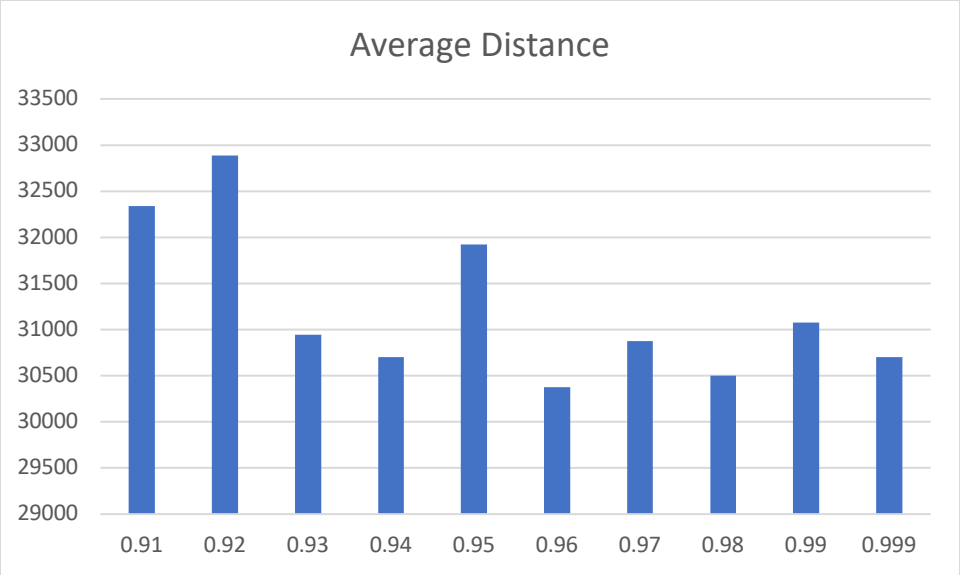
File: EE599_Lab5_2176023892_task1.cpp
EE599_Lab5_2176023892_task2.cpp
EE599_Lab5_2176023892_task3.cpp
Lab5_partII_2176023892.sh
Author: YaoGuo
USCID: 2176023892
Email: yaog@usc.edu
Description: Using Hill Climbing and Simulated Annealing to solve TSP problems.
Task1 is to implement Stimulated annealing with initial T_start 100, cooling rate is 0.95,
Task2 is to implement Hill Climbing method, and the start city is No.1.
Task3 is to find the optimized T-start and find a better cooling rate.
The shell script is to practice regex.
Problem 1. Develop a Unix command for a binary string that represents an unsigned value that is divisible by 3.
Problem 2. Develop a Unix command to classify “pich up red trunk $”. Find the matching lines and output them.
Problem 3. Write a Unix command to match a date in the format “dd{separator}MMM{separator}yyyy”.
Problem 4. Write a Unix command to find the target courses which is 500 level and units is above 3 credits. Sorting them and then output.

Question TASK 2B:

The best T_start temperature is 380, from task 2As

ß	Total iteration times	Distance 1	Distance 2	Distance 3	Distance 4	Distance 5	average
0.91	210	32014	30438	35653	32441	31154	32340
0.92	237	30107	32262	30438	34535	37102	32888.8
0.93	273	30107	30178	30107	32163	32163	30943.6
0.94	320	30520	30977	31321	30344	30344	30701.2
0.95	386	32283	34284	31029	30344	31688	31925.6
0.96	484	30344	31154	30107	30178	30107	30378
0.97	649	30344	30683	30454	30683	32228	30878.4
0.98	978	30449	31154	30454	30107	30344	30501.6
0.99	1966	31154	30107	30107	30344	33666	31075.6
0.999	19746	32441	30520	30178	30178	30178	30699
							31233.18



We can see from the graph above, as the beta getting close to 1, the average distance is getting smaller. And when the beta is 0.96, I get the smallest average distance, 0.96 is the best cooling constant.

The maximum final optimal distance is 32888 which the beta is 0.92;
The minimum final optimal distance is 30378 which beta is 0.96;
The average final optimal distance is 31233 in this program of the 11*5 tests.

Reference:
EE599_Lab5_2176023892_task1.cpp
Line 127 – line 139
https://blog.csdn.net/qq547276542/article/details/77800776
thanks to DASEason, in order to know how to implement this annealing cooling to c++.

EE599_Lab5_2176023892_task2.cpp
Line 112 – line 123
https://blog.csdn.net/shujian_tianya/article/details/80885029
thanks to shujian_tianya. I get some clue about how to use the greedy method to solve tsp find the shortest path.

Lab5_partII_2176023892.sh
Line 12
https://www.jb51.net/article/57943.htm
Thanks to junjie, I refer his code about how to transfer binary string to Decimal string.