

Introduction to Artificial Intelligence

Homework 1

Overview

- Given an unknown function and variable ranges, you need to use both **Brute Force** and **Local Beam Search** methods to find the minimal value of the function
 - The function may contain several local minimums and a global minimum
 - Try your best to find the global minimum
- This homework contains two parts
 - Programming problems
 - Report

Programming Problems

- The target function will be unknown
 - Two-variable function $z = f(x, y)$
 - You can only import function to calculate the function value z
- Find the minimum of the function by
 1. Brute Force
 2. Local Beam Search (or stochastic beam search)

Programming Problems

- Input (`input.txt`)
 - 60,60 → x range -60 ~ 60
 - 30,70 → y range -30 ~ 70
- Output (on terminal)
 - Round X and Y to integer, Z to three decimal places
 - 0 → Result X of BF
 - 30 → Result Y of BF
 - 30.010 → Result Z of BF
 - 0 → Result X of LBS
 - 30 → Result Y of LBS
 - 30.010 → Result Z of LBS

Report

1. Describe your implementation of Brute Force method.
2. Describe your implementation of Local Beam Search method.
What do you find or learn while implementing this method ?
3. Compare these two methods by the performance, execution time, etc. What are the pros and cons of them?
4. Other observation, analysis or idea for optimization.

Scoring

1. Programming problems - **50%**
 - 1) Brute Force – **20 %**
 - 2) Local Beam Search – **30%**
2. Report – **50%**
 - 1) Brute force implementation – **5%**
 - 2) Local beam search implementation – **20%**
 - 3) Comparison of the methods – **15%**
 - 4) Other observation or analysis – **10%**

Notice

- Please use **Python 3.7** to do the homework
- DO NOT use the algorithms provided by other packages or modules; you can only use the original modules from Python like `math` and `random` for computing
- Import the unknown function like:

```
from function import func  
z = func(0, 0)
```

Notice

- Write all the code in `main.py`.
- `input.txt` and `function.py` will be changed while grading.
- Do not post your code directly to the report.

Submission

- Due: 10/13 Wed. 23:59
- 0 point for late submission and copying
- Submit the .zip file of the folder below to Moodle

hw1_P76012345/

| – – main.py

| — report_p76012345.pdf

- TA hour:
Tues. & Thurs. 13:30 ~ 16:00 @ 65601 MMCVLAB