Appendix A

Experimental Computer Specification

Experimental Computer Specification

Processor: Intel(R) Core(TM) i7-4790 CPU @ 3.60 GHz

Installed memory (RAM): 16.00 GB

Operating System type: 64-bit

Operating system: Ubuntu

Appendix B

Algorithm

Algorithm

For each function in genetic algorithm, it has the difference operation for its role. The important functions in genetic algorithm are the functions that used to generate a new solution in next generation. They are shown in below.

B.1 Crossover

Crossover is a function for creation a new solution by switching the range of bases in the same domain of two individuals. For the flowchart of this function, it is shown in Figure B.1.

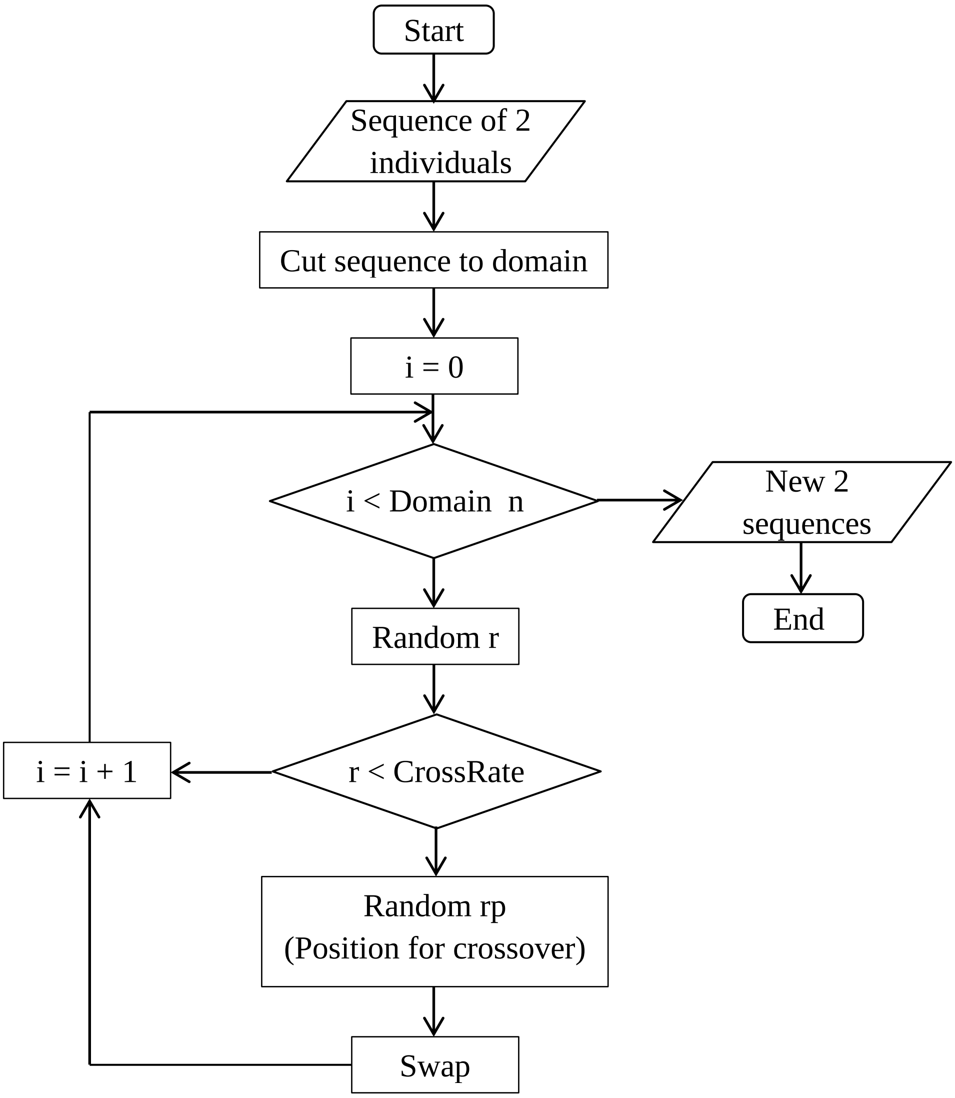

Figure B.1 Algorithm of crossover function

This function start by receiving two sequences of pair parents from selection step. They will be cut to domain before sent to next step. And then program will handle in each domain. In each domain, program will random a number from zero to one to compare with the crossover rate. If its value is lower than crossover rate, that domain will be crossovered. For crossover, this tool will random the position of base for crossover. The range from that position to the end of that domain will swap with this range of another sequence on the same domain. The results of this function are two new sequences. They will be used in mutation step.

