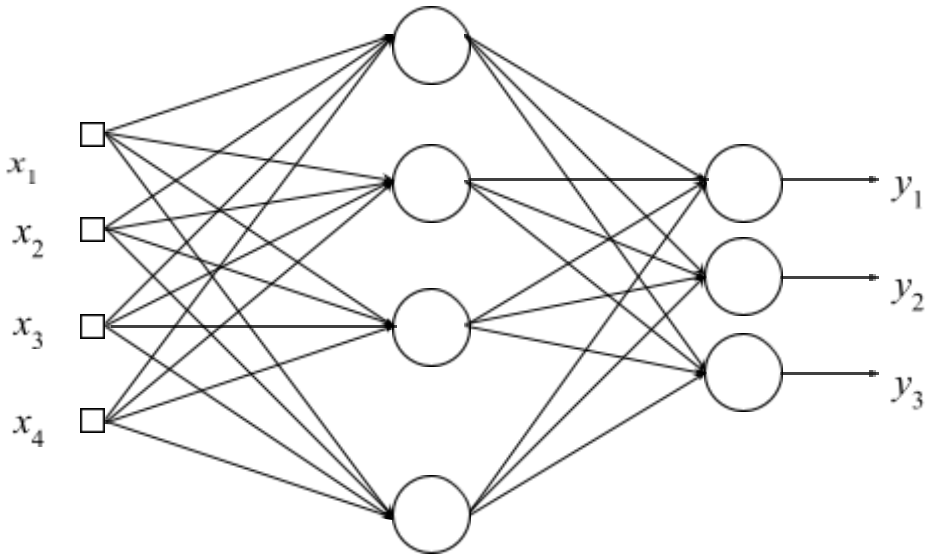
EXERCÍCIO MLPClassifier - BEBIDAS:

Implementar a solução e responder as questões e forma de relatório. Utilizar Python no Google Colab para a resolução. Deve-se apresentar o código em anexo.

Descrição do Problema:

No processamento de bebidas, a aplicação de um determinado conservante é efetuada em função da combinação de 04 variáveis reais, definidas por x_1 (teor de água), x_2 (grau de acidez), x_3 (temperatura) e x_4 (tensão superficial). Sabe-se que existem apenas três tipos de conservantes que podem ser aplicados, os quais são categorizados por tipo A, B e C. A partir destas variáveis, realizam-se ensaios em laboratório para especificar que tipo de conservante deve ser aplicado em determinada bebida.

Por intermédio de 148 desses ensaios experimentais, a equipe de engenheiros e cientistas resolveu aplicar uma rede perceptron multicamadas como classificadora de padrões, a fim de que esta identifique qual conservante será aplicado em determinado lote de bebida. Por questões operacionais da própria linha de produção, utilizar-se-á aqui uma rede perceptron com três saídas, conforme apresentado na figura abaixo.



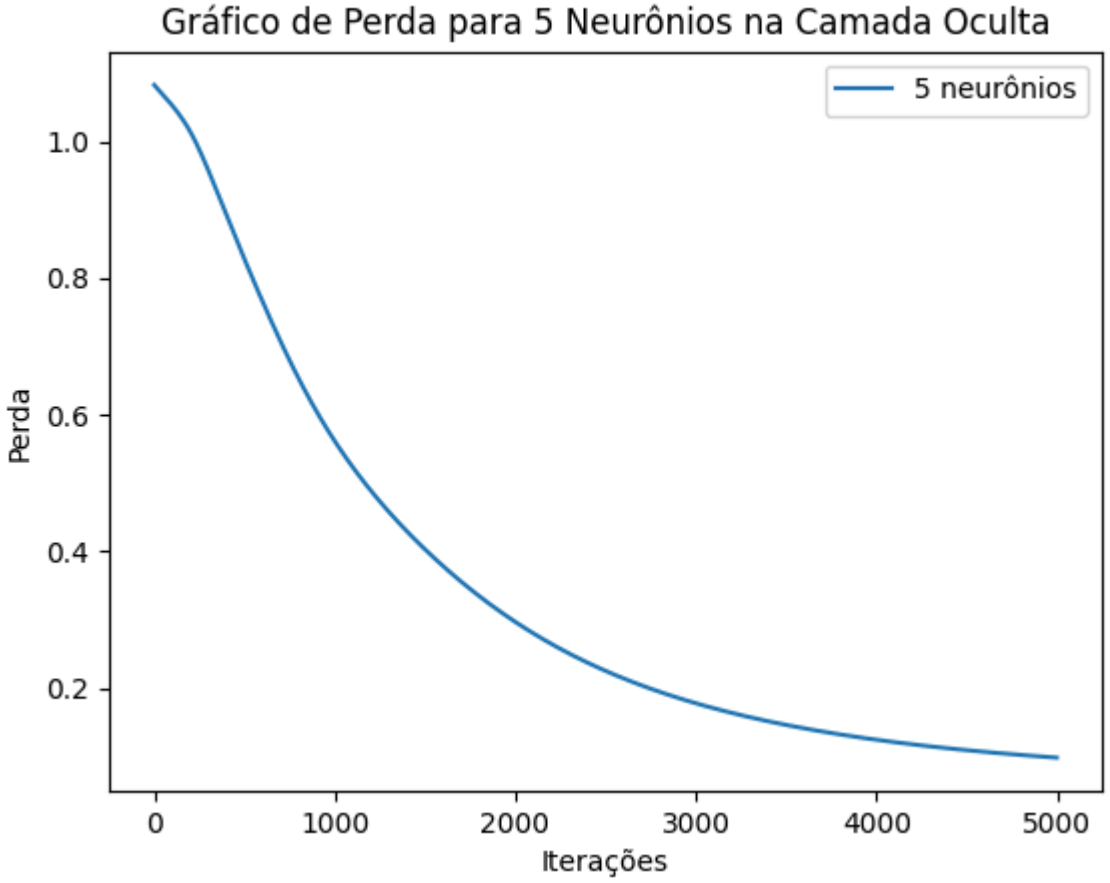
A padronização para a saída, representando o conservante a ser aplicado, ficou definida da seguinte forma:

Tipo de Conservante	y_1	y_2	y_3
Tipo A	1	0	0
Tipo B	0	1	0
Tipo C	0	0	1

Utilizando os dados de treinamento apresentados no Anexo, execute o treinamento de uma rede perceptron multicamadas (04 entradas, variação dos neurônios da camada oculta e 03 saídas) que possa classificar, em função apenas dos valores medidos de x_1, x_2, x_3 e x_4 (já normalizados), qual

o tipo de conservante que deverá ser aplicado em determinada bebida. Para tanto, faça as seguintes atividades:

1. Execute três treinamentos da rede perceptron multicamadas ilustrada na Figura 1, por meio do do MLPClassifier do Sklearn Python variando o número de neurônios na camada oculta com 5, 10 e 15. Utilize a função de ativação logística para todos os neurônios, taxa de aprendizagem = 0.001, precisão (épsilon) $\varepsilon = 10^{-6}$ e máximo de épocas igual a 5000. Os demais parâmetros podem considerar o default. Qual configuração apresentou o melhor desempenho? Para cada configuração de treinamento, apresente o gráfico de perda (loss).



