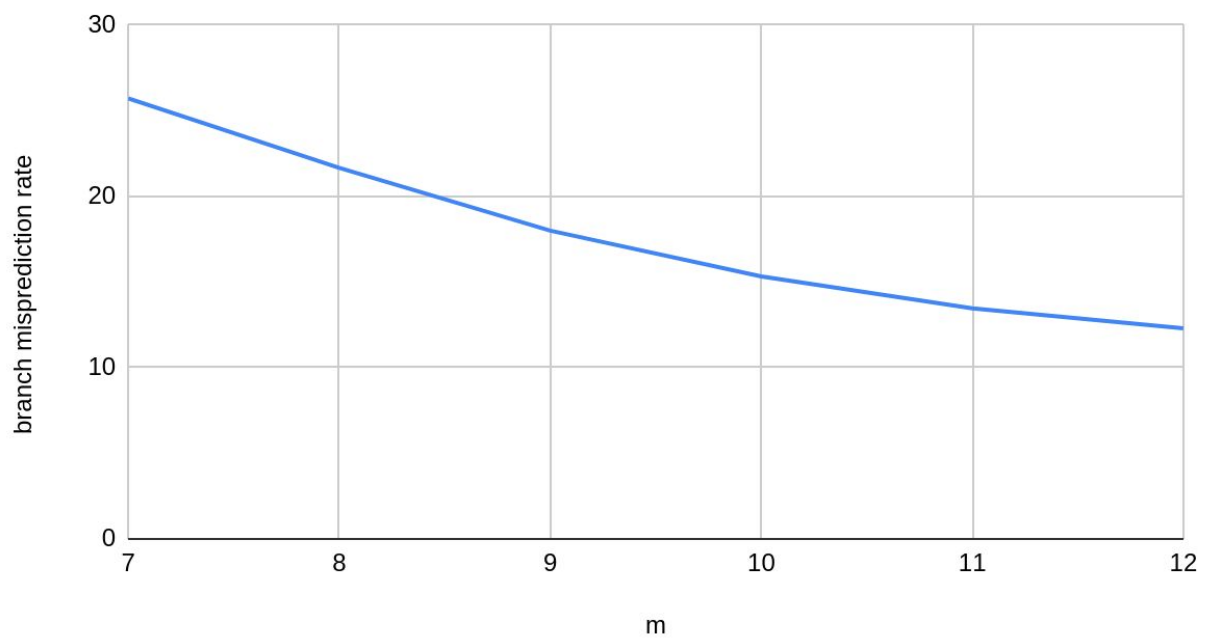
| b | branch_misprediction_rate |
|---|---------------------------|
| 1 | 50.02 |
| 2 | 30.98 |
| 3 | 29.12 |
| 4 | 28.14 |
| 5 | 28 |
| 6 | 27.94 |

Part 2: Bimodal Predictor ($7 \leq m \leq 12$)

(1) gcc_trace:

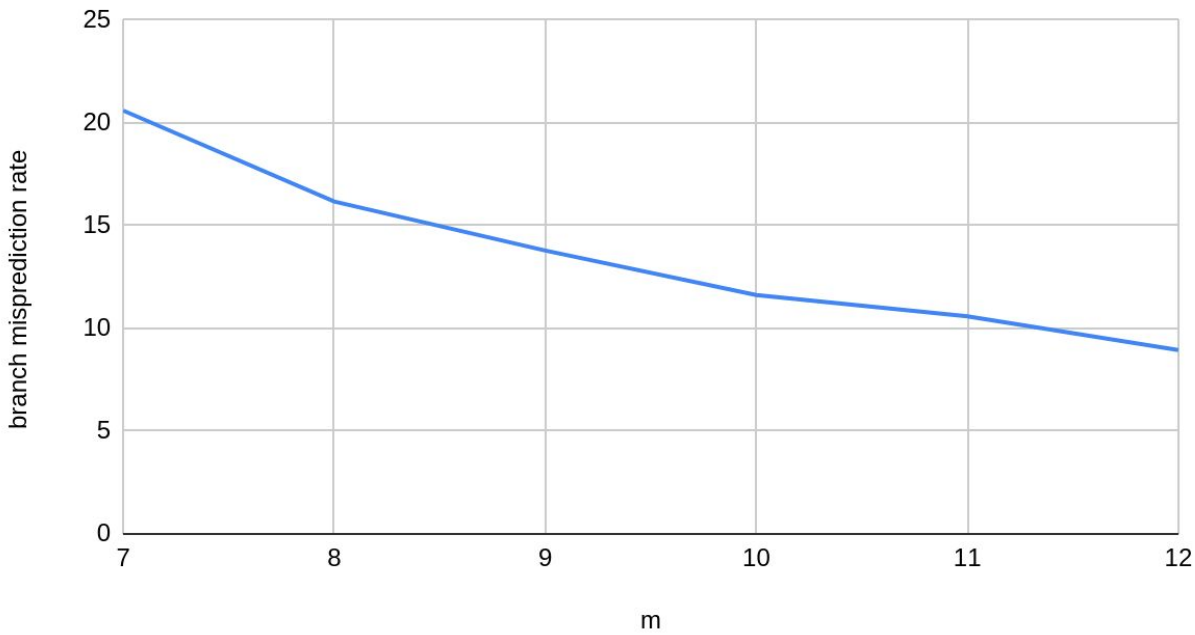
| m | branch_misprediction_rate |
|----|---------------------------|
| 7 | 25.72 |
| 8 | 21.66 |
| 9 | 18 |
| 10 | 15.33 |
| 11 | 13.46 |
| 12 | 12.3 |

