Assignment-2 :: Artificial Intelligence

IMPORTANT

- In case you are adding additional files for Q1, make sure to add a README file with necessary instructions for execution. The code(s) will be executed during evaluation. If the reported output does not match with the output produced during evaluation, the score will be deducted. **Make sure that your code does not contain unnecessary comments, similar to a code produced by LLM.**
- Two reports (each for Q1 and Q2, preferably in PDF format) containing the explanations, input used, output, and necessary discussions and screenshots which can support your solution. **Adding unnecessary theory and/or texts just to make it look comprehensive will be strictly penalized.**

*** Plagiarism will not be tolerated. If caught, zero will be awarded.**

Q1 [Coding]. Consider the code of NAS using GA discussed on Nov 10, 2025 : [Link]. Download or Clone the repository on your local machine and modify the code based on the given requirements.

Q1A. In the given code, tournament selection has been used to choose the best fit solutions (chromosomes) for generating next set of population. Modify the selection to Roulette-Wheel selection which will consider the relative fitness score of the chromosomes in a population. Based on the relative fitness score, proportional probability will be assigned to them so that highly fit chromosomes will be selected.
[Hint: Modify the `selection()` function accordingly. You can take some help (don't copy) from this Stackoverflow discussion.]

Q2B. As of now, the fitness function considers model accuracy score, penalized with a fraction of number of total parameters. Come up with a modified fitness function which considers the number of parameters in all convolution blocks and all FC layers. Based on the computational requirements of convolution and FC blocks, assign weights to the number of parameters and add as penalty. Justify the selection of the weights associated with the number of parameters in Conv and FC blocks.
[Hint: Modify the `evaluate_fitness()` function where the fitness score is calculated.]

For more specific instructions regarding submission of Q1, check your assignment post on the LMS.

Q2 [Subjective]. Given a hypothetical situation where a random person (say X) has two particular preferences when it comes to holiday-destination-choices or restaurant-choices. The probability that X sticks to their first preference is 0.75 and the probability that they continue with their second preference is 0.55, and on an average they opt for 2 holidays per year or eat out twice a year. If

we assume that their first preference of holiday-destination or restaurant has a 55% market share of their respective business domains, what would your prediction of their market shares be after 2 years? Your answer must include transition matrices and diagrams to model choice changes.

For more specific instructions regarding submission of Q2, check your assignment post on the LMS.
