

Intro to deep learning

Assignment 1

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[https://colab.research.google.com/drive/
1VWq3g7QP16C5NmC7rtTSdwkC7CX7zsLn?
usp=sharing](https://colab.research.google.com/drive/1VWq3g7QP16C5NmC7rtTSdwkC7CX7zsLn?usp=sharing)

Intro To Deep Learning Homework 1 Jordan Diaz

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Problem 1: Simple Calculator: In Python, implement a simple calculator that does the following operations:

- *summation*
- *subtraction*
- *multiplication*
- *division*
- *mod*
- *power*
- *exp*
- *natural log*
- *abs*

```
import math

def isfloat(num):
    try:
        float(num)
        return True
    except ValueError:
        return False

def isInt(num):
    try:
        int(num)
        return True
    except ValueError:
        return False

while True:

    first_num = input("Enter the first number: ")

    if first_num == 'x':
        break
    elif isfloat(first_num) or isInt(first_num):
        first_num = float(first_num)
    else:
        print("Improper Input, please try again")

    op = input("Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs'] \n")
```

```
if op == '+':
    second_num = input("Enter the second number: ")

    if first_num == 'x':
        break
    elif isfloat(second_num) or isInt(second_num):
        second_num = float(second_num)
    else:
        print("Improper Input, please try again")

    print(first_num, " + ", second_num, " = ", first_num + second_num)

elif op == '-':
    second_num = input("Enter the second number: ")

    if first_num == 'x':
        break
    elif isfloat(second_num) or isInt(second_num):
        second_num = float(second_num)
    else:
        print("Improper Input, please try again")

    print(first_num, " - ", second_num, " = ", first_num - second_num)

elif op == '/':
    second_num = input("Enter the second number: ")

    if first_num == 'x':
        break
    elif isfloat(second_num) or isInt(second_num):
        second_num = float(second_num)
    else:
        print("Improper Input, please try again")

    if second_num != 0:
        print(first_num, " / ", second_num, " = ", first_num / second_num)
    else:
        print("Cannot divide by Zero, Try again")

elif op == '*':
    second_num = input("Enter the second number: ")

    if first_num == 'x':
        break
    elif isfloat(second_num) or isInt(second_num):
        second_num = float(second_num)
    else:
        print("Improper Input, please try again")

    print(first_num, " * ", second_num, " = ", first_num * second_num)
```

```

elif op == '%':
    second_num = input("Enter the second number: ")

    if first_num == 'x':
        break
    elif isfloat(second_num) or isInt(second_num):
        second_num = float(second_num)
    else:
        print("Improper Input, please try again")

    print(first_num, " % ", second_num, " = ", first_num % second_num)

elif op == '^':
    second_num = input("Enter the second number: ")

    if first_num == 'x':
        break
    elif isfloat(second_num) or isInt(second_num):
        second_num = float(second_num)
    else:
        print("Improper Input, please try again")

    print(first_num, " ^ ", second_num, " = ", first_num ** second_num)

elif op == 'exp':
    print("exp of ", first_num, " = ", math.exp(first_num))

elif op == 'log':
    print("log of ", first_num, " = ", math.log(first_num))

elif op == 'abs':
    print("abs of ", first_num, " = ", math.fabs(first_num))
elif op == 'x':
    break
else:
    print("Improper Input, please try again")

```

```

☞ Enter the first number: 2
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
+
Enter the second number: 3
2.0 + 3.0 = 5.0
Enter the first number: 2
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
-
Enter the second number: 3
2.0 - 3.0 = -1.0
Enter the first number: 3
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
/
Enter the second number: 3
3.0 / 3.0 = 1.0
Enter the first number: 5

```

```

Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
*
Enter the second number: -1
5.0 * -1.0 = -5.0
Enter the first number: 10
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
%
Enter the second number: 5
10.0 % 5.0 = 0.0
Enter the first number: 20
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
^
Enter the second number: 3
20.0 ^ 3.0 = 8000.0
Enter the first number: 25
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
exp
exp of 25.0 = 72004899337.38588
Enter the first number: 23
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
log
log of 23.0 = 3.1354942159291497
Enter the first number: -300
Enter the operation: ['+', '-', '/', '*', '%', '^', 'exp', 'log', 'abs']
abs
abs of -300.0 = 300.0
Enter the first number: x

