CSCE 625: Programming Project #1

UAV Intelligent Path Planning for Wilderness Search and Rescue

Submitted By:
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Algorithm Implemented: Complete Coverage Algorithm

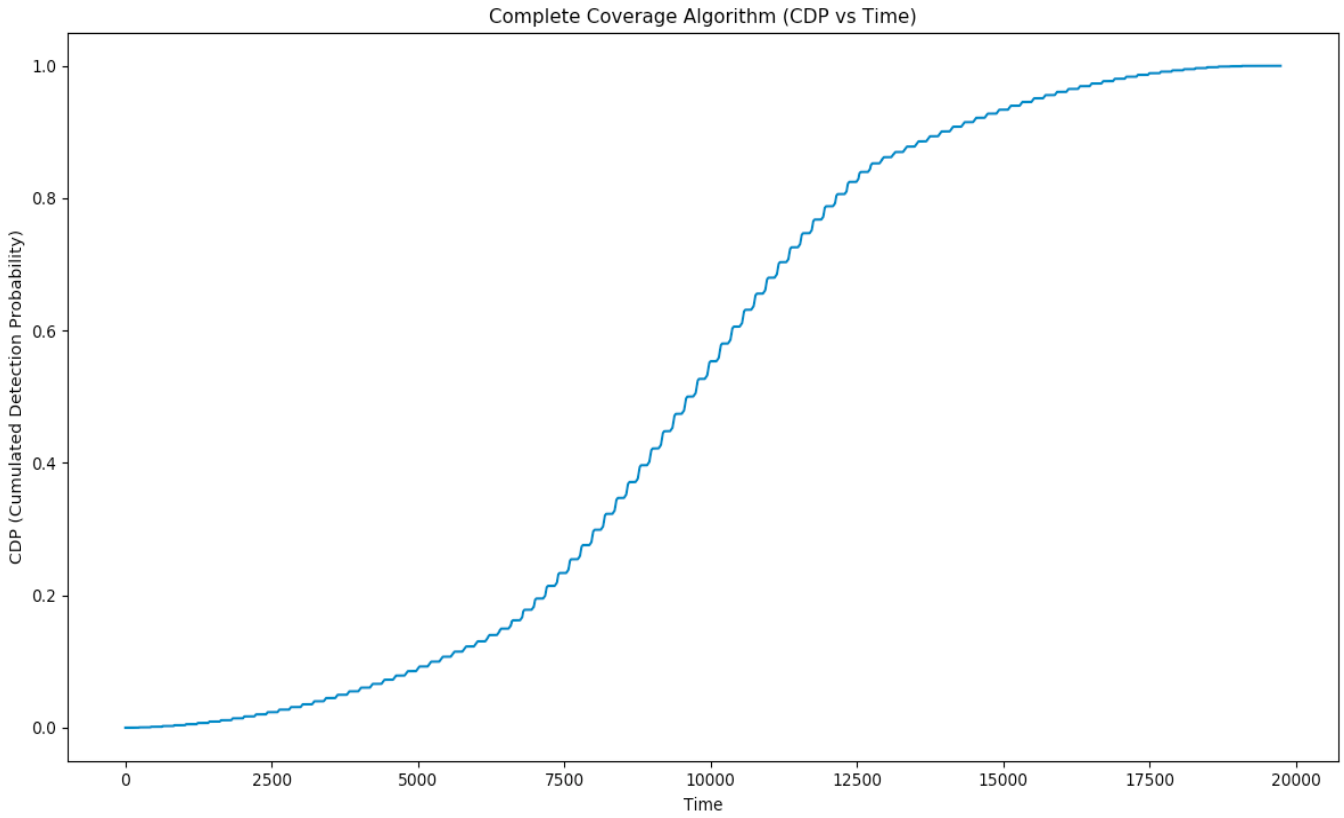
Language Used: Python

Submission Directory Structure:

- Project1_<UIN>
  - main.py
    - Complete implementation source code in python
  - heatmap_1.txt
    - Input data file for Heatmap 1
  - heatmap_1_path.txt
    - Output file containing Path for Heatmap 1
  - CDP vs Time – Heatmap 1
    - CDP vs Time plot generated through the code using pyplot for Heatmap 1
  - EfficiencyLB vs Time – Heatmap 1
    - EfficiencyLB vs Time plot at specified time points for Heatmap 1
  - Efficiency-Heatmap1.PNG
    - Program output for Efficiency-LB Calculations for Heatmap 1
  - heatmap_2.txt
    - Input data file for Heatmap 2
  - Heatmap_1_path.txt
    - Output file containing Path for Heatmap 2
  - CDP vs Time – Heatmap 2
    - CDP vs Time plot generated through the code using pyplot for Heatmap 2
  - EfficiencyLB vs Time – Heatmap 2
    - EfficiencyLB vs Time plot at specified time points for Heatmap 2
  - Efficiency-Heatmap2.PNG
    - Program output for Efficiency-LB Calculations for Heatmap 2
  - README.txt
    - Readme file that explains how to run the code and analyze the output
  - Project1 Description.doc
    - This documentation file with a description of all the files and other details

