

CSCE 689
Machine Learning Based Systems
Homework 1
Due: Sep 24, 2018

Name:

UIN:

1. Install one machine learning library in your machine (either in your personal machine or departmental machine using your account). Answer the following questions:
 - (a) What is the name of your library?
 - (b) Does it support C, C++, Java or Python?
 - (c) Did you encounter any issue installing the library? If so, how did you resolve it?
 - (d) Write a small test program and use at least one function from the library.
 - i. Show the code.
 - ii. Show the compilation commands/steps.
 - iii. Take a screenshot of your output and attach here.

2. Implement an RNN that takes 3 consecutive numbers as inputs and output the next number. For example, if it takes 1, 2, 3 as inputs, it will output 4. Similarly, if the inputs are 20, 21, 22, the output will be 23.
- (a) How many sequences did you use to train your RNN?
 - (b) What is the configuration of your RNN?
 - (c) How many sequences did you use to test your RNN?
 - (d) What is the accuracy of your RNN.
 - (e) Show your code.

3. I have an equation $z = x^2 + e^{y/5} + 100 \times \log_2 x - 1/xy - x$. I like to find the values of x and y for which z will be closet to 100 and -5. Assume $1 < x, y < 10$. Use genetic algorithm to solve this problem.
- (a) What is your fitness function?
 - (b) What is the initial population size?
 - (c) How do you apply mutation and crossover?
 - (d) What are the values of x and y for z to be closet to 100? How many iterations did you need?
 - (e) What are the values of x and y for z to be closet to -5? How many iterations did you need?
 - (f) Show your code.

4. How can you improve the effectiveness of mutation and crossover process in genetic algorithm? Mention at least 1 idea for each.
5. Can you think of a way to incorporate self loop (such as in RNN) in CNN? What would be an ideal use case for that? Show the diagram and explain how it will work.