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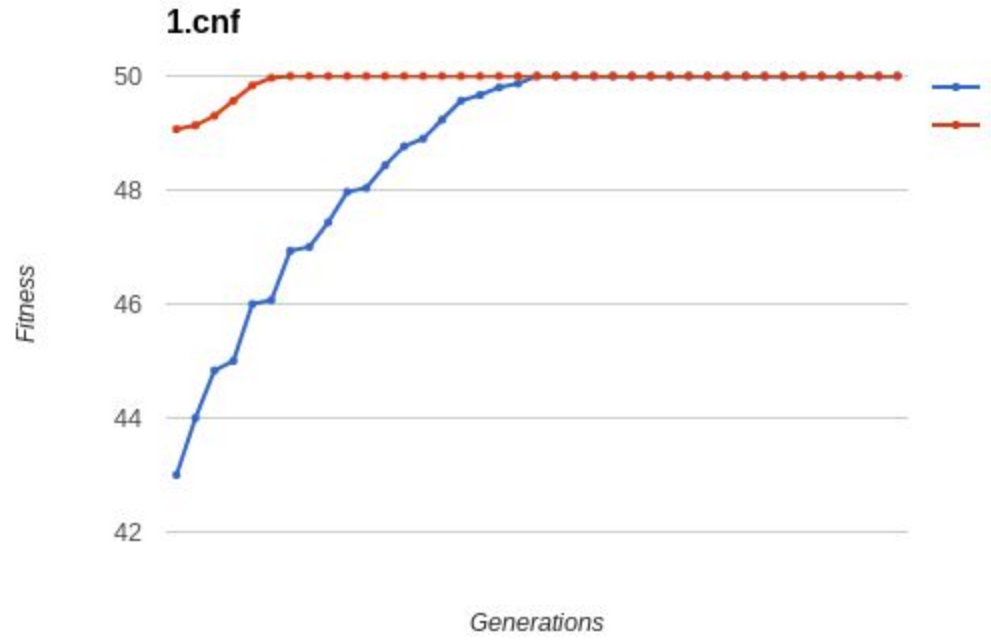
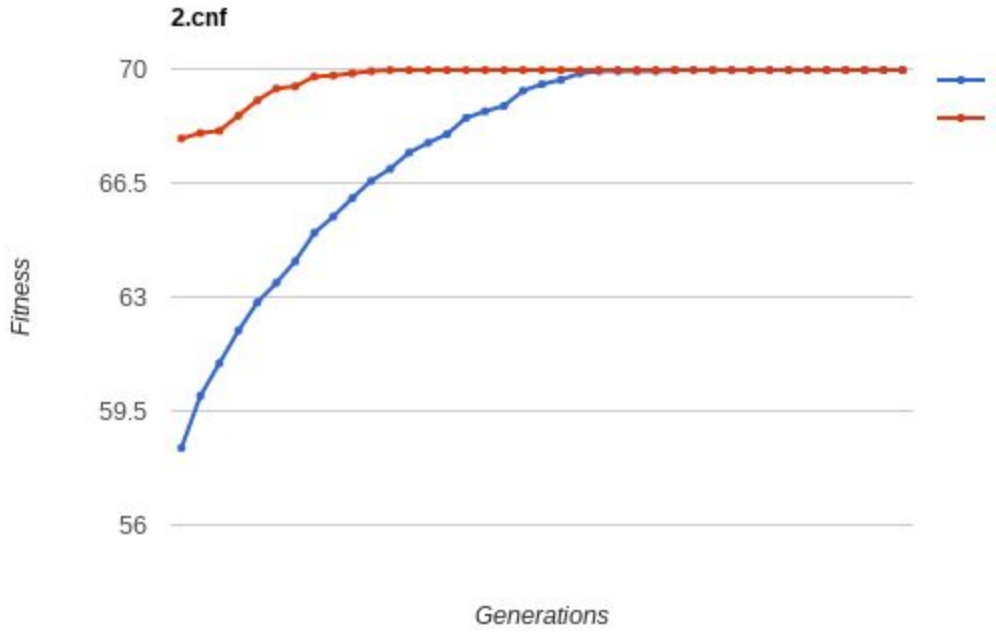
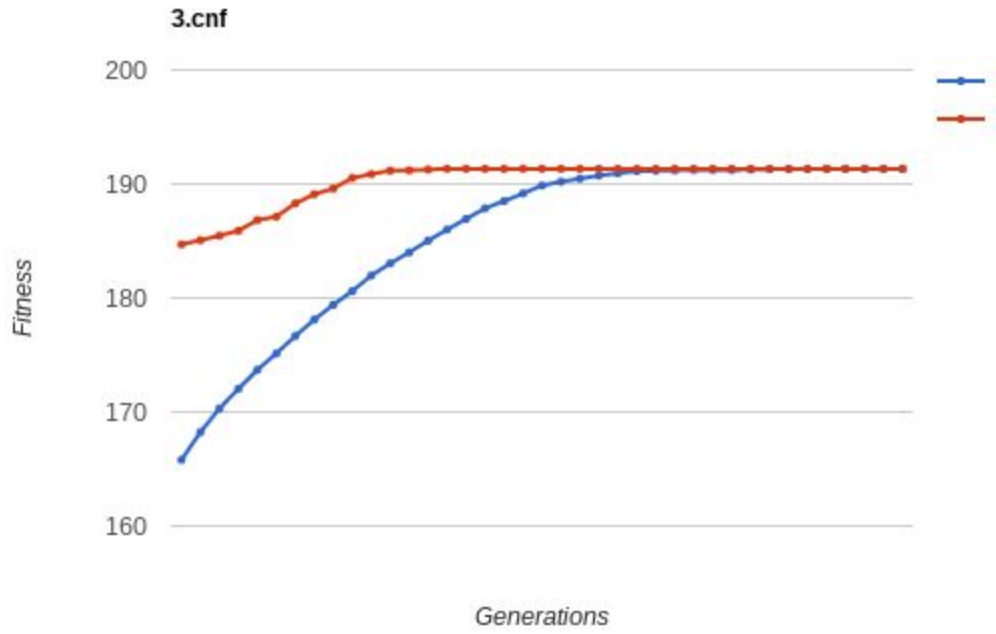
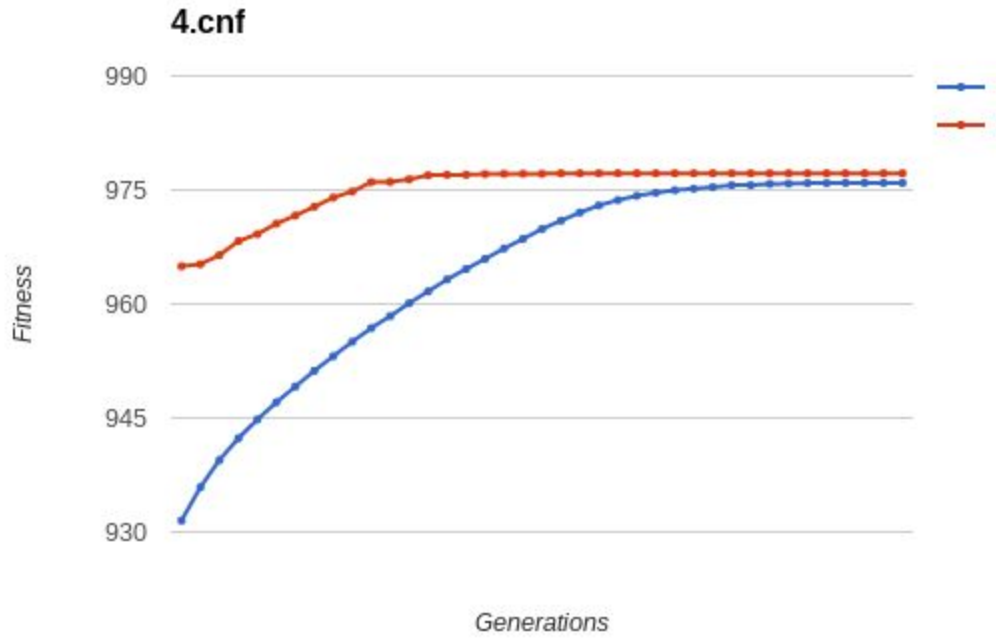
COMP SCI 5401 FS2015 Assignment 1b

