

UTS KECERDASAN BUATAN

PART II



Dibuat oleh :

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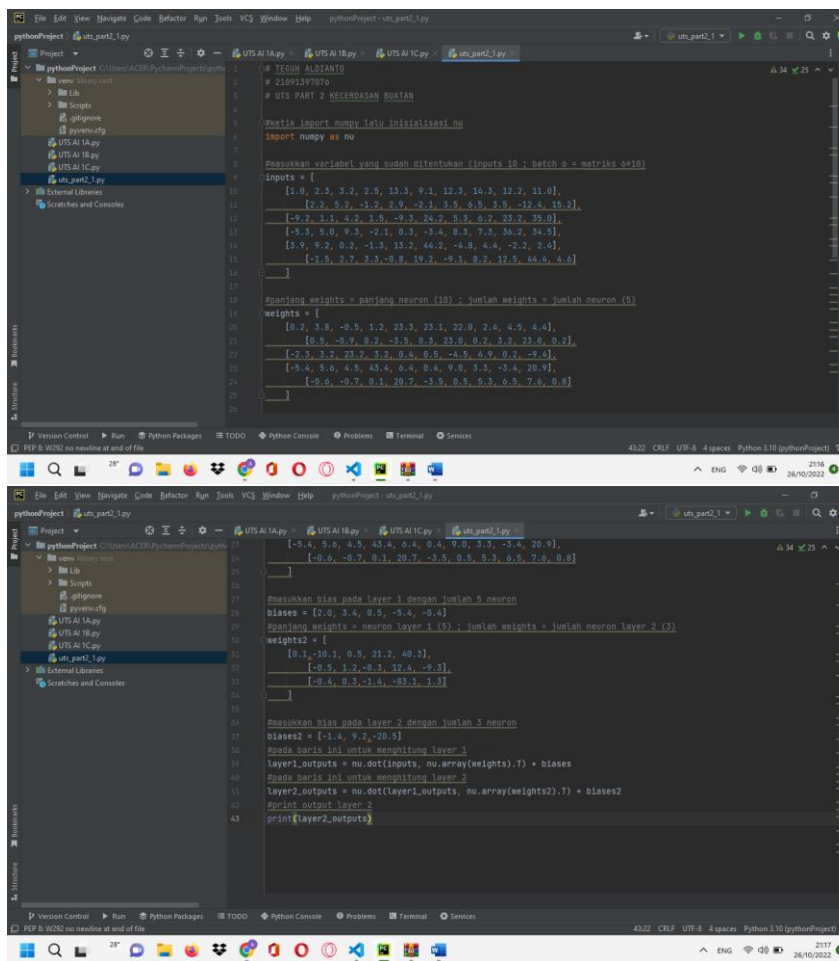
PRODI D4 MANAJEMEN INFORMATIKA