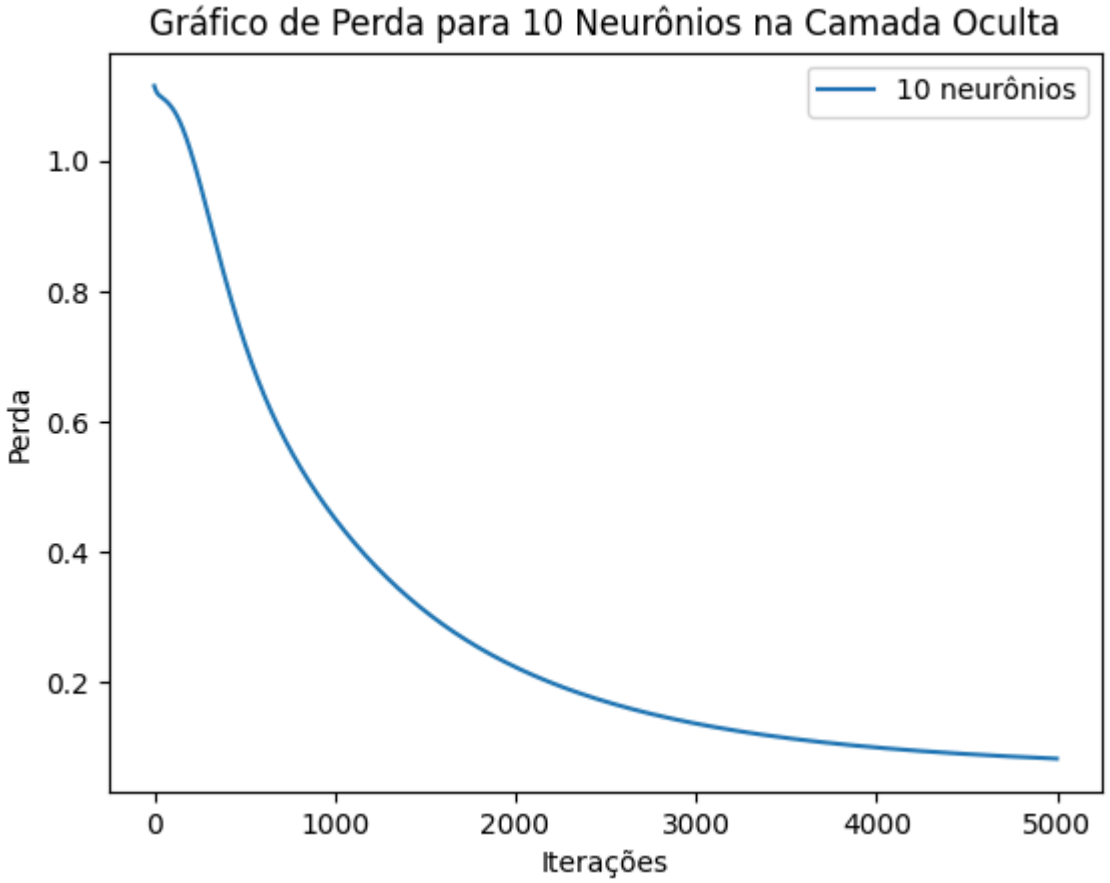


Gráfico de Perda para 10 Neurônios na Camada Oculta
10 neurônios
Perda
1.0
0.8
0.6
0.4
0.2
0
1000
2000
3000
4000
5000
Iterações