Heatmap 1

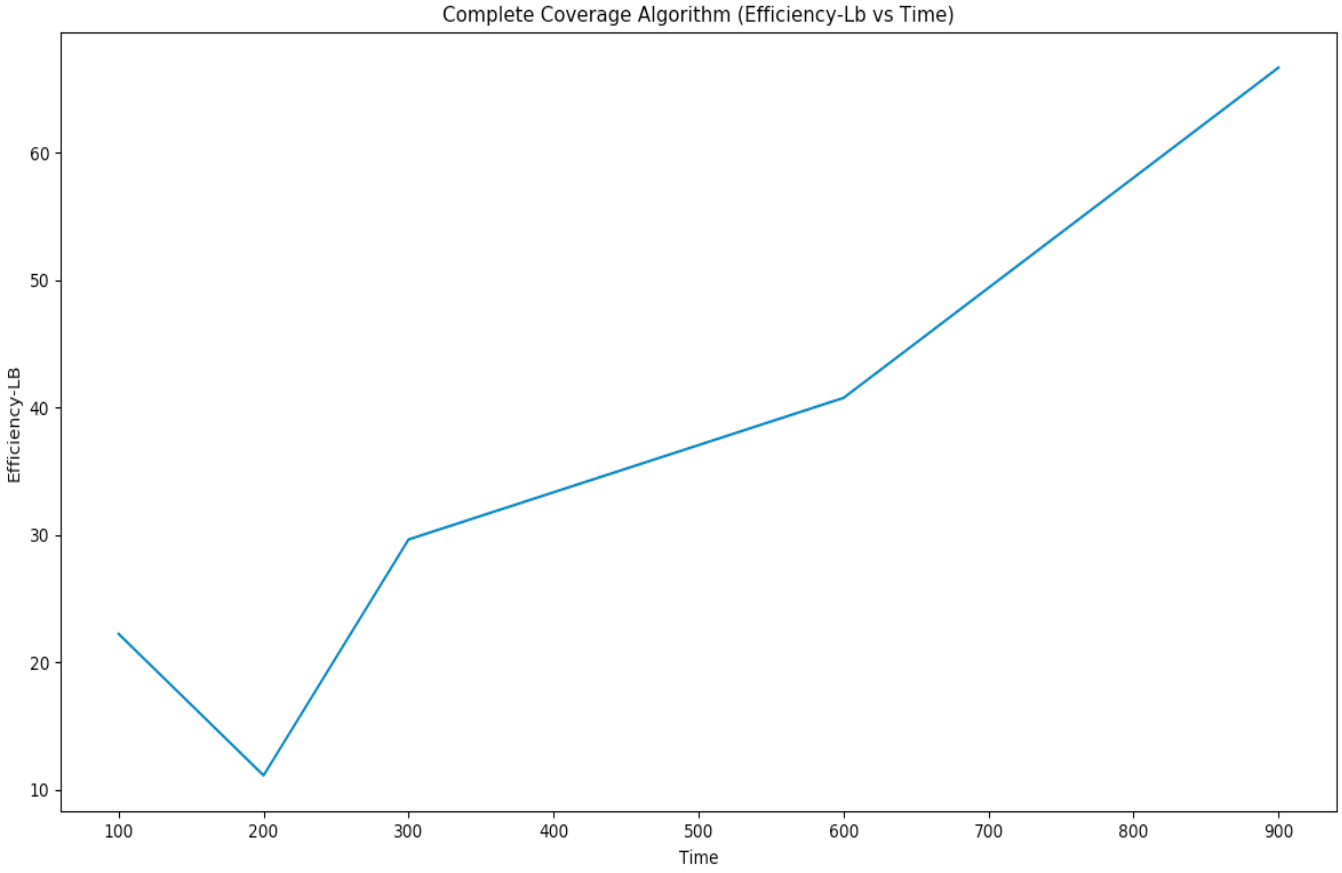
1. CDP vs Time Plot



2. Efficiency-LB vs Time Table:

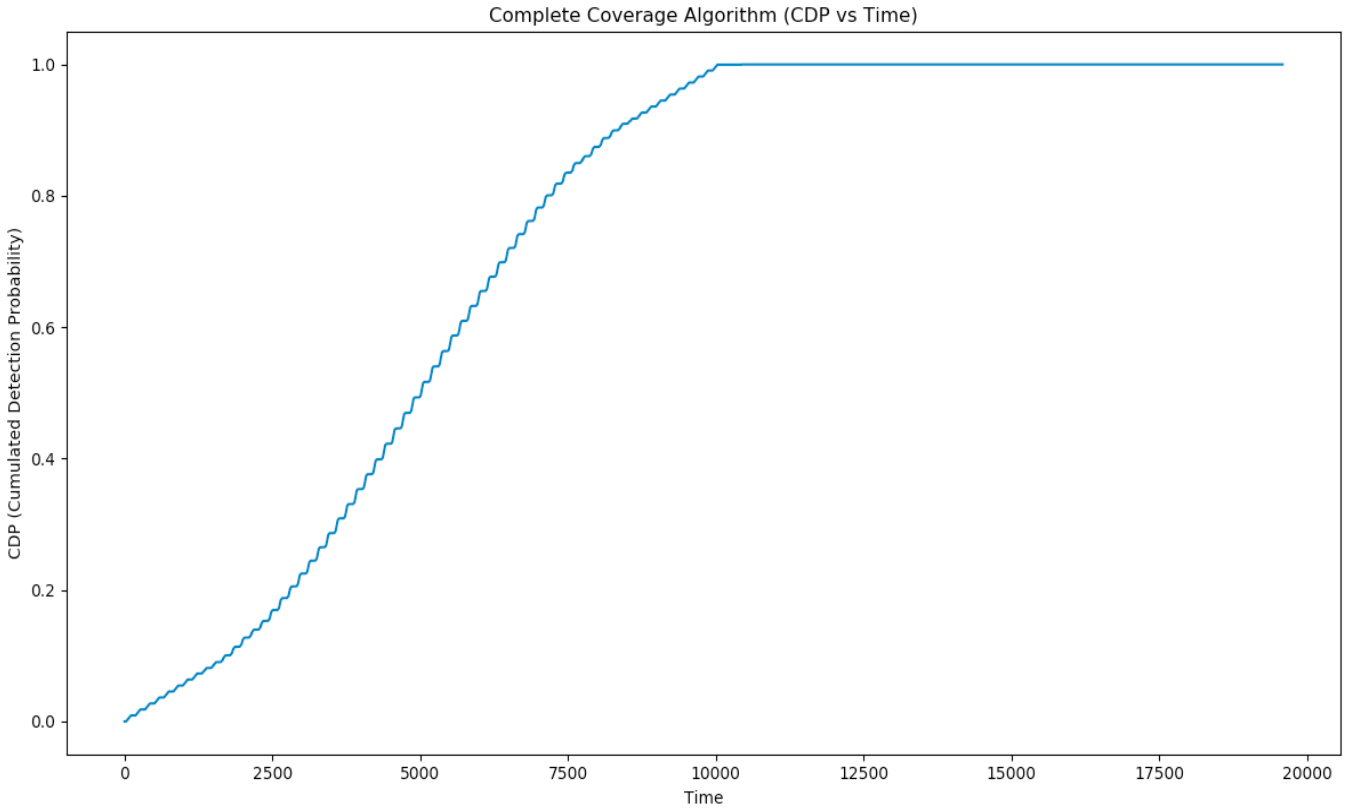
Time	Probability Coverage for Upper Bound	Probability Coverage by Implementation	Efficiency-LB (%)
100	0.00055	0.00012	22.2222
200	0.00111	0.00012	11.1111
300	0.00167	0.00049	29.6296
600	0.00334	0.00136	40.7407
900	0.00557	0.00371	66.6666

```
Cumulative probability coverage values for Upper Bound:
(100, 0.000557620817844)
(200, 0.001115241635688)
(300, 0.001672862453532)
(600, 0.003345724907064)
(900, 0.00557620817844)

Cumulative probability coverage values for my Implementation:
(100, 0.000123915737299)
(200, 0.000123915737299)
(300, 0.000495662949196)
(600, 0.0013630731102890004)
(900, 0.0037174721189700026)

Efficiency-LB calculation for the specified time points:
Time=100 Efficiency-LB=22.2222222223
Time=200 Efficiency-LB=11.1111111111
Time=300 Efficiency-LB=29.6296296297
Time=600 Efficiency-LB=40.7407407409
Time=900 Efficiency-LB=66.6666666668
```



Heatmap 2

1. **CDP vs Time Plot**



2. **Efficiency-LB vs Time Table:**

Time	Probability Coverage for Upper Bound	Probability Coverage by Implementation	Efficiency-LB (%)
100	0.00050	0.00812	1600.0
200	0.00101	0.01049	1033.33
300	0.00152	0.01816	1192.59
600	0.00304	0.03633	1192.59
900	0.00507	0.05360	1055.55

```
Cumulative probability coverage values for Upper Bound:
(100, 0.000507814704057)
(200, 0.001015629408114)
(300, 0.001523444112171)
(600, 0.0030468882243419996)
(900, 0.0050781470405699995)

Cumulative probability coverage values for my Implementation:
(100, 0.008125035264935994)
(200, 0.010494837217208992)
(300, 0.018168481634092987)
(600, 0.036336963268186126)
(900, 0.05360266320617564)

Efficiency-LB calculation for the specified time points:
Time=100 Efficiency-LB=1600.0
Time=200 Efficiency-LB=1033.33333334
Time=300 Efficiency-LB=1192.5925926
Time=600 Efficiency-LB=1192.5925926
Time=900 Efficiency-LB=1055.55555556
```