FAKULTAS VOKASI

UNIVERSITAS NEGERI SURABAYA

2022

Source code



```
# TEGUH ALDIANTO
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# UTS PART 2 KECERDASAN BUATAN

#Matrik import numpy lalu inialisasi nu
import numpy as nu

#masukkan variabel yang sudah ditentukan (inputs 10 ; batch a = matriks 6x10)
inputs = [
    [1.0, 2.3, 3.2, 2.5, 13.3, 9.1, 12.3, 14.3, 12.2, 11.0],
    [2.2, 5.2, -1.2, 2.9, -2.1, 3.5, 0.5, 3.5, -12.4, 15.2],
    [-9.2, 1.1, 4.2, 1.5, -7.3, 24.2, 5.5, 6.2, 23.2, 35.0],
    [-5.2, 3.0, 9.3, -2.0, 0.3, -2.4, 8.2, 7.3, 34.2, 34.5],
    [5.9, 9.2, 0.2, -1.3, 12.2, 44.2, -4.8, 4.4, -2.2, 2.4],
    [-1.5, 2.7, 3.3, -9.8, 19.2, -9.1, 8.2, 12.5, 44.4, 4.0]
]

#panjang weights = panjang neuron (10) ; jumlah weights = jumlah neuron (5)
weights = [
    [0.2, 3.8, -0.5, 1.2, 23.5, 23.1, 22.0, 2.4, 4.5, 4.4],
    [0.5, -0.9, 8.2, -3.5, 0.3, 21.0, 0.2, 3.2, 21.0, 0.2],
    [-2.3, 3.2, 23.2, 3.2, 0.4, 0.5, -4.5, 4.9, 0.2, -9.4],
    [-5.4, 5.4, 4.5, 43.4, 0.4, 0.4, 9.0, 3.3, -5.4, 20.9],
    [-0.6, -0.7, 0.1, 20.7, -3.5, 0.5, 5.3, 0.5, 7.6, 0.8]
]

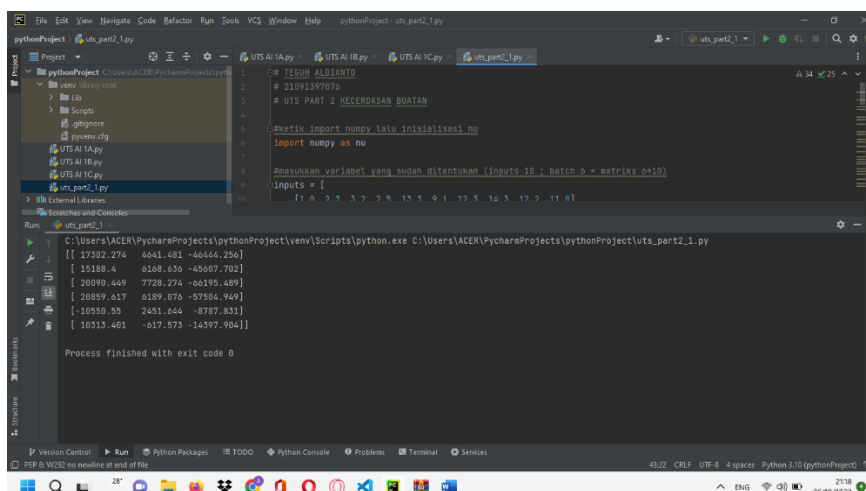
#masukkan bias pada layer 1 dengan jumlah 5 neuron
biases = [2.0, 3.4, 0.5, -5.4, -0.4]

#panjang weights = neuron layer 1 (5) ; jumlah weights = jumlah neuron layer 2 (3)
weights2 = [
    [0.1, 10.1, 0.5, 21.2, 40.3],
    [-0.5, 3.2, -0.3, 12.4, -9.3],
    [-0.4, 0.3, -1.4, -43.1, 1.3]
]

#masukkan bias pada layer 2 dengan jumlah 3 neuron
biases2 = [-1.4, 9.2, -20.5]

#pada baris ini untuk menghitung layer 1
layer1_outputs = nu.dot(inputs, nu.array(weights).T) + biases
#pada baris ini untuk menghitung layer 2
layer2_outputs = nu.dot(layer1_outputs, nu.array(weights2).T) + biases2
#print output layer 2
print(layer2_outputs)
```

Output :



```
[[ 29382.274  4441.481 -40464.260]
 [ 15188.4   6108.030 -45007.702]
 [ 20980.449  7728.274 -60195.489]
 [ 20859.617  6189.070 -57504.949]
 [-10550.55   2451.664 -8787.831]
 [ 10313.401 -617.573 -14397.964]]

Process finished with exit code 0
```

Penjelasan :

- mengimport numpy sebagai library dan memberi inisial **nu**
- memasukkan variable untuk inputs, weights, dan biases dengan soal
$$\left. \begin{array}{l} \text{inputs} = 10 \\ \text{batch} = 6 \end{array} \right\} \text{inputs menjadi matrix } 6 \times 10$$

weights 1 = 5×10

weights 2 = 3×5

biases 1 = 5

biases 2 = 3

- buatlah output menghitung variable yang sudah kita masukkan/buat **nu.dot** untuk menghitung vector weights dan inputs kemudian hasil dari hitungan vector ditambah dengan biases
- untuk output yang diinginkan adalah output layer2 yang berasal dari hasil perhitungan layer 1 lalu dihitung lagi dengan weights2 dan biases2
- buatlah command print untuk menampilkan hasil perhitungan output

perhatikan layer 1

Perhitungan dot product

Weights 10×5

0.2	3.8	-0.5	1.2	23.3	23.1	22.0	2.4	4.5	4.4
0.5	-0.9	0.2	-3.5	0.3	23.0	0.2	3.2	23.0	0.2
-2.3	3.2	23.2	3.2	0.4	0.5	-4.5	4.9	0.2	-9.4
-5.4	5.6	4.5	43.4	6.4	0.4	9.0	3.3	-3.4	20.9
-0.6	-0.7	0.1	20.7	-3.5	0.5	5.3	6.5	7.6	0.8