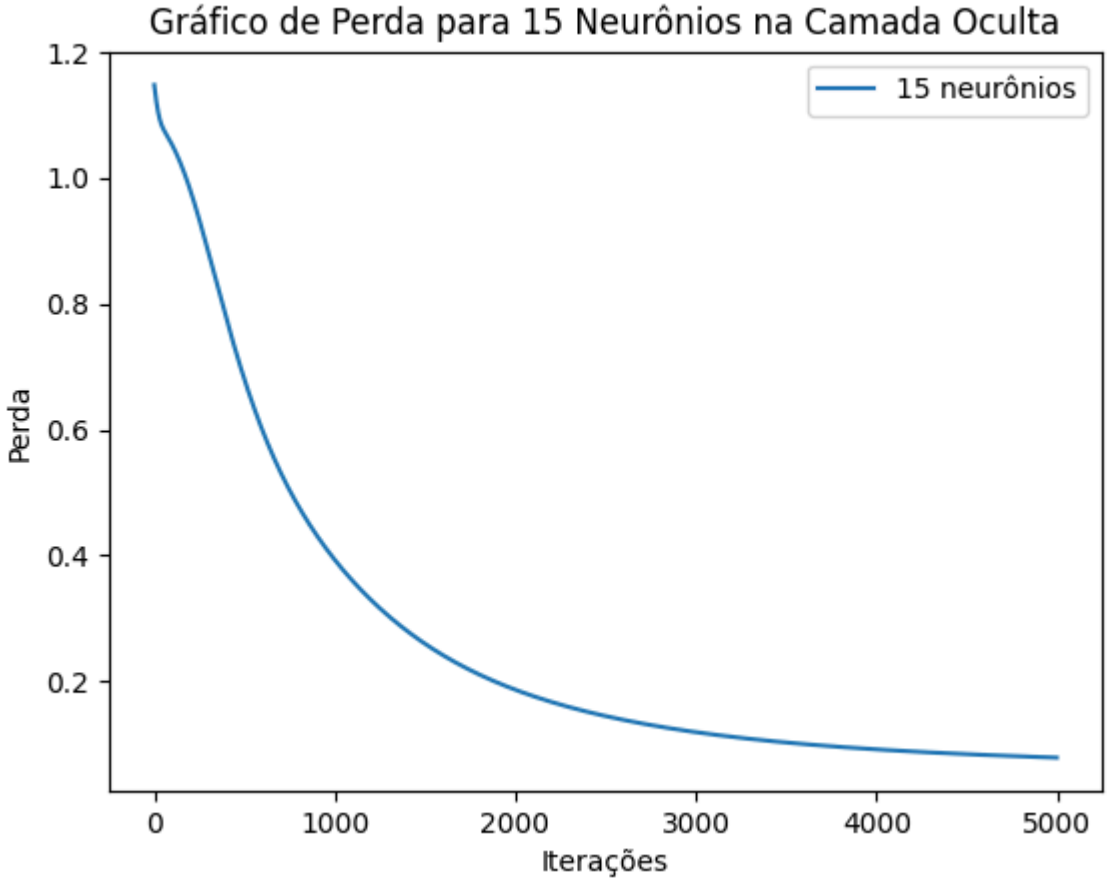
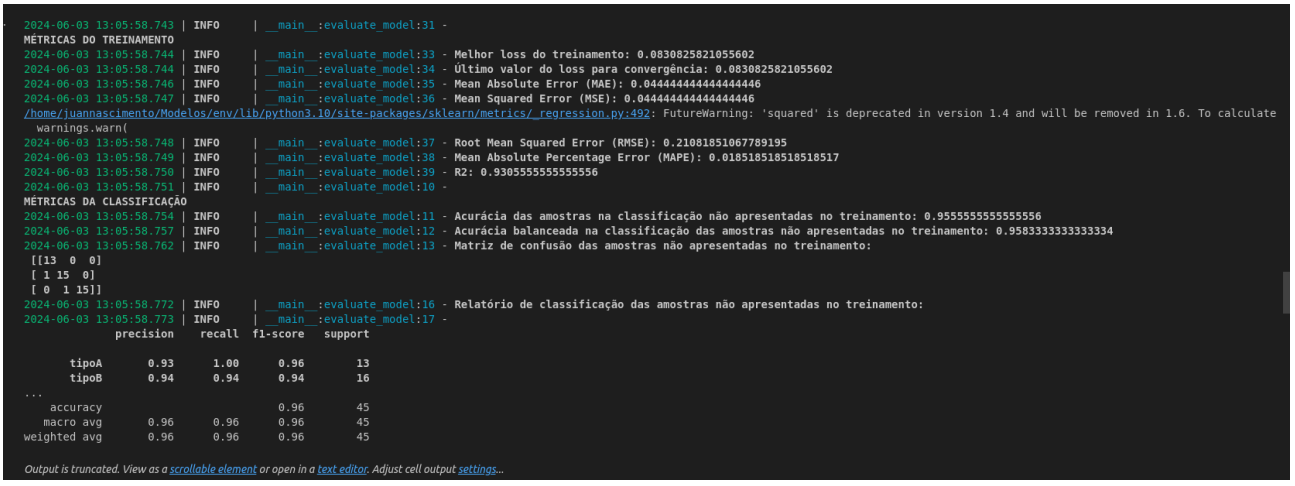
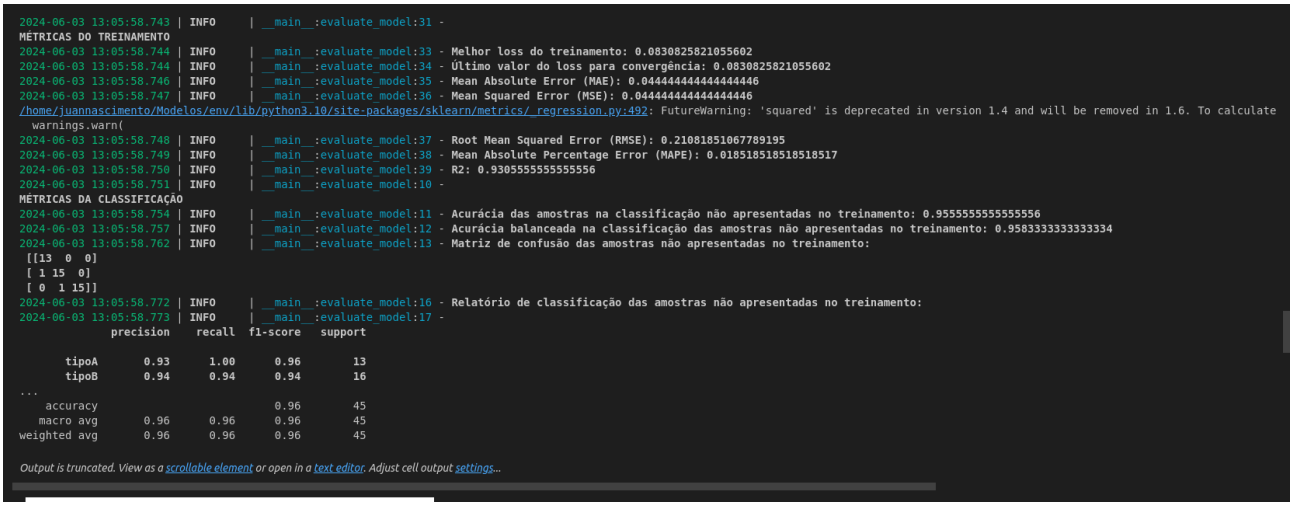


Gráfico de Perda para 15 Neurônios na Camada Oculta
15 neurônios
Perda
1.2
1.0
0.8
0.6
0.4
0.2
0
1000
2000
3000
4000
5000
Iterações

2. Considerando a melhor configuração do Item 1 em função da perda, faça então a validação aplicando o conjunto de teste fornecido na tabela abaixo. Forneça a taxa de acerto/Acurácia (%) e MSE entre os valores desejados e os valores fornecidos pela rede em relação a todas as amostras de teste.

```
2024-06-03 13:05:58.531 | INFO     | __main__:evaluate_model:31 -
MÉTRICAS DO TREINAMENTO
2024-06-03 13:05:58.532 | INFO     | __main__:evaluate_model:33 - Melhor loss do treinamento: 0.09834194950756614
2024-06-03 13:05:58.532 | INFO     | __main__:evaluate_model:34 - Último valor do loss para convergência: 0.09834194950756614
2024-06-03 13:05:58.534 | INFO     | __main__:evaluate_model:35 - Mean Absolute Error (MAE): 0.044444444444444446
2024-06-03 13:05:58.536 | INFO     | __main__:evaluate_model:36 - Mean Squared Error (MSE): 0.044444444444444446
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/metrics/_regression.py:492: FutureWarning: 'squared' is deprecated in version 1.4 and will be removed in 1.6. To calculate
  warnings.warn(
2024-06-03 13:05:58.537 | INFO     | __main__:evaluate_model:37 - Root Mean Squared Error (RMSE): 0.21081851067789195
2024-06-03 13:05:58.539 | INFO     | __main__:evaluate_model:38 - Mean Absolute Percentage Error (MAPE): 0.018518518518518517
2024-06-03 13:05:58.542 | INFO     | __main__:evaluate_model:39 - R2: 0.9305555555555556
2024-06-03 13:05:58.543 | INFO     | __main__:evaluate_model:10 -
MÉTRICAS DA CLASSIFICAÇÃO
2024-06-03 13:05:58.546 | INFO     | __main__:evaluate_model:11 - Acurácia das amostras na classificação não apresentadas no treinamento: 0.9555555555555556
2024-06-03 13:05:58.550 | INFO     | __main__:evaluate_model:12 - Acurácia balanceada na classificação das amostras não apresentadas no treinamento: 0.9583333333333334
2024-06-03 13:05:58.554 | INFO     | __main__:evaluate_model:13 - Matriz de confusão das amostras não apresentadas no treinamento:
 [[13  0  0]
 [ 1 15  0]
 [ 0  1 15]]
2024-06-03 13:05:58.564 | INFO     | __main__:evaluate_model:16 - Relatório de classificação das amostras não apresentadas no treinamento:
2024-06-03 13:05:58.564 | INFO     | __main__:evaluate_model:17 -
              precision    recall  f1-score   support

       tipoA       0.93      1.00      0.96        13
       tipoB       0.94      0.94      0.94        16
...
    accuracy                           0.96        45
   macro avg       0.96      0.96      0.96        45
weighted avg       0.96      0.96      0.96        45

Output is truncated. View as a scrollable element or open in a text editor. Adjust cell output settings...
```





