+ Code + Text

LAB - 6

```
!pip install mlrose_hiive
```

```
Collecting mlrose_hiive
  Downloading mlrose_hiive-2.2.4.tar.gz (49 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 49.7/49.7 kB 1.6 MB/s eta 0:00:00
  Preparing metadata (setup.py) ... done
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (from mlrose_hiive) (1.26.4)
Requirement already satisfied: scipy in /usr/local/lib/python3.10/dist-packages (from mlrose_hiive) (1.13.1)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.10/dist-packages (from mlrose_hiive) (1.5.2)
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages (from mlrose_hiive) (2.2.2)
Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-packages (from mlrose_hiive) (3.4.2)
Requirement already satisfied: joblib in /usr/local/lib/python3.10/dist-packages (from mlrose_hiive) (1.4.2)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.10/dist-packages (from pandas->mlrose_hiive) (2.8.2
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas->mlrose_hiive) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas->mlrose_hiive) (2024.2)
Requirement already satisfied: threadpoolctl>=3.1.0 in /usr/local/lib/python3.10/dist-packages (from scikit-learn->mlrose_hiive) (3
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.8.2->pandas->mlrose_hii
Building wheels for collected packages: mlrose_hiive
  Building wheel for mlrose_hiive (setup.py) ... done
  Created wheel for mlrose_hiive: filename=mlrose_hiive-2.2.4-py3-none-any.whl size=98335 sha256=b8b9c7063bf9fd0f3dafca4ded08d2df09
  Stored in directory: /root/.cache/pip/wheels/bc/e5/b1/de57d3595365eda00e4c8b37f65601da5c85c6afcf146423eb
Successfully built mlrose_hiive
Installing collected packages: mlrose_hiive
Successfully installed mlrose_hiive-2.2.4
```

CODE:

```
!sed -i 's/from joblib.my_exceptions import WorkerInterrupt/import joblib/' /usr/local/lib/python3.10/dist-packages/mlrose_hiive/runners/
import mlrose_hiive as mlrose
import numpy as np


def queens_max(position):
    no_attack_on_j = 0
    queen_not_attacking = 0
    for i in range(len(position) - 1):
        no_attack_on_j = 0
        for j in range(i + 1, len(position)):
            if (position[i] != position[j]) and (position[i] != position[j] + (j - i)) and (position[i] != position[j] - (j - i)):
                no_attack_on_j += 1
        if no_attack_on_j == len(position) - 1 - i:
            queen_not_attacking += 1
    if queen_not_attacking == 7:
        queen_not_attacking += 1
    return queen_not_attacking

objective = mlrose.CustomFitness(queens_max)

problem = mlrose.DiscreteOpt(length=8, fitness_fn=objective, maximize=True, max_val=8)
T = mlrose.ExpDecay()

initial_position = np.array([4, 6, 1, 5, 2, 0, 3, 7])


best_position, best_objective, _ = mlrose.simulated_annealing(
    problem=problem, schedule=T, max_attempts=500, max_iters=5000, init_state=initial_position
)

print('The best position found is:', best_position)
print('The number of queens that are not attacking each other is:', best_objective)
```

```
The best position found is: [2 0 6 4 7 1 3 5]
The number of queens that are not attacking each other is: 8.0
```