```

Problem 2: Threshold-based Classifier – We have a two-class classification problem (i.e., C1 and C2). Each data sample is represented by two attributes (x, y). The three data samples in class C1 are {(1, 1), (3, 2), (2, 3)} and {(1, 2), (2, 2), (2, 1)} in class C2. Perform the followings in Python:

-
- Plot the data samples. The data points in classes C1 and C2 must be in two different colors and shapes. Label the axes and add legends as appropriate.
 - The code asks the user to enter two thresholds th_x and th_y .
 - Your code calculates and prints the classification accuracy based on the user-entered thresholds. To do so, assume that for any data point (x, y) with $x > th_x$ and $y > th_y$, the data sample belongs to class C1, and C2 if otherwise. Using this rule and the user-entered thresholds, the code calculates the classification accuracy for the six data samples. The classification accuracy is defined as the number of correctly classified data points over the total number of data points (6 in here).
 - Use a for loop to repeat part c for a total of three times and enter different sets of thresholds each time.
 - Based on your observation from the results above, report a suitable set of thresholds that will give the highest possible accuracy. Report your suggested thresholds and the corresponding classification accuracy.

```
import matplotlib.pyplot as plt

c1x = [1, 3, 2]
c1y = [1, 2, 3]

plt.scatter(c1x, c1y, label="Class 1", marker="s")

c2x = [1, 2, 2]
c2y = [2, 2, 1]

plt.scatter(c2x, c2y, label="Class 2")

plt.title("Problem 2")
plt.xlabel("X Axis")
plt.ylabel("Y Axis")
plt.legend()
plt.show()

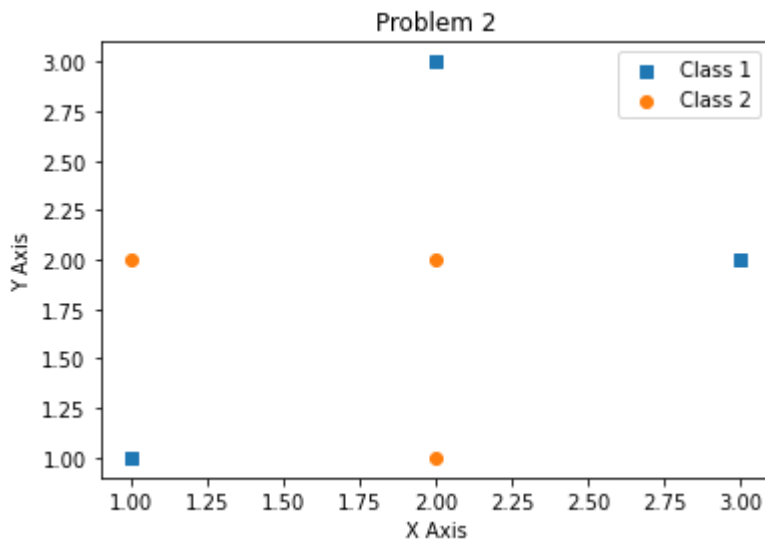
for i in range(0, 3):

    thx = float(input("Please enter threshold x: "))
    thy = float(input("please enter threshold y: "))

    # In this problem assume that for any data point if x > thx and y > thy the data sample b
    c1 = (1, 1), (3, 2), (2, 3)
    c2 = (1, 2), (2, 2), (2, 1)
    points = (1, 1), (3, 2), (2, 3), (1, 2), (2, 2), (2, 1)
    correct = 0

    for xy in points:
        if xy[0] > thx and xy[1] > thy and xy in c1:
            correct += 1
        elif xy[0] <= thx and xy[1] <= thy and xy in c2:
            correct += 1

    print("The Classification Accuracy is: ", correct / len(points))
```



Please enter threshold x: 0
please enter threshold y: 0
The Classification Accuracy is: 0.5
Please enter threshold x: 5
please enter threshold y: 5
The Classification Accuracy is: 0.5
Please enter threshold x: -5
please enter threshold y: -5
The Classification Accuracy is: 0.5

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