Amostra	x_1	x_2	x_3	x_4	d_1	d_2	d_3
1	0.8622	0.7101	0.6236	0.7894	0	0	1
2	0.2741	0.1552	0.1333	0.1516	1	0	0
3	0.6772	0.8516	0.6543	0.7573	0	0	1
4	0.2178	0.5039	0.6415	0.5039	0	1	0
5	0.7260	0.7500	0.7007	0.4953	0	0	1
6	0.2473	0.2941	0.4248	0.3087	1	0	0
7	0.5682	0.5683	0.5054	0.4426	0	1	0
8	0.6566	0.6715	0.4952	0.3951	0	1	0
9	0.0705	0.4717	0.2921	0.2954	1	0	0
10	0.1187	0.2568	0.3140	0.3037	1	0	0
11	0.5673	0.7011	0.4083	0.5552	0	1	0
12	0.3164	0.2251	0.3526	0.2560	1	0	0
13	0.7884	0.9568	0.6825	0.6398	0	0	1
14	0.9633	0.7850	0.6777	0.6059	0	0	1
15	0.7739	0.8505	0.7934	0.6626	0	0	1
16	0.4219	0.4136	0.1408	0.0940	1	0	0
17	0.6616	0.4365	0.6597	0.8129	0	0	1
18	0.7325	0.4761	0.3888	0.5683	0	1	0
Taxa de Acerto/Acurácia (%):							
MSE:							

ANEXO

Amostra	x_1	x_2	x_3	x_4	d_1	d_2	d_3	Amostra	x_1	x_2	x_3	x_4	d_1	d_2	d_3
1	0.3841	0.2021	0.0000	0.2438	1	0	0	**71**	0.3460	0.2722	0.1866	0.5049	1	0	0
2	0.1765	0.1613	0.3401	0.0843	1	0	0	**72**	0.2241	0.2046	0.3575	0.2891	1	0	0
3	0.3170	0.5786	0.3387	0.4192	0	1	0	**73**	0.1412	0.2264	0.4025	0.2661	1	0	0
4	0.2467	0.0337	0.2699	0.3454	1	0	0	**74**	0.5782	0.6418	0.7212	0.6396	0	0	1
5	0.6102	0.8192	0.4679	0.4762	0	1	0	**75**	0.9153	0.6571	0.8229	0.6689	0	0	1
6	0.7030	0.7784	0.7482	0.6562	0	0	1	**76**	0.6014	0.7664	0.6385	0.5513	0	0	1
7	0.4767	0.4348	0.4852	0.3640	0	1	0	**77**	0.7328	0.8708	0.8812	0.7060	0	0	1
8	0.7589	0.8256	0.6514	0.6143	0	0	1	**78**	0.4270	0.6352	0.6811	0.3884	0	1	0
9	0.1579	0.3641	0.2551	0.2919	1	0	0	**79**	0.6189	0.1652	0.4016	0.3042	1	0	0
10	0.5561	0.5602	0.5605	0.2105	0	1	0	**80**	0.2143	0.3868	0.1926	0.0000	1	0	0
11	0.3267	0.2974	0.0343	0.1466	1	0	0	**81**	0.5696	0.7238	0.7199	0.6677	0	0	1
12	0.2303	0.0942	0.3889	0.1713	1	0	0	**82**	0.8656	0.6700	0.6570	0.6065	0	0	1
13	0.2953	0.2963	0.2600	0.3039	1	0	0	**83**	0.9002	0.6858	0.7409	0.7047	0	0	1
14	0.5797	0.4789	0.5780	0.3048	0	1	0	**84**	0.4167	0.5255	0.5506	0.4093	0	1	0
15	0.5860	0.5250	0.4792	0.4021	0	1	0	**85**	0.8325	0.4804	0.7990	0.7471	0	0	1
16	0.7045	0.6933	0.6449	0.6623	0	0	1	**86**	0.4124	0.1191	0.4720	0.3184	1	0	0
17	0.9134	0.9412	0.6078	0.5934	0	0	1	**87**	1.0000	1.0000	0.7924	0.7074	0	0	1
18	0.2333	0.4943	0.2525	0.2567	1	0	0	**88**	0.5685	0.6924	0.6180	0.5792	0	1	0
19	0.2676	0.4172	0.2775	0.2721	1	0	0	**89**	0.6505	0.4864	0.2972	0.4599	0	1	0
20	0.4850	0.5506	0.5269	0.6036	0	1	0	**90**	0.8124	0.7690	0.9720	1.0000	0	0	1
21	0.2434	0.2567	0.2312	0.2624	1	0	0	**91**	0.9013	0.7160	1.0000	0.8046	0	0	1
22	0.1250	0.3023	0.1826	0.3168	1	0	0	**92**	0.8872	0.7556	0.9307	0.6791	0	0	1
23	0.5598	0.4253	0.4258	0.3192	0	1	0	**93**	0.3708	0.2139	0.2136	0.4295	1	0	0
24	0.5738	0.7674	0.6154	0.4447	0	0	1	**94**	0.5159	0.4349	0.3715	0.4086	0	1	0
25	0.5692	0.8368	0.5832	0.4585	0	0	1	**95**	0.6768	0.6304	0.8044	0.4885	0	0	1
26	0.4655	0.7682	0.3221	0.2940	0	1	0	**96**	0.1664	0.2404	0.2000	0.3425	1	0	0
27	0.5568	0.7592	0.6293	0.5453	0	1	0	**97**	0.2495	0.2807	0.4679	0.2200	1	0	0
28	0.8842	0.7509	0.5723	0.5814	0	0	1	**98**	0.2487	0.2348	0.0913	0.1281	1	0	0
29	0.7959	0.9243	0.7339	0.7334	0	0	1	**99**	0.5748	0.8552	0.5973	0.7317	0	0	1
30	0.7124	0.7128	0.6065	0.6668	0	0	1	**100**	0.3858	0.7585	0.3239	0.3565	0	1	0
31	0.6749	0.8767	0.6543	0.7461	0	0	1	**101**	0.3329	0.4946	0.5614	0.3152	0	1	0
32	0.3674	0.4359	0.4230	0.2965	1	0	0	**102**	0.3891	0.4805	0.7598	0.4231	0	1	0
33	0.3473	0.0754	0.2183	0.1905	1	0	0	**103**	0.2888	0.4888	0.1930	0.0177	1	0	0
34	0.6931	0.5188	0.5386	0.5794	0	1	0	**104**	0.3827	0.4900	0.2272	0.3599	0	1	0
35	0.6439	0.4959	0.4322	0.4582	0	1	0	**105**	0.6047	0.4224	0.6274	0.5809	0	1	0
36	0.5627	0.4893	0.6831	0.5120	0	1	0	**106**	0.9840	0.7031	0.6469	0.4701	0	0	1
37	0.5182	0.7553	0.6368	0.4538	0	1	0	**107**	0.6554	0.6785	0.9279	0.7723	0	0	1

