

TUGAS 7
JARINGAN SARAF TIRUAN



OLEH :

NAMA : INDAH PUSPITA SARI

NIM : 192452

KELAS : 5TJST – F

UNIVERSITAS DIPA MAKASSAR
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```
import numpy as np
import matplotlib.pyplot as plt

NUM_FEATURES = 2
NUM_ITER = 100
learning_rate = 0.1

x = np.array([[0,0],[0,1],[1,0],[1,1]], np.float32)
y = np.array([0,0,0,1], np.float32)

# initial weight & bias
w = np.zeros(NUM_FEATURES, np.float32)
b = np.zeros(1, np.float32)

[ ] for i in range(NUM_ITER):
    y_pred = np.dot(x, w) + b

    # apply activation
    y_pred[y_pred > 0] = 1
    y_pred[y_pred <= 0] = 0

    # calculate error
    err = y - y_pred
    delta_w = learning_rate * np.dot(np.transpose(x), err)
    delta_b = learning_rate * np.sum(err)
    w = w + delta_w
    b = b + delta_b
    print("Iterasi ke-" + str(i) + ", err = " + str(np.sum(err)) + ", b = " + str(b))
```

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```
delta_b = learning_rate * np.sum(err)
w = w + delta_w
b = b + delta_b
print("Iterasi ke-" + str(i), err, w, b, "Error : " + str(np.abs(np.sum(err)) / np.sum(y)))
if (np.abs(np.sum(err)) / np.sum(y)) <= 0.1:
    break

Literasi ke-0 [0. 0. 0. 1.] [0.1 0.1] [0.1] Error :1.0
Literasi ke-1 [-1. -1. -1.  0.] [0. 0.] [-0.20000002] Error :3.0
Literasi ke-2 [0. 0. 0. 1.] [0.1 0.1] [-0.10000002] Error :1.0
Literasi ke-3 [0. 0. 0. 0.] [0.1 0.1] [-0.10000002] Error :0.0

# test
x_test = [[0,0],[0,1],[1,0],[1,1]]

for x_test_item in x_test:
    y_test = np.dot(x_test_item, w) + b
    y_test = 1 if y_test > 0 else 0
    print(str(x_test_item[0]) + ' AND ' + str(x_test_item[1]) + ' = ' + str(y_test))

0 AND 0 = 0
0 AND 1 = 0
1 AND 0 = 0
1 AND 1 = 1

# plot linery separable class (logic AND)
plot_x = np.array([np.min(x[:, 0] - 0.2), np.max(x[:, 1]+0.2)])

plot_y = - 1 / w[1] + (w[0] + plot_x + b)
```



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```
# plot linearly separable class (logic AND)
plot_x = np.array([np.min(x[:, 0] - 0.2), np.max(x[:, 1]+0.2)])

plot_y = - 1 / w[1] + (w[0] + plot_x + b)

print('w: ' + str(w))
print('b: ' + str(b))
print('plot_y: ' + str(plot_y))

plt.scatter(x[:, 0], x[:, 1], c=y, s=100, cmap='viridis')
plt.plot(plot_x, plot_y, color='k', linewidth=2)
plt.xlim([-0.2, 1.2]); plt.ylim([-0.2, 1.25]);
plt.show()
```

```
w:[0.1 0.1]
b:[-0.10000002]
plot_y:[-10.2 -8.8]
```

