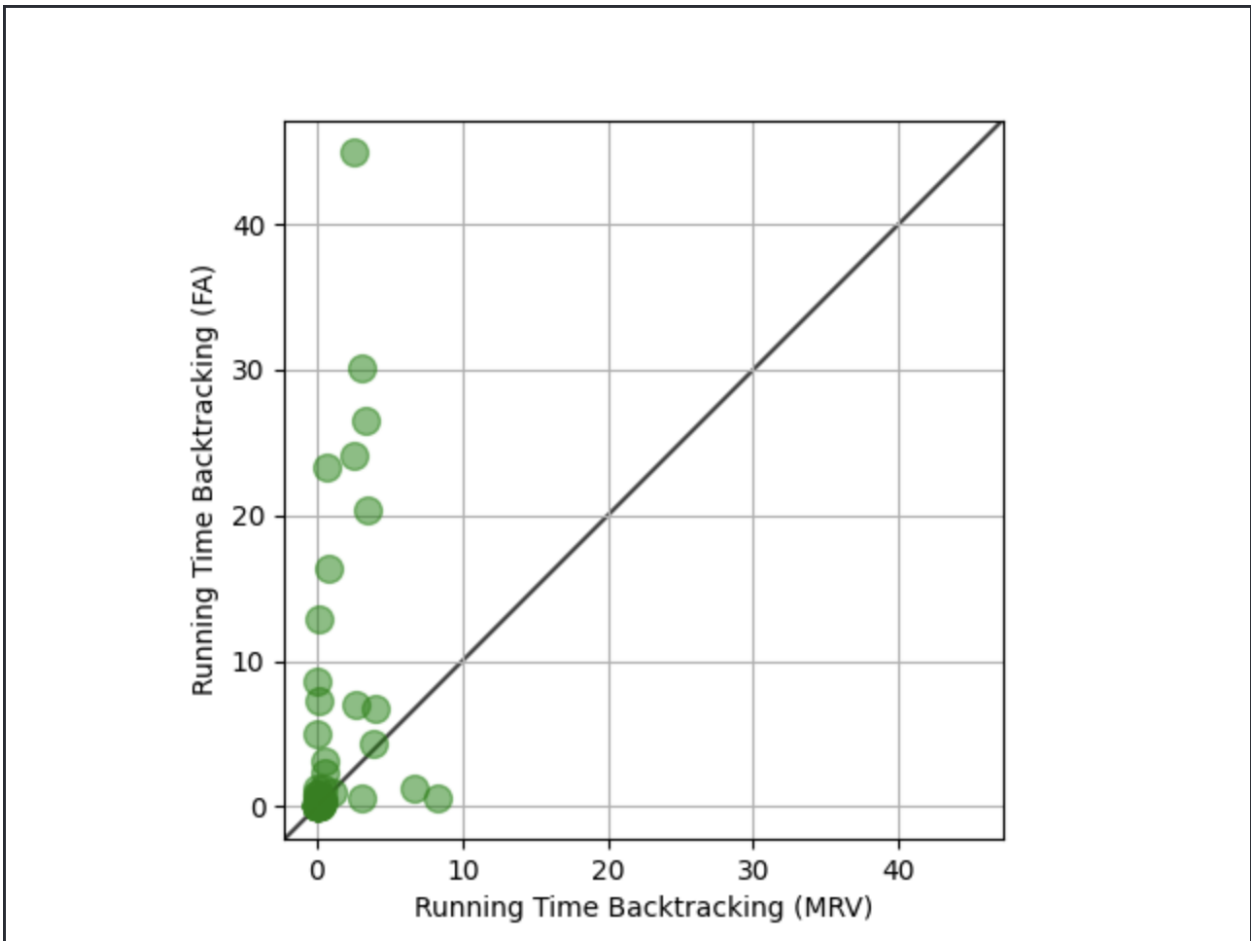

Here we compare the runtime performance of two variable selection heuristic algorithms for solving the top 95 Sudoku puzzles from top.txt via Backtrack search

First is minimum remaining values (MRV) : select the variable with fewest legal values remaining. First Available heuristic selects the first available the first unassigned variable following a top down in a left right order. From the scatterplot above which shows the running time in seconds the X-axis is the MRV search heuristic and Y-axis is the First available heuristic. Where the diagonal line represents equal performance.

Now from the given scatterplot of both heuristic algorithms we can basically infer that since most points of the scatterplot are below the diagonal this indicates our MRV heuristic outperforms First available in most cases. However there are couple of points close to the line which could have probably been easier puzzles. But as we look at harder and harder puzzles the performance gap between MRV and firstavailable keeps growing larger. And finally since No points of MRV are above the line we can say the MRV performs way better usally. Hence from our Reasoning above we can confidently say that MRV is the smarter heuristic since it mainly chooses the variable which is most constrained. This basically leads to fewer available paths but these paths are very much legal. And this leads to quicker pruning of branches too. But when

we go back to firstavailable heuristic it does not care for constraint level , so it chooses variables with more path s and not all of them might be legal thus leeding to deeper and less informed recursion espically when solving harder problems. Thus MRV usally performs way better than first available heuristic for solving sudoku problems using backtracking. This is useful in more tougher problems where the paths chosen are more legal and we can prune uneeded branches easily. This also demonstrates the importance of intelligent variable selection via constraint level in constraint satisfaction problems. Thus in any real world problem I would always prefer MRV as compared to first Available.