B.2 Mutation

The mutation function is used for changing some base on sequence to promote diversity by probability or mutation rate. Hence process for this function is perusal of each base as shown in Figure B.2

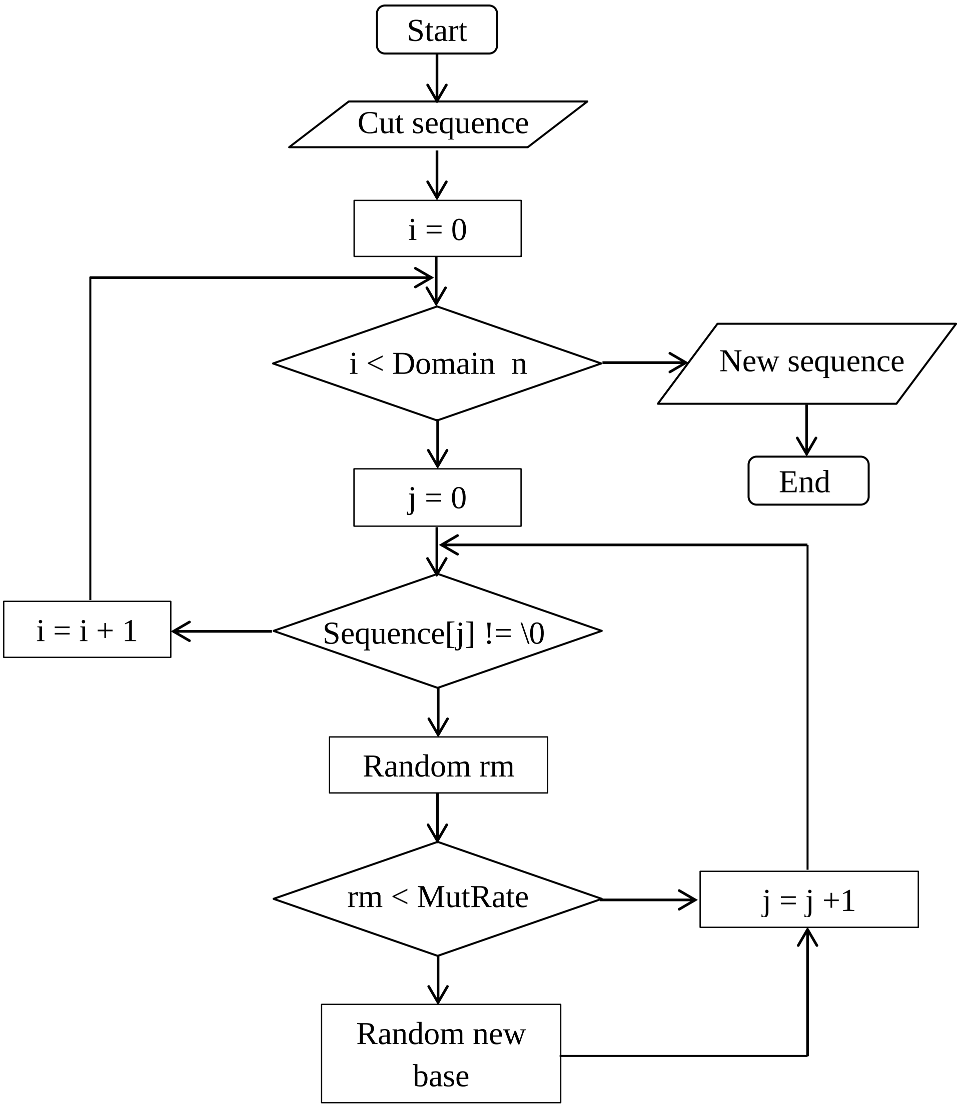

Figure B.2 Algorithm of mutation function

For this function, it started by receive the cut sequence from crossover function. The cut sequence is the domains. The program will run every domain of that individual and consider base in each domain. For each base, program will random a number from zero to one for compare with mutation rate. If it is lower than mutation rate, that base will be changed by random.

