# Branch Prediction Programming Report

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## GitHub repo link - <https://github.com/saivittalb/branch-prediction-programming>

## Instructions to run the code:

Included in the README.md file in the GitHub repo link.

## Results:

The shared results files are the predicted accuracy outcomes in a line-by-line fashion for the provided 16 traces.

### Comparison in decreasing reliability

### Dynamic-NN >> Dynamic-GSHARE > Dynamic-BM >> Static-T >= Static-NT

|  |  |
| --- | --- |
| Static-T | Static-NT |
| 88.3724 | 12.6276 |
| 58.1501 | 42.8499 |
| 56.3637 | 44.6363 |
| 94.9918 | 6.00817 |
| 50.1466 | 50.8534 |
| 63.455 | 37.545 |
| 39.4872 | 61.5128 |
| 33.935 | 67.065 |
| 39.1215 | 61.8785 |
| 38.0891 | 62.9109 |
| 37.6188 | 63.3812 |
| 39.6208 | 61.3792 |
| 39.1208 | 61.8792 |
| 38.7541 | 62.2459 |
| 38.3617 | 62.6383 |
| 39.2372 | 61.7628 |

**Dynamic-BM**

Table Size (8, 16, 32, 128, 256, 512, and 1024 entries)

97.3898 97.1735 97.5924 98.5526 99.0689 99.1537 99.1514

70.1561 73.2736 77.3801 79.043 80.7047 80.7044 80.7041

69.6721 72.0028 71.7969 77.4014 78.9097 82.1645 83.4267

99.083 99.0864 99.2127 99.4907 99.6771 99.7997 99.814

62.3554 66.1172 69.9684 79.2522 84.7318 87.8304 88.9967

75.2004 78.0164 79.1881 83.4142 85.6503 87.3727 88.7874

69.3364 72.1877 75.3225 81.4888 84.3361 86.8709 89.6572

67.914 71.6493 75.122 80.1342 81.2575 83.3785 86.282

68.6388 71.9049 74.1819 79.1977 81.1226 83.7136 85.6946

64.123 66.6608 66.7959 70.2126 73.382 77.2518 81.0027

63.6535 65.9515 65.9765 70.1592 73.5372 77.6433 81.4321

64.2323 66.7068 67.2551 73.7209 77.0126 80.8422 83.8718

76.6917 79.7219 84.2057 87.7979 90.361 91.0364 91.4518

65.5207 67.7632 68.0172 72.2421 75.0359 78.5441 81.9181

64.5354 66.6142 66.2372 69.5679 72.6615 76.738 80.7206

62.9662 65.0859 65.1831 71.0118 75.0727 79.4349 83.0028

**Dynamic-GSHARE**

9 different global register size range from 2 bits to 10 bits for a table size of 1024 entries

99 98 99 99 99 99 99 99 99

89 93 93 93 94 90 91 91 94

86 85 85 84 83 82 80 79 78

99 99 99 99 99 99 99 99 99

91 91 88 90 88 89 88 87 87

89 89 88 88 88 88 87 87 87

88 88 88 87 87 86 86 85 85

85 84 83 82 82 81 81 80 79

86 86 85 85 84 83 83 83 83

80 80 78 78 76 74 75 74 73

80 80 78 78 76 74 74 74 73

83 82 81 81 80 79 79 78 78

92 91 92 91 91 92 92 92 92

82 81 80 79 78 76 76 76 75

80 79 78 77 76 74 74 73 73

82 81 79 79 78 76 76 75 74

**Dynamic-NN (Custom Algorithm)**

Adaptive Neural Network with great accuracy. The following accuracy is when the number of unique addresses are unknown. Instructions are provided in README.md to run the code to get accuracy when the number of unique addresses are known.

99.167699446

99.0375091503

94.0876745932

99.7180795752

98.922666136

95.1044055202

97.1894180235

97.6137475312

95.9857717083

97.1377508602

96.9478647676

96.0559916884

96.7566237986

96.36469231

96.9232207022

96.8132693058