\times

Inputs 6×10

1.0	2.3	3.2	2.5	13.3	9.1	12.3	14.3	12.2	11.0
2.2	5.2	-1.2	2.9	-2.1	3.5	6.5	3.5	-12.4	15.2
-9.2	1.1	4.2	1.5	-9.3	24.2	5.3	6.2	23.2	35.0
-5.3	5.0	9.3	-2.1	0.3	-3.4	8.3	7.3	36.2	34.5
3.9	9.2	0.2	-1.3	13.2	44.2	-4.8	4.4	-2.2	2.4
-1.5	2.7	3.3	-0.8	19.2	-9.1	8.2	12.5	44.4	4.6

Weights*Inputs

938.66	534.63	10.93	565.45	267.52
218.68	-203.76	-163.53	555.55	39.17
734.25	1105.31	-182.53	810.78	353.58
454.04	788.47	-82.99	704.65	348.55
1268.28	981.82	68.49	106.06	-71.41
674.94	860.5	79.21	182.82	376.86

nn.dot + biases

$$\begin{bmatrix} 938.66, 534.63, 10.93, 565.45, 267.52 \\ 218.68, -203.76, -163.53, 555.55, 39.17 \\ 734.25, 1105.31, -182.53, 810.78, 353.58 \\ 454.04, 788.47, -82.99, 704.65, 348.55 \\ 1268.28, 981.82, 68.49, 106.06, -71.41 \\ 674.94, 860.5, 79.21, 182.82, 376.86 \end{bmatrix} + [2.0, 3.4, 0.5, -5.4, -0.4]$$

$$= \begin{bmatrix} 940.66, 538.03, 11.43, 560.05, 267.12 \\ 220.68, -200.36, -163.03, 550.15, 38.77 \\ 736.25, 1108.71, -182.03, 805.38, 353.18 \\ 456.04, 791.87, -82.49, 699.25, 348.15 \\ 1270.28, 985.22, 68.99, 100.66, -71.81 \\ 676.94, 863.9, 79.71, 177.42, 376.46 \end{bmatrix}$$

Perhitungan layer 2

Perhitungan dot product

Weights 3*5

$$\begin{bmatrix} 0.1, -10.1, 0.5, 21.2, 40.3 \\ -0.5, 1.2, -0.3, 12.4, -9.3 \\ -0.4, 0.3, -1.4, -83.1, 1.3 \end{bmatrix}$$

×

Output layer 1
5*6

$$\begin{bmatrix} 940.66, 538.03, 11.43, 560.05, 267.12 \\ 220.68, -200.36, -163.03, 550.15, 38.77 \\ 736.25, 1108.71, -182.03, 805.38, 353.18 \\ 456.04, 791.87, -82.49, 699.25, 348.15 \\ 1270.28, 985.22, 68.99, 100.66, -71.81 \\ 676.94, 863.9, 79.71, 177.42, 376.46 \end{bmatrix}$$

Weights 2 * output layer 1

$$\begin{bmatrix} 17303.674, 4632.281, -46423.756 \\ 15189.8, 6159.436, -45587.202 \\ 20091.849, 7719.074, -66174.989 \\ 20861.017, 6179.876, -57484.449 \\ -10549.15, 2442.444, -8767.331 \\ 10314.801, -626.773, -14377.404 \end{bmatrix}$$

nn.dot + biases 2

$$\begin{bmatrix} 17303.674, & 4632.281, & -46423.756 \\ 15189.8, & 6159.436, & -45587.202 \\ 20091.849, & 7719.074, & -66174.989 \\ 20861.017, & 6179.876, & -57484.449 \\ -10549.15, & 2442.444, & -8767.331 \\ 10314.801, & -626.773, & -14377.404 \end{bmatrix} + [-1.4, 9.2, -20.5]$$

=

$$\begin{bmatrix} 17302.274, & 4641.481, & -46444.256 \\ 15188.4, & 6168.636, & -45607.702 \\ 20090.449, & 7728.274, & -66195.489 \\ 20859.617, & 6189.076, & -57504.949 \\ -10550.55, & 2451.644, & -8787.831 \\ 10313.401, & -617.573, & -14397.904 \end{bmatrix}$$