B.3 Repair

This function was added for edited of base in position that made wrong structure. It was a function that used for solved problems about unpaired base, but it paired with another base in design structure. It used HD to a data for found that position as shown in Figure B.3

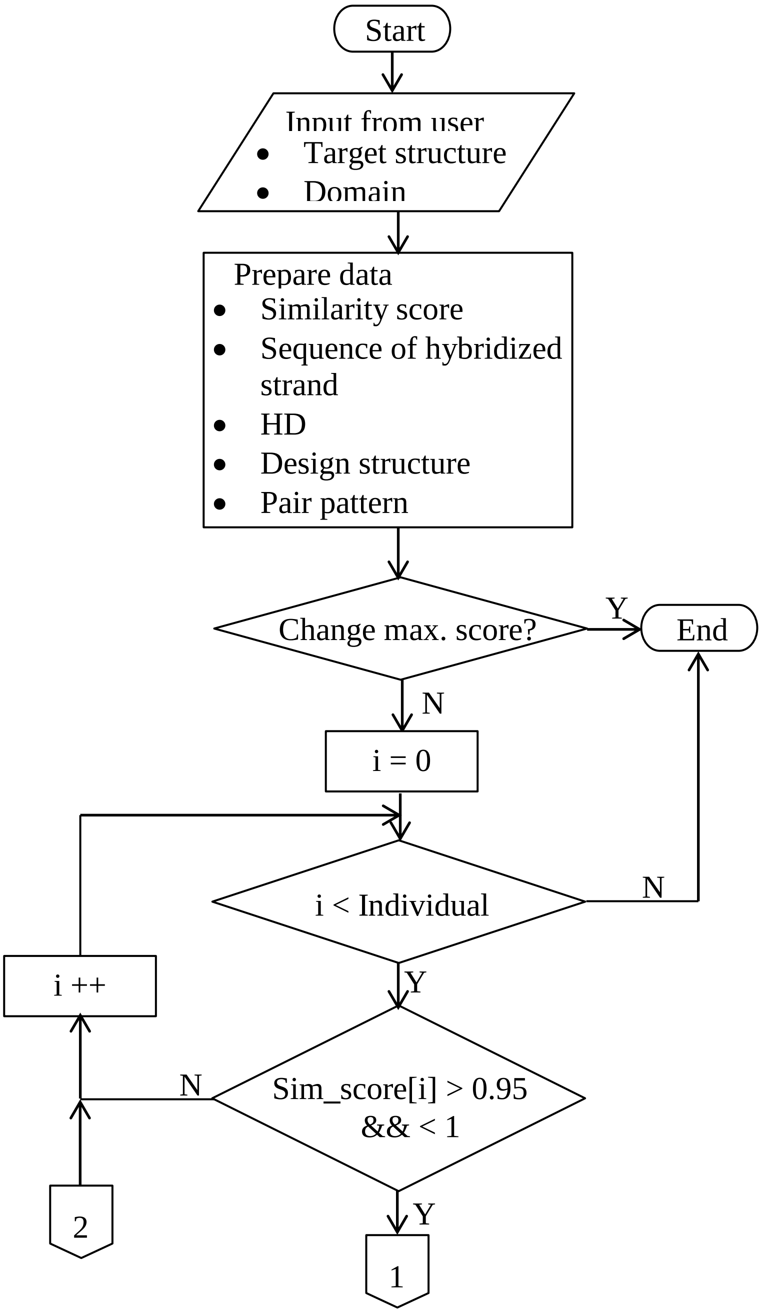

Figure B.3 Algorithm of repair function

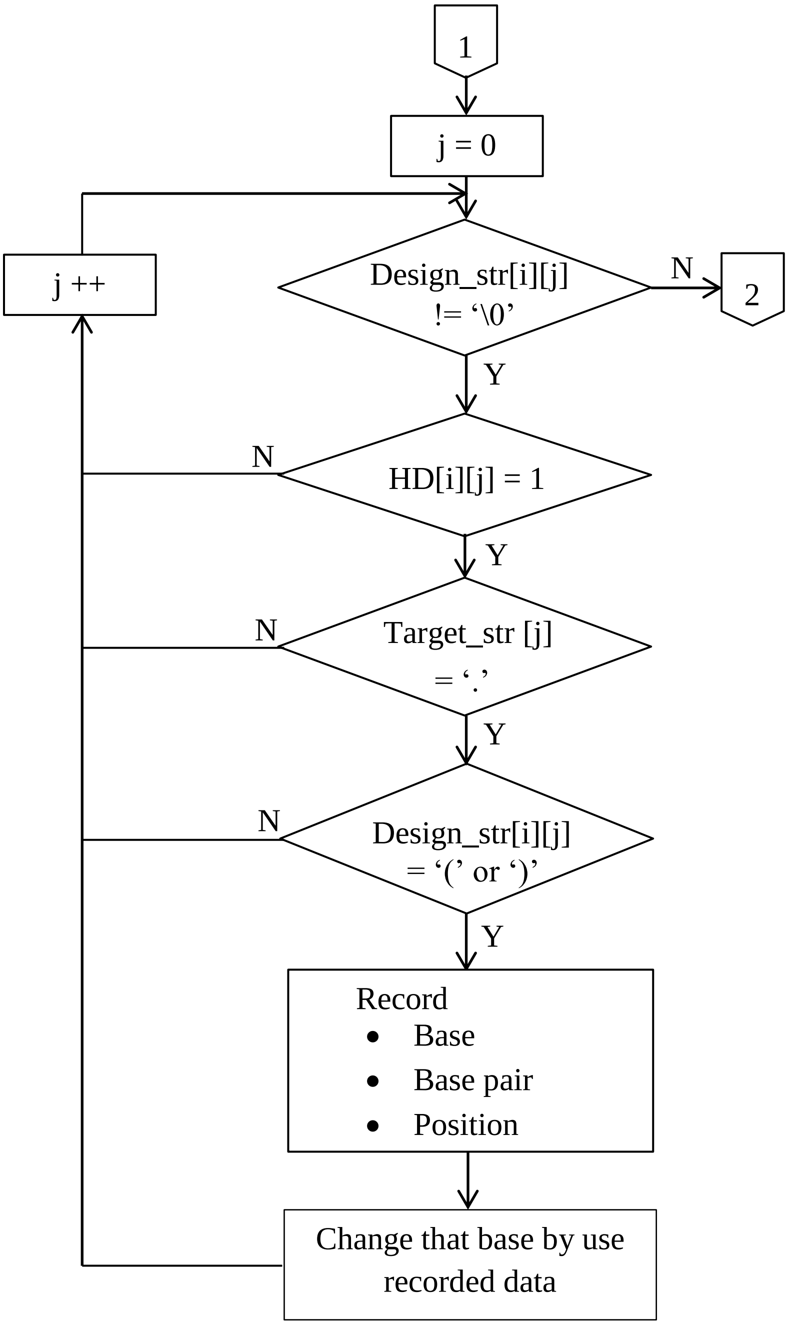

Figure B.3 Algorithm of repair function (cont.)

This function was called when this tool cannot generate a solution that had higher fitness score. And it operated only individual that had similarity score more than 0.95 for performance of this function. This function used the data from user and design sequence for compared and found the position that had problems. It use HD for found the position that wrong and checked the target structure to ensured that position should not had a pair by found '.' (dot) in target structure. And then, it recorded the data of base pair position for replacement decisions. And the last, it changed base to another base that cannot pair with base of remaining.

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