38	0.6046	0.7479	0.6542	0.4375	0	1	0	**108**	0.0466	0.3388	0.0840	0.0762	1	0	0
39	0.6328	0.6786	0.7751	0.6183	0	0	1	**109**	0.6154	0.8196	0.6339	0.7729	0	0	1
40	0.3429	0.4694	0.2855	0.2977	1	0	0	**110**	0.8452	0.8897	0.8383	0.6961	0	0	1
41	0.6371	0.5069	0.5316	0.4520	0	1	0	**111**	0.6927	0.7870	0.7689	0.7213	0	0	1
42	0.6388	0.6970	0.6407	0.7677	0	0	1	**112**	0.4032	0.6188	0.4930	0.5380	0	1	0
43	0.3529	0.5504	0.3706	0.4828	0	1	0	**113**	0.4006	0.3094	0.3868	0.0811	1	0	0
44	0.4302	0.3237	0.6397	0.4319	0	1	0	**114**	0.7416	0.7138	0.6823	0.6067	0	0	1
45	0.7078	0.9604	0.7470	0.6399	0	0	1	**115**	0.7404	0.6764	0.8293	0.4694	0	0	1
46	0.7350	0.8170	0.7227	0.6279	0	0	1	**116**	0.7736	0.7097	0.6826	0.8142	0	0	1
47	0.7011	0.2946	0.6625	0.4312	0	1	0	**117**	0.5823	0.9635	0.3706	0.5636	0	1	0
48	0.5961	0.3817	0.6363	0.3663	0	1	0	**118**	0.2081	0.3738	0.3119	0.3552	1	0	0
49	0.0000	0.2563	0.2603	0.3027	1	0	0	**119**	0.5616	0.8972	0.5186	0.6650	0	0	1
50	0.5996	0.5704	0.6965	0.6548	0	0	1	**120**	0.6594	0.8907	0.6000	0.7157	0	0	1
51	0.4289	0.3709	0.3994	0.3656	0	1	0	**121**	0.3979	0.3070	0.3637	0.1220	1	0	0
52	0.2093	0.3655	0.3334	0.1802	1	0	0	**122**	0.2644	0.0000	0.3572	0.1931	1	0	0
53	0.2335	0.2856	0.3912	0.1601	1	0	0	**123**	0.4816	0.4791	0.4213	0.5889	0	1	0
54	0.3266	0.7751	0.4356	0.3448	0	1	0	**124**	0.0848	0.0749	0.4349	0.3328	1	0	0
55	0.2457	0.1203	0.1228	0.2206	1	0	0	**125**	0.4608	0.6775	0.3533	0.3016	0	1	0
56	0.4656	0.4815	0.4211	0.4862	0	1	0	**126**	0.4155	0.6589	0.5310	0.5404	0	1	0
57	0.7511	0.8868	0.5408	0.6253	0	0	1	**127**	0.3934	0.6244	0.4817	0.4324	0	1	0
58	0.7825	0.9386	0.6510	0.6996	0	0	1	**128**	0.5843	0.8517	0.8576	0.7133	0	0	1
59	0.3463	0.4118	0.2507	0.0454	1	0	0	**129**	0.1995	0.3690	0.3537	0.3462	1	0	0
60	0.5172	0.1482	0.3172	0.2323	1	0	0	**130**	0.3832	0.2321	0.0341	0.2450	1	0	0
61	0.6942	0.4516	0.5387	0.5983	0	1	0								
62	0.7586	0.7017	0.7120	0.7509	0	0	1								
63	0.6880	0.6004	0.6602	0.4320	0	1	0								
64	0.4742	0.5079	0.4135	0.4161	0	1	0								
65	0.4419	0.5761	0.4515	0.4497	0	1	0								
66	0.3367	0.4333	0.2336	0.1678	1	0	0								
67	0.4744	0.4604	0.1507	0.4873	1	0	0								
68	0.7510	0.4350	0.5453	0.4831	0	1	0								
69	0.4045	0.5636	0.2534	0.5573	0	1	0								
70	0.1449	0.1539	0.2446	0.0559	1	0	0								

```
!pip install scikit-learn seaborn pandas numpy matplotlib loguru
```

```
Looking in indexes: https://pypi.org/simple,
https://packagecloud.io/github/git-lfs/pypi/simple
Requirement already satisfied: scikit-learn in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (1.5.0)
Requirement already satisfied: seaborn in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (0.13.0)
Requirement already satisfied: pandas in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (2.1.4)
Requirement already satisfied: numpy in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (1.25.2)
Requirement already satisfied: matplotlib in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (3.8.2)
Collecting loguru
  Obtaining dependency information for loguru from
https://files.pythonhosted.org/packages/03/0a/4f6fed21aa246c6b49b561ca
55facacc2a44b87d65b8b92362a8e99ba202/loguru-0.7.2-py3-none-
any.whl.metadata
  Downloading loguru-0.7.2-py3-none-any.whl.metadata (23 kB)
Requirement already satisfied: scipy>=1.6.0 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
scikit-learn) (1.11.4)
Requirement already satisfied: joblib>=1.2.0 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
scikit-learn) (1.4.2)
Requirement already satisfied: threadpoolctl>=3.1.0 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
scikit-learn) (3.5.0)
Requirement already satisfied: python-dateutil>=2.8.2 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
pandas) (2023.3.post1)
Requirement already satisfied: tzdata>=2022.1 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
pandas) (2023.3)
Requirement already satisfied: contourpy>=1.0.1 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (1.2.0)
Requirement already satisfied: cycler>=0.10 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (4.46.0)
Requirement already satisfied: kiwisolver>=1.3.1 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (1.4.5)
```

```
Requirement already satisfied: packaging>=20.0 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (23.2)
Requirement already satisfied: pillow>=8 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (10.1.0)
Requirement already satisfied: pyparsing>=2.3.1 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
matplotlib) (3.1.1)
Requirement already satisfied: six>=1.5 in
/home/juannascimento/Modelos/env/lib/python3.10/site-packages (from
python-dateutil>=2.8.2->pandas) (1.16.0)
Downloading loguru-0.7.2-py3-none-any.whl (62 kB)
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 62.5/62.5 kB 2.8 MB/s eta
0:00:00
[notice] A new release of pip is available: 23.2.1 -> 24.0
[notice] To update, run: pip install --upgrade pip
```

▶ **Multi-layer Perceptron Classifier (MLPClassifier)** - MLP também pode ser usado para resolver problemas de classificação. Para este exemplo foi utilizado o conjunto de dados Iris com todas as classes possíveis, da plataforma "Kaggle" (https://www.kaggle.com/datasets/uciml/iris)

```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
import seaborn as sns
import matplotlib.pyplot as plt
import pandas as pd
```

▶ **Carregamento e Organização Inicial do Dataset**

```
train = pd.read_csv("bebidas.csv")
test = pd.read_csv("bebidasTestes.csv")

base = pd.concat([train, test])

base
```