gcc_trace, bimodal



(2) perl_trace:

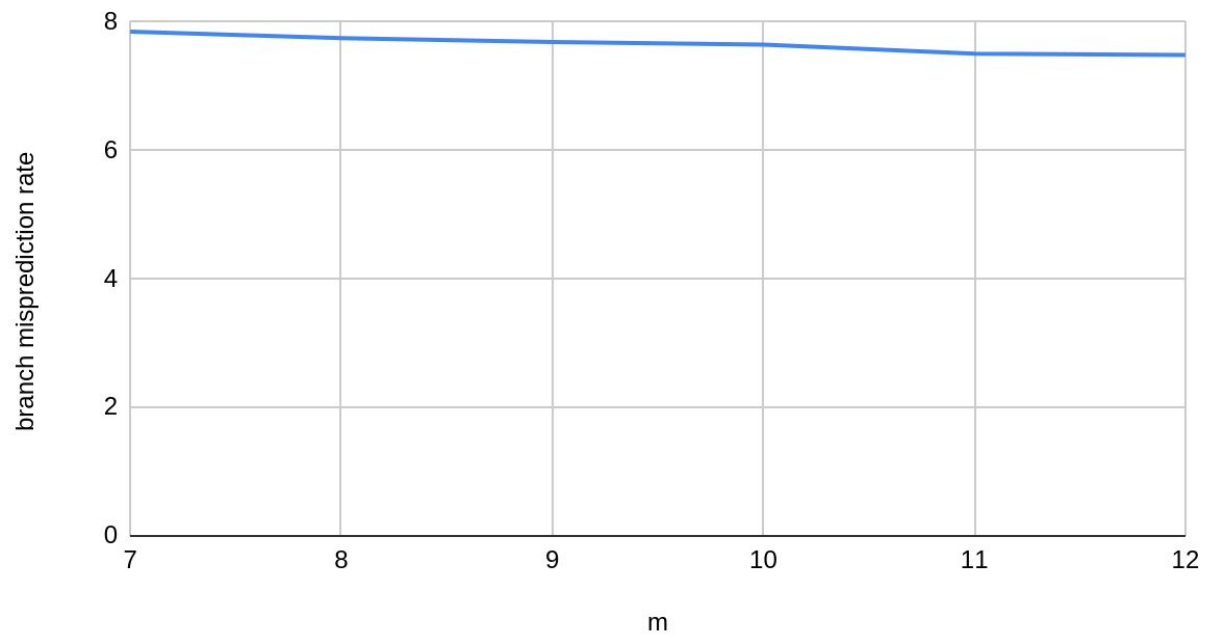
perl_trace, bimodal



| m | branch_misprediction_rate |
|----|---------------------------|
| 7 | 20.6 |
| 8 | 16.17 |
| 9 | 13.79 |
| 10 | 11.62 |
| 11 | 10.59 |
| 12 | 8.94 |

(3) Jpeg_trace:

jpeg_trace, bimodal



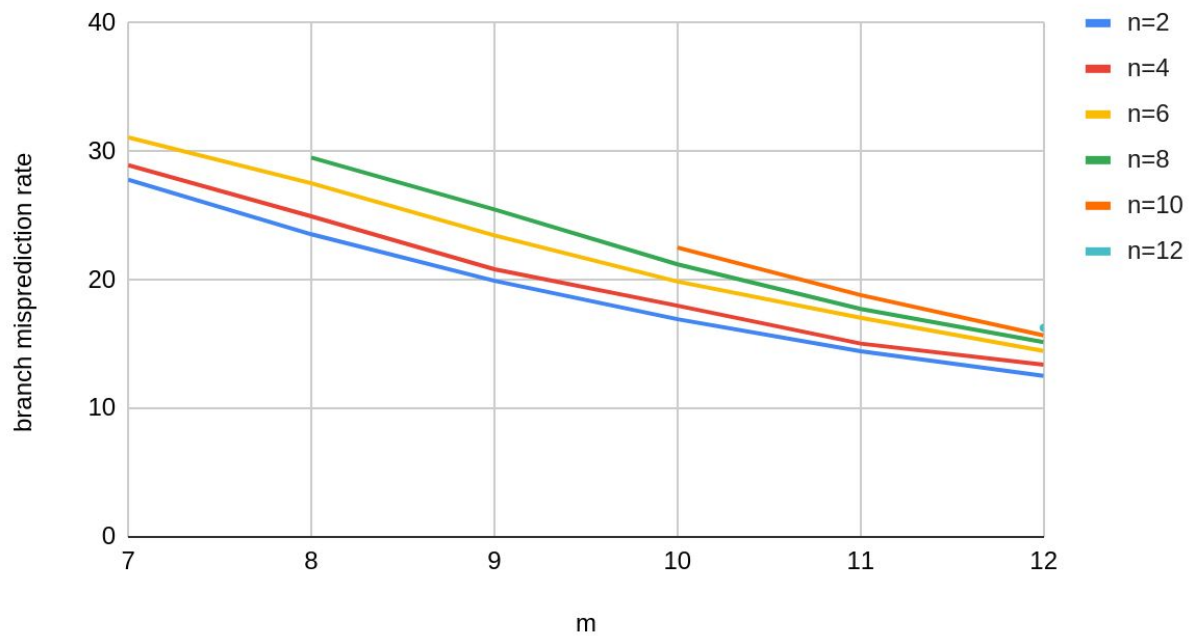
| m | branch_misprediction_rate |
|----|---------------------------|
| 7 | 7.85 |
| 8 | 7.75 |
| 9 | 7.69 |
| 10 | 7.65 |
| 11 | 7.51 |
| 12 | 7.49 |

Part 3: Gshare Predictor ($7 \leq m \leq 12$ and $2 \leq n \leq m$)

(1) gcc_trace:

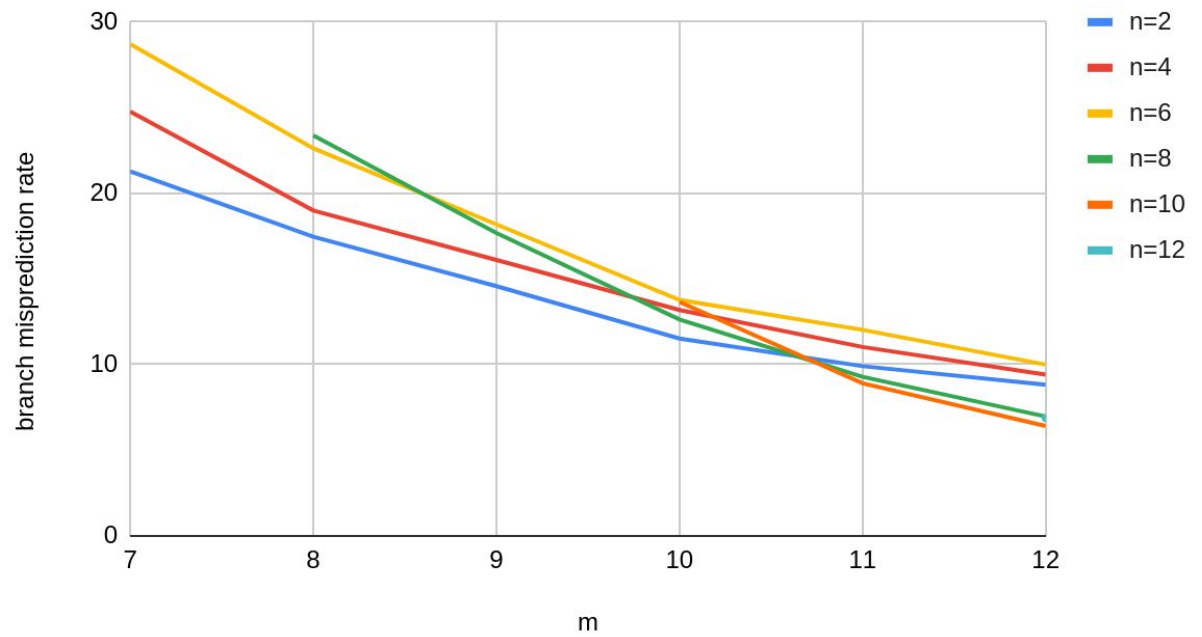
| m | n=2 | n=4 | n=6 | n=8 | n=10 | n=12 |
|----|-------|-------|-------|-------|-------|-------|
| 7 | 27.81 | 28.95 | 31.1 | | | |
| 8 | 23.56 | 24.96 | 27.53 | 29.53 | | |
| 9 | 19.94 | 20.84 | 23.47 | 25.49 | | |
| 10 | 16.95 | 18 | 19.88 | 21.22 | 22.52 | |
| 11 | 14.46 | 15.05 | 17.06 | 17.75 | 18.83 | |
| 12 | 12.53 | 13.4 | 14.47 | 15.16 | 15.69 | 16.28 |

