

CECS 451
Assignment 3
Total: 60 Points

General Instruction

- Submit uncompressed file(s) in the Dropbox folder via BeachBoard (Not email).
 - Use Python 3, any other programming language is not acceptable.
 - You can import modules in the Python Standard Library (please check the full list [here](#)). If you want to use any other library, please consult with the instructor or TA.
 - Your submission may be evaluated automatically using a script file, so if you would not follow the output format, you may receive zero point even though your program outputs correct answers.
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1. Implement 5-queens problem solvers using the **hill-climbing algorithm** and the **genetic algorithm**.
 - (a) (30 points) Implement a program that performs the **hill-Climbing algorithm** to find a solution.
 - (b) (30 points) Implement a program that performs the **genetic algorithm** with 8 states including the three operations, i.e., **selection**, **crossover**, **mutation** to find a solution.

Program specification.

- i. You can use `numpy` library.
- ii. Find the `board.py`, and please do not modify it.
- iii. An initial state locates a queen per each row. Please use **an appropriate** and **simple local search** strategy.
- iv. The function `get_fitness` in the `board.py` returns **the number of attacking pairs**. It assumes a queen per each row, which means it checks only **columns** and **diagonals**.
- v. The hill-climbing algorithms can stuck in local minima. Please implement the **random restart procedure** when they stuck.
- vi. Please report **running time** and **a solution**.

Running time: 200ms

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- vii. Submit `hill.py` and `genetic.py`.