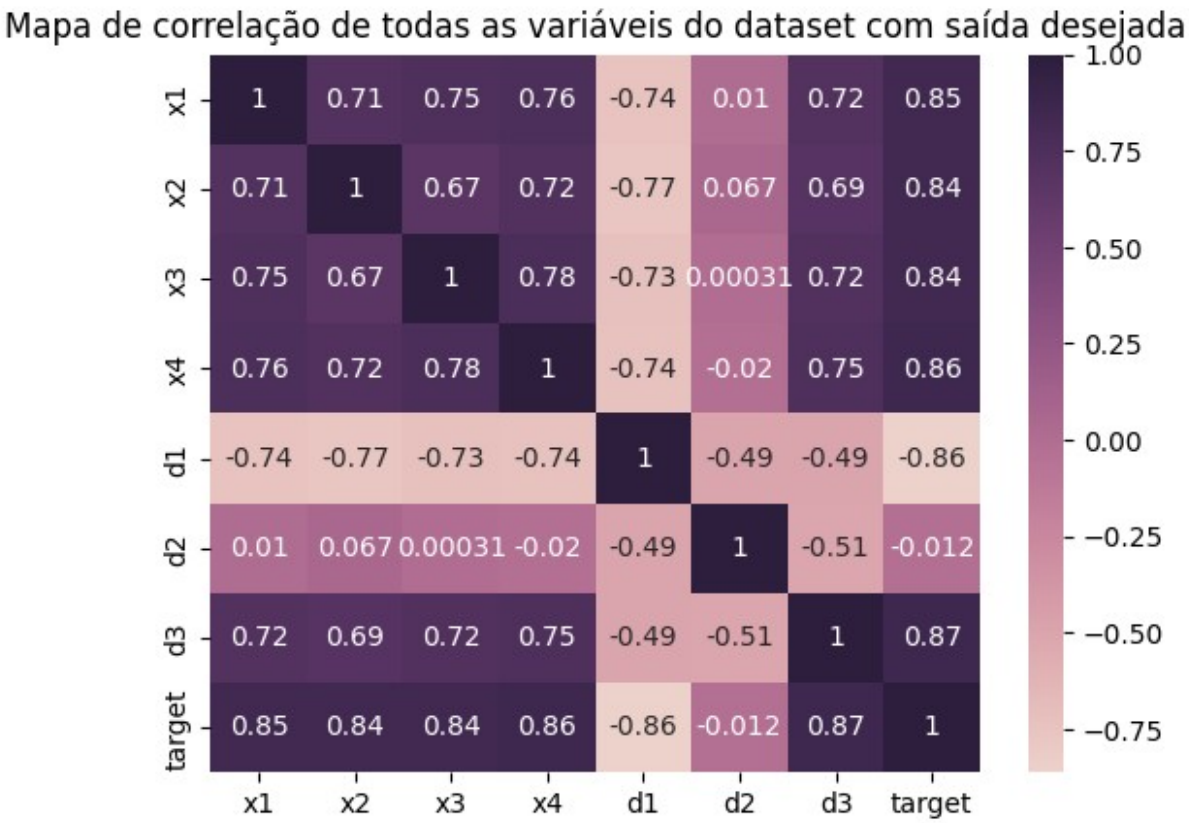
	x1	x2	x3	x4	d1	d2	d3
0	0.3841	0.2021	0.0000	0.2438	1	0	0
1	0.1765	0.1613	0.3401	0.0843	1	0	0
2	0.3170	0.5786	0.3387	0.4192	0	1	0
3	0.2467	0.0337	0.2699	0.3454	1	0	0
4	0.6102	0.8192	0.4679	0.4762	0	1	0
..	...	...	...	...	..	..	..
13	0.9633	0.7850	0.6777	0.6059	0	0	1
14	0.7739	0.8505	0.7934	0.6626	0	0	1
15	0.4219	0.4136	0.1408	0.0940	1	0	0
16	0.6616	0.4365	0.6597	0.8129	0	0	1
17	0.7325	0.4761	0.3888	0.5683	0	1	0

```
[148 rows x 7 columns]
```

```
tipoA = base.query("d1 == 1 & d2 == 0 & d3 == 0").copy()
tipoB = base.query("d1 == 0 & d2 == 1 & d3 == 0").copy()
tipoC = base.query("d1 == 0 & d2 == 0 & d3 == 1").copy()


# Função para determinar o target
def determine_target(row):
    if row['d1'] == 1 and row['d2'] == 0 and row['d3'] == 0:
        return 1
    elif row['d1'] == 0 and row['d2'] == 1 and row['d3'] == 0:
        return 2
    elif row['d1'] == 0 and row['d2'] == 0 and row['d3'] == 1:
        return 3
    else:
        return 4

# Aplicando a função ao DataFrame
base['target'] = base.apply(determine_target, axis=1)

feature = base[['x1', 'x2', 'x3', 'x4']].copy()
target = base[['target']].copy()
```

▶ Mapa de correlação entre as variáveis do dataset

```
ax = sns.heatmap(base.corr(numeric_only=True), annot=True,
cmap=sns.cubehelix_palette(as_cmap=True))
ax.set_title('Mapa de correlação de todas as variáveis do dataset com
saída desejada')
ax=ax
```



▶ Pré-Processamento dos Dados

```
Xcv = feature.copy()
scaler = MinMaxScaler().fit(feature)
X = scaler.transform(feature)

X_train, X_test, y_train, y_test = train_test_split(X, target,
test_size=0.30)
```

▶ Aplicação do MLPClassifier (
https://scikit-learn.org/stable/modules/generated/sklearn.neural_network.MLPClassifier.html)

Training With 5, 10 and 15 Layers

```
from loguru import logger
from sklearn.neural_network import MLPClassifier

def train_mlp(hidden_layer_size, X_train, y_train,
learning_rate_init=0.001, max_iter=5000, epsilon=1e-6):
    logger.info(f"Configurando o modelo com {hidden_layer_size}
neurônios, taxa de aprendizado {learning_rate_init}, máximo de
```

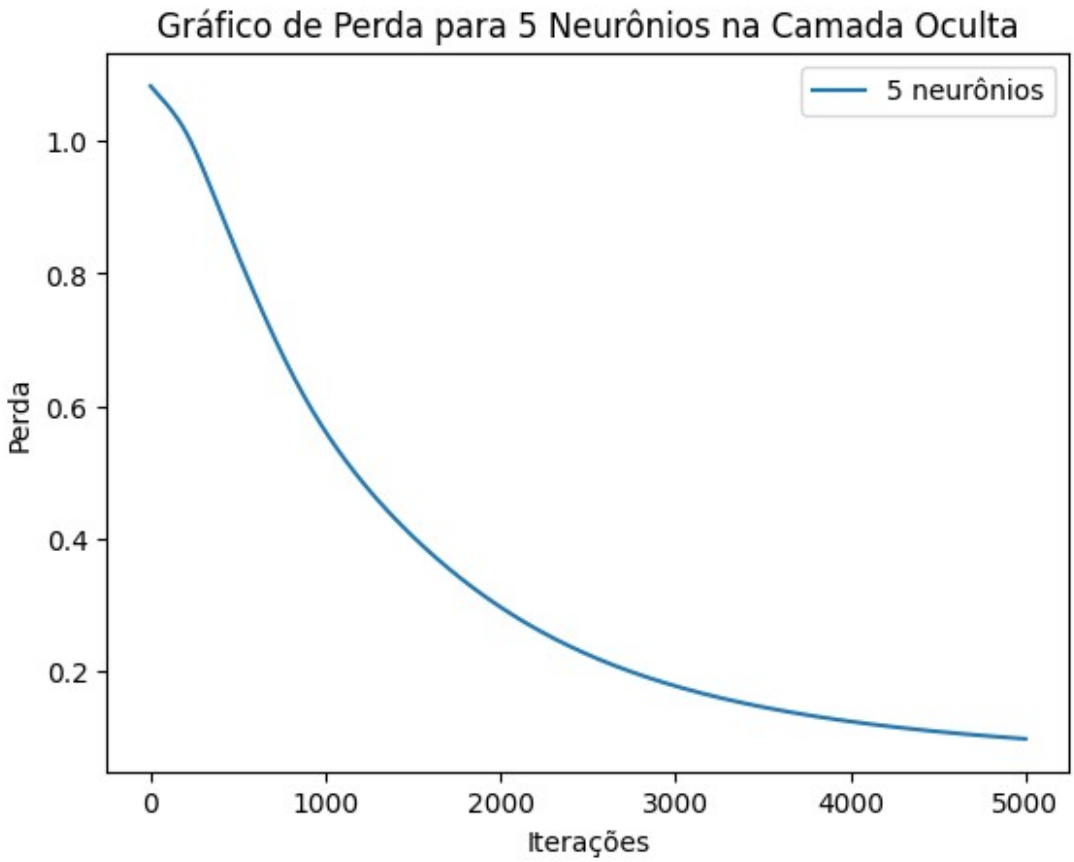
```
iterações {max_iter}, e tolerância {epsilon}.")


    mlp = MLPClassifier(hidden_layer_sizes=(hidden_layer_size,),
                        activation='logistic',
                        learning_rate_init=learning_rate_init,
                        max_iter=max_iter,
                        tol=epsilon,
                        random_state=42)

    mlp.fit(X_train, y_train)
    logger.info(f"Modelo com {hidden_layer_size} neurônios treinado
com sucesso.")

    return mlp

mlp_5 = train_mlp(5, X_train, y_train)
mlp_10 = train_mlp(10, X_train, y_train)
mlp_15 = train_mlp(15, X_train, y_train)
```

```
2024-06-03 12:49:01.576 | INFO     | __main__:train_mlp:5 -
Configurando o modelo com 5 neurônios, taxa de aprendizado 0.001,
máximo de iterações 5000, e tolerância 1e-06.
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5000) reached and the
optimization hasn't converged yet.
  warnings.warn(
2024-06-03 12:49:02.474 | INFO     | __main__:train_mlp:17 - Modelo
com 5 neurônios treinado com sucesso.
2024-06-03 12:49:02.475 | INFO     | __main__:train_mlp:5 -
Configurando o modelo com 10 neurônios, taxa de aprendizado 0.001,
máximo de iterações 5000, e tolerância 1e-06.
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5000) reached and the
optimization hasn't converged yet.
  warnings.warn(
2024-06-03 12:49:03.396 | INFO     | __main__:train_mlp:17 - Modelo
com 10 neurônios treinado com sucesso.
```

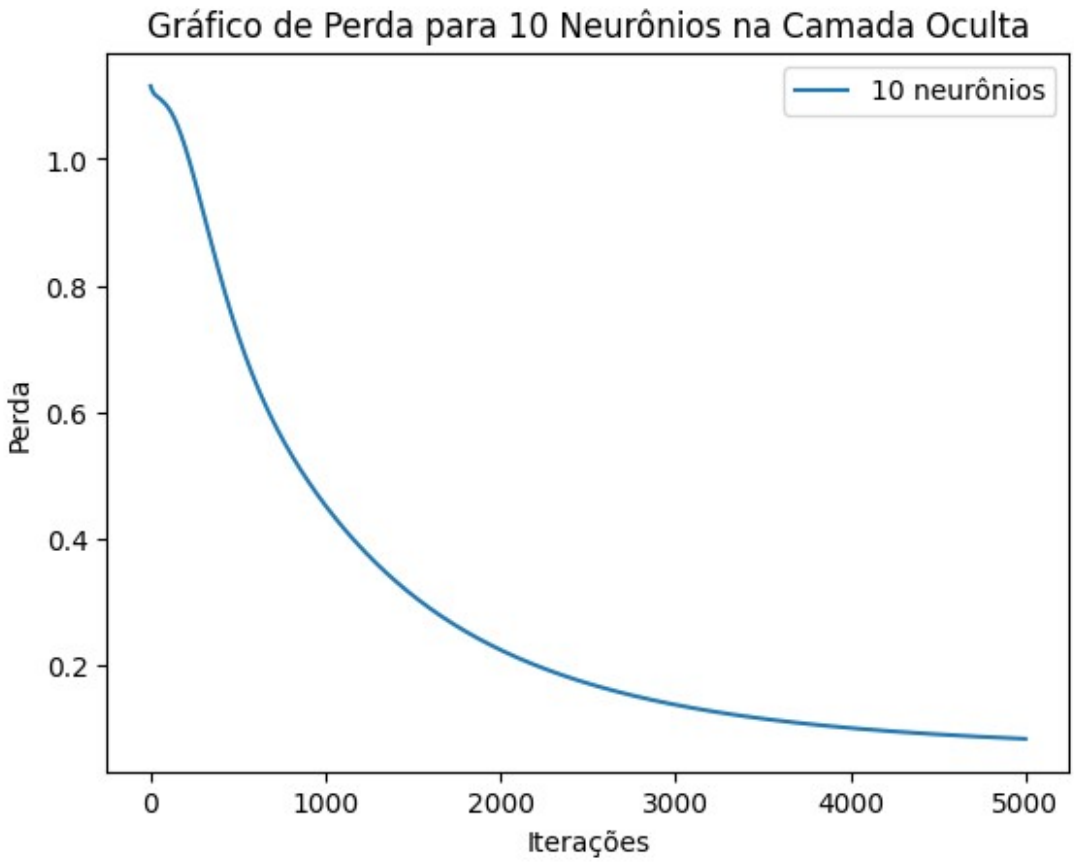
```
2024-06-03 12:49:03.397 | INFO     | __main__:train_mlp:5 -
Configurando o modelo com 15 neurônios, taxa de aprendizado 0.001,
máximo de iterações 5000, e tolerância 1e-06.
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5000) reached and the
optimization hasn't converged yet.
  warnings.warn(
2024-06-03 12:49:04.296 | INFO     | __main__:train_mlp:17 - Modelo
com 15 neurônios treinado com sucesso.
```

```python
from loguru import logger
import matplotlib.pyplot as plt
from sklearn.metrics import accuracy_score

def evaluate_and_plot(model, X_test, y_test, hidden_layer_size):
    y_pred = model.predict(X_test)
    accuracy = accuracy_score(y_test, y_pred)
    logger.info(f'Configuração com {hidden_layer_size} neurônios -
Acurácia: {accuracy * 100:.2f}%')

    plt.plot(model.loss_curve_, label=f'{hidden_layer_size}
neurônios')
    plt.title(f'Gráfico de Perda para {hidden_layer_size} Neurônios na
Camada Oculta')
    plt.xlabel('Iterações')
    plt.ylabel('Perda')
    plt.legend()

    plot_filename = f'loss_curve_{hidden_layer_size}_neurons.png'
    plt.savefig(plot_filename)
    logger.info(f'Gráfico de perda salvo como {plot_filename}')

    plt.show()

# Exemplo de uso da função:
evaluate_and_plot(mlp_5, X_test, y_test, 5)
evaluate_and_plot(mlp_10, X_test, y_test, 10)
evaluate_and_plot(mlp_15, X_test, y_test, 15)
```

