

# neuralnet

March 26, 2025

```
[3]: from scripts import clean_data
import pandas as pd
import numpy as np
from sklearn.neural_network import MLPClassifier
from sklearn.model_selection import train_test_split
```

```
[4]: df = pd.read_csv("./Data/clean_data.csv")
X = df
T = pd.read_csv("./Data/cleaned_data_combined_modified.csv")["Label"]
```

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[5]: X_train, X_test, T_train, T_test = train_test_split(X, T, test_size=0.2,
    ↪random_state=42)
X_train, X_valid, T_train, T_valid = train_test_split(X_train, T_train,
    ↪test_size=0.2, random_state=42)
X_train = X_train.filter(regex='^(?!movie_).*', axis=1)
X_train = X_train.filter(regex='^(?!drink_).*', axis=1)
X_test = X_test.filter(regex='^(?!movie_).*', axis=1)
X_test = X_test.filter(regex='^(?!drink_).*', axis=1)
X_valid = X_valid.filter(regex='^(?!movie_).*', axis=1)
X_valid = X_valid.filter(regex='^(?!drink_).*', axis=1)
print(X_train)
```

	Teachers	Strangers	Friends	Family	Siblings	price	num_ingredients	\
1206	0	1	1	0	0	6		7
1001	0	0	1	0	1	9		12
54	1	0	1	0	1	5		5
1002	1	0	1	0	0	5		9
872	0	0	0	0	0	4		4
...	...	...	...	...	...	...		...
219	1	0	1	0	0	10		7
1371	0	0	0	0	0	20		5
1515	0	0	1	0	1	15		6
1417	0	0	1	0	1	15		3
1408	1	0	0	0	0	10		10

	complexity	Week day dinner	Week Day lunch	Weekend lunch	\
1206	2	0	0	1	
1001	3	1	0	1	

54	4	1	0	0
1002	3	1	0	0
872	4	0	0	0
...	...	...	...	...
219	3	0	0	0
1371	5	0	0	1
1515	4	1	0	1
1417	5	1	0	1
1408	1	0	0	1

	Late night snack	Weekend dinner	At a party	medium	hot	None	mild
1206	0	0	1	1	0	0	0
1001	1	1	1	0	0	0	0
54	1	0	1	0	0	0	1
1002	1	1	1	0	0	0	1
872	1	0	1	0	0	0	1
...	...	...	...	...	...	...	...
219	1	1	1	0	0	0	1
1371	0	1	0	0	0	0	0
1515	0	1	1	0	0	0	0
1417	0	1	1	0	0	0	0
1408	0	0	1	0	1	0	0

[1052 rows x 18 columns]

```
[6]: def calculate_accuracy(i, j):
      clf = MLPClassifier(hidden_layer_sizes=(i, j), activation='relu',
      ↪ solver='adam', max_iter=1000, random_state=1)
      clf.fit(X_train, T_train)
      return clf.score(X_valid, T_valid)
```

```
[11]: hidden_layer_one = range(18, 26)
      hidden_layer_two = range(9, 17)
      import matplotlib.pyplot as plt
      from mpl_toolkits.mplot3d import Axes3D

      X, Y = np.meshgrid(hidden_layer_one, hidden_layer_two)
      Z = np.zeros((8, 8))
      for i in range(8):
          for j in range(8):
              Z[i][j] = calculate_accuracy(hidden_layer_one[i], hidden_layer_two[j])
```

```
[14]: fig = plt.figure(figsize=(10, 7))
      ax = fig.add_subplot(111, projection='3d')
      # Surface plot
      ax.plot_surface(X, Y, Z, cmap='viridis', edgecolor='k')
```

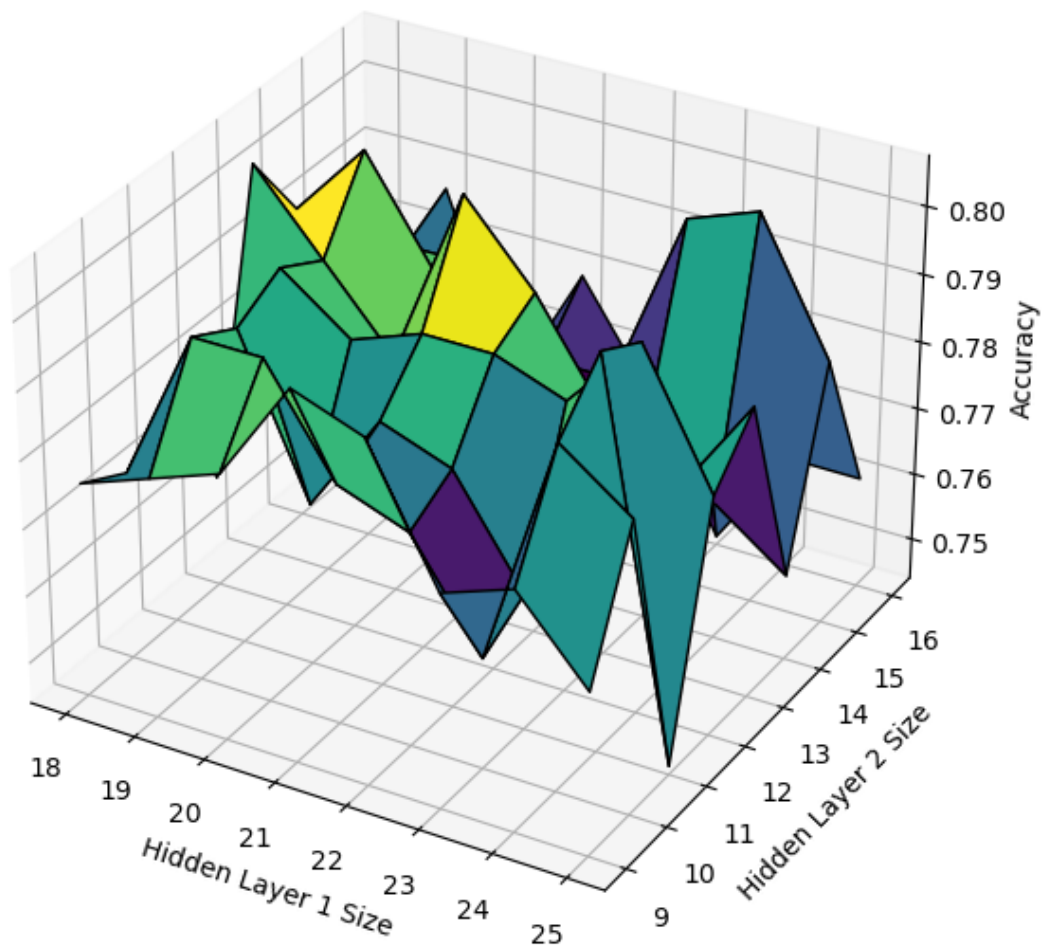
```

# Labels
ax.set_xlabel('Hidden Layer 1 Size')
ax.set_ylabel('Hidden Layer 2 Size')
ax.set_zlabel('Accuracy')
ax.set_title('Neural Network Accuracy vs Hidden Layer Sizes')

plt.show()

```

Neural Network Accuracy vs Hidden Layer Sizes



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