gcc_trace, gshare



(2) perl_trace:

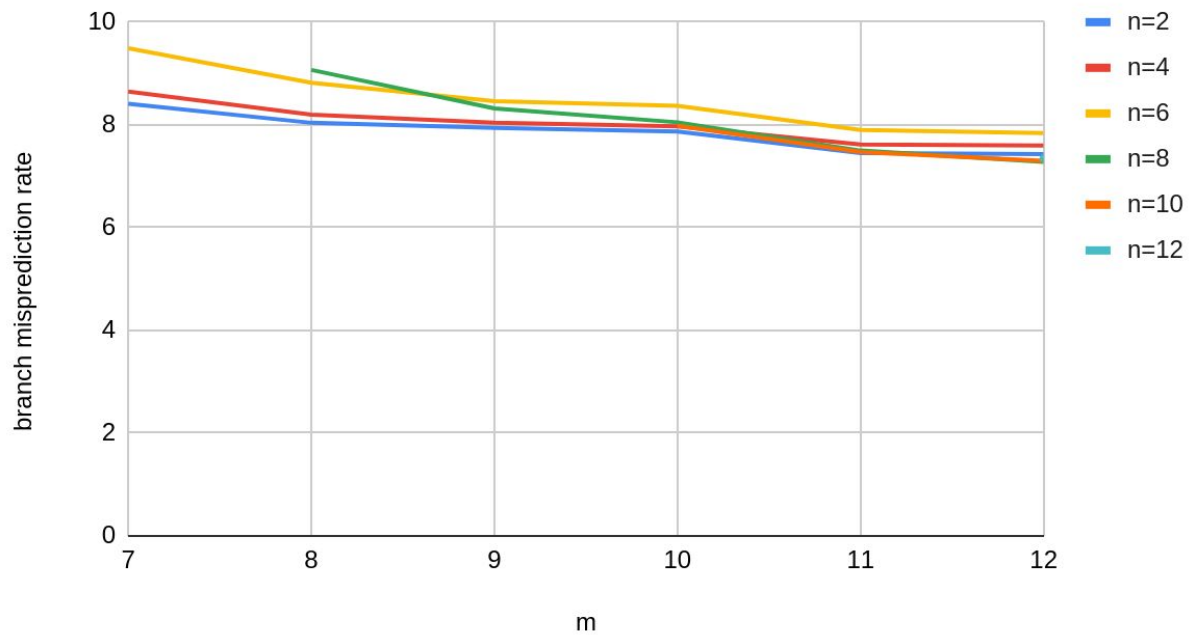
perl_trace, gshare



| m | n=2 | n=4 | n=6 | n=8 | n=10 | n=12 |
|----|-------|-------|-------|-------|-------|------|
| 7 | 21.28 | 24.78 | 28.72 | | | |
| 8 | 17.47 | 19 | 22.63 | 23.39 | | |
| 9 | 14.58 | 16.11 | 18.19 | 17.69 | | |
| 10 | 11.52 | 13.19 | 13.78 | 12.64 | 13.66 | |
| 11 | 9.91 | 11.03 | 12.03 | 9.29 | 8.91 | |
| 12 | 8.83 | 9.42 | 10 | 6.97 | 6.42 | 6.88 |

(3) jpeg_trace:

jpeg_trace, gshare



| m | n=2 | n=4 | n=6 | n=8 | n=10 | n=12 |
|----|------|------|------|------|------|------|
| 7 | 8.41 | 8.65 | 9.49 | | | |
| 8 | 8.04 | 8.2 | 8.82 | 9.07 | | |
| 9 | 7.94 | 8.04 | 8.46 | 8.32 | | |
| 10 | 7.87 | 7.97 | 8.37 | 8.05 | 7.98 | |
| 11 | 7.45 | 7.62 | 7.9 | 7.5 | 7.47 | |
| 12 | 7.43 | 7.6 | 7.84 | 7.28 | 7.3 | 7.35 |