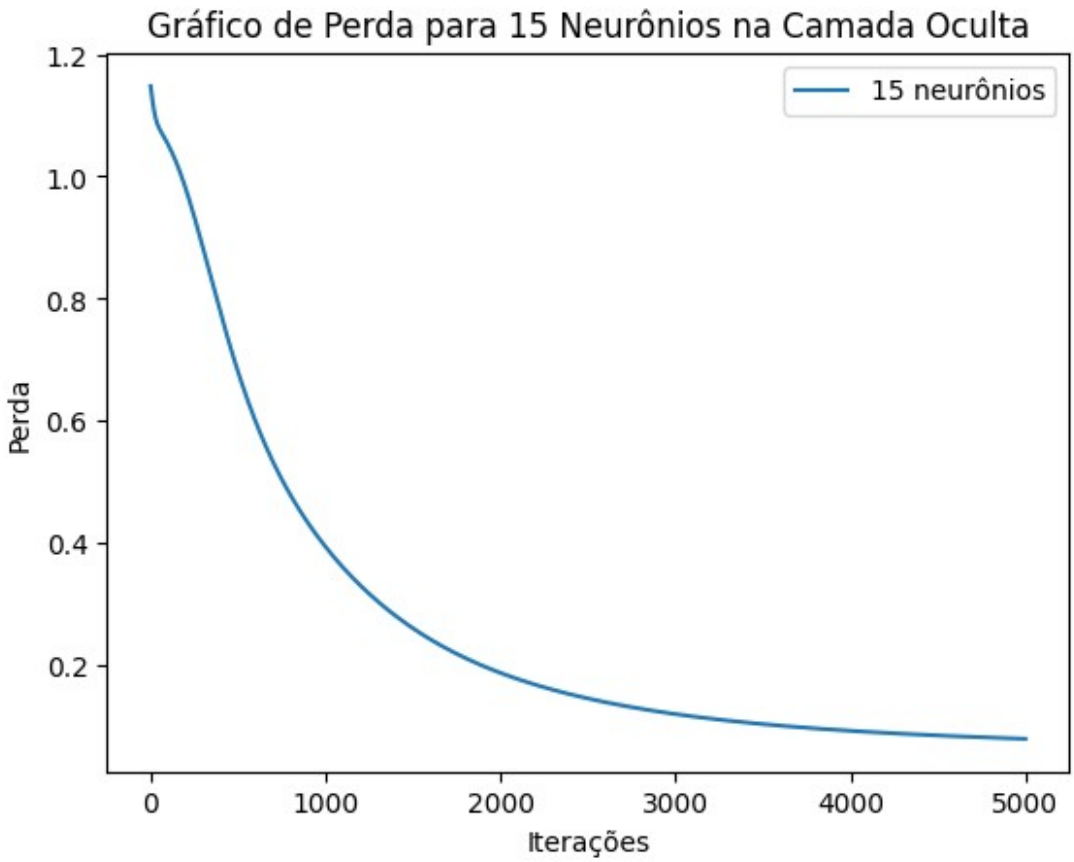
```
2024-06-03 13:03:40.097 | INFO     | __main__:evaluate_and_plot:8 -
Configuração com 5 neurônios - Acurácia: 95.56%

2024-06-03 13:03:40.185 | INFO     | __main__:evaluate_and_plot:18 -
Gráfico de perda salvo como loss_curve_5_neurons.png
```




```
2024-06-03 13:03:40.274 | INFO     | __main__:evaluate_and_plot:8 -
Configuração com 10 neurônios - Acurácia: 95.56%
2024-06-03 13:03:40.350 | INFO     | __main__:evaluate_and_plot:18 -
Gráfico de perda salvo como loss_curve_10_neurons.png
```




```
2024-06-03 13:03:40.430 | INFO     | __main__:evaluate_and_plot:8 -
Configuração com 15 neurônios - Acurácia: 95.56%
2024-06-03 13:03:40.514 | INFO     | __main__:evaluate_and_plot:18 -
Gráfico de perda salvo como loss_curve_15_neurons.png
```



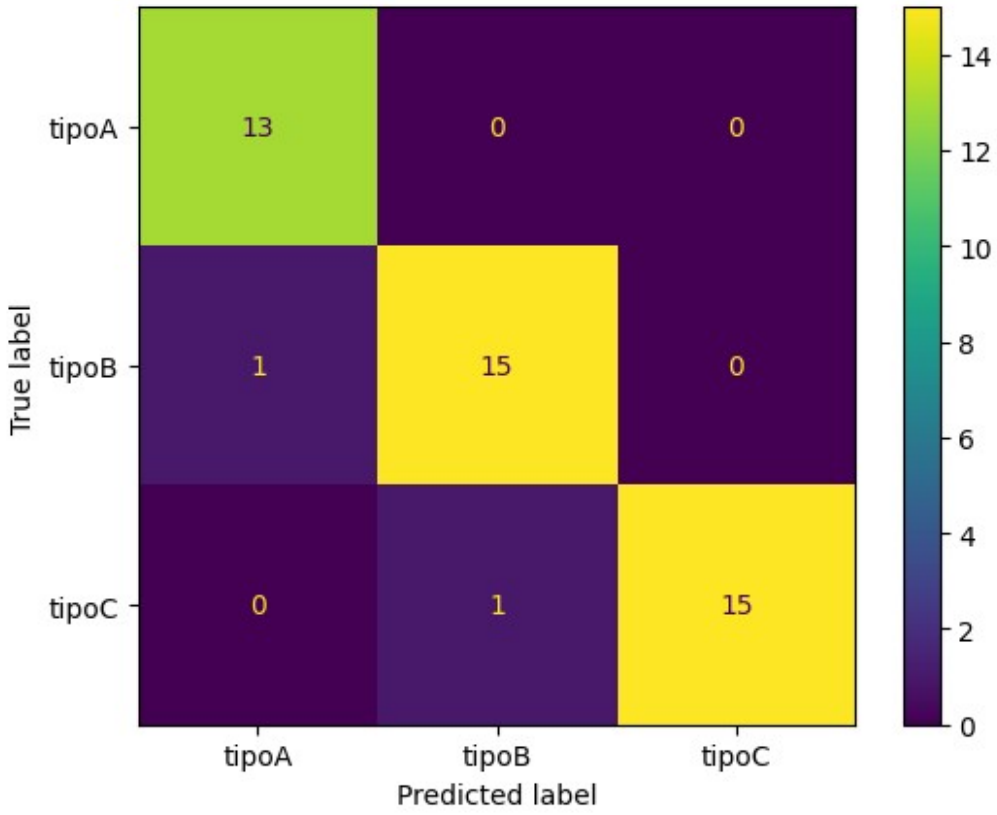
▶ Avaliação do Modelo considerando um percentual fixo de amostras para treinamentos e outro para validação