The graphs below represent the average best and average average fitnesses after each generation over the 30 runs on each cnf file. The red series represents the average best fitness, and the blue series represents the average average fitness. Each generation represents 250 evaluations.









This algorithm and the random search algorithm perform quite differently. Although the random search has the potential to reach the maximum fitness earlier, the recombination of parent solutions brought a much more consistent set of results. As seen in the first two cnf files, recombination was able to find the maximum fitness value within the first half of the evaluations, around five thousand. The third and fourth files show a slightly different case. Although they also find a plateau within the first half of the evaluations, they converge on a value that is not the maximum. This is caused by a lack of diversity in the population. Because the algorithm does not properly mutate its children in order to create more diversity, it tends to find a local maximum value and plateau in the first half of the evaluations.

The average final best fitness value from the recombination algorithm for 3.cnf was 191.3333333. The same value from the random search algorithm was 188.2666667. So you can see that the EA produced a higher mean final value. The standard deviations for the final best values for the EA and random search respectively are 2.056668436 and 1.529780993. Performing a T-Test on the two sets of data gave a value of 0.0003611322927, showing that the two sets are unlikely to have come from the same set of data with the same mean. The evolutionary algorithm had a major impact on the data set as a whole, even if it had similar possibilities of reaching the maximum fitness value.