A close-up of a white background

Description automatically generated

def divided\_difference(x, y): n = len(y)

coef = np.zeros((n, n)) coef[:, 0] = y

for j in range(1, n):

for i in range(n - j):

coef[i][j] = (coef[i + 1][j - 1] - coef[i][j - 1]) / (x[i + j]

- x[i])

return coef[0]

def newton\_interpolation(x, y, value): coef =

1

for i in range(1, n):

product\_term \*= (value - x[i - 1]) result += coef[i] \* product\_term

return result

x\_data = [300, 310, 320, 330, 340] # x values

y\_data = [45, 50, 65, 70, 75] # corresponding y values

x\_value = 301

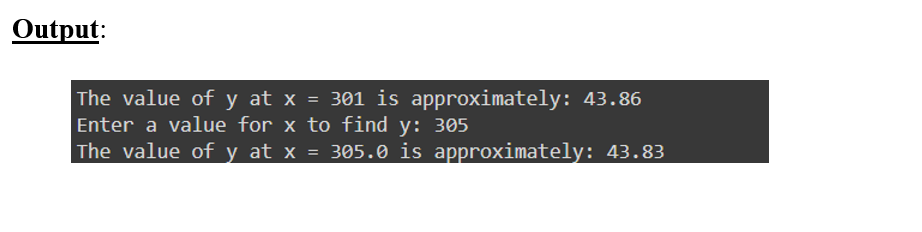
y\_at\_301 = newton\_interpolation(x\_data, y\_data, x\_value)

print(f"The value of y at x = {x\_value} is approximately: {y\_at\_301:.2f}")

# b. Find the value of y at user input

user\_input = float(input("Enter a value for x to find y: ")) y\_at\_user\_input = newton\_interpolation(x\_data, y\_data, user\_input) print(f"The value of y at x = {user\_input} is approximately:

{y\_at\_user\_input:.2f}")



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Description automatically generated

path = kagglehub.dataset\_download("ravitejakotharu/salary-datacsv") print("Path to dataset files:", path)

data = pd.read\_csv(path + '/salary\_data.csv')' x = data['YearsExperience'].values

y = data['Salary'].values n = len(x)

difference\_table = np.zeros((n, n)) difference\_table[:, 0] = y

for j in range(1, n):

for i in range(n - j):

difference\_table[i][j] = difference\_table[i + 1][j - 1] - difference\_table[i][j - 1]

return difference\_table

def newton\_interpolation(x, y, xp): n = len(x)

diff\_table = newton\_difference\_table(x, y) h = x[1] - x[0]

result = diff\_table[0, 0] u = (xp - x[0]) / h

for i in range(1, n): u\_term

j)

result += (u\_term \* diff\_table[0, i]) / np.math.factorial(i) return result

years\_of\_experience = float(input("Enter the years of experience: ")) predicted\_salary = newton\_interpolation(x, y, years\_of\_experience) print(f"Predicted Salary for {years\_of\_experience} years of experience:

{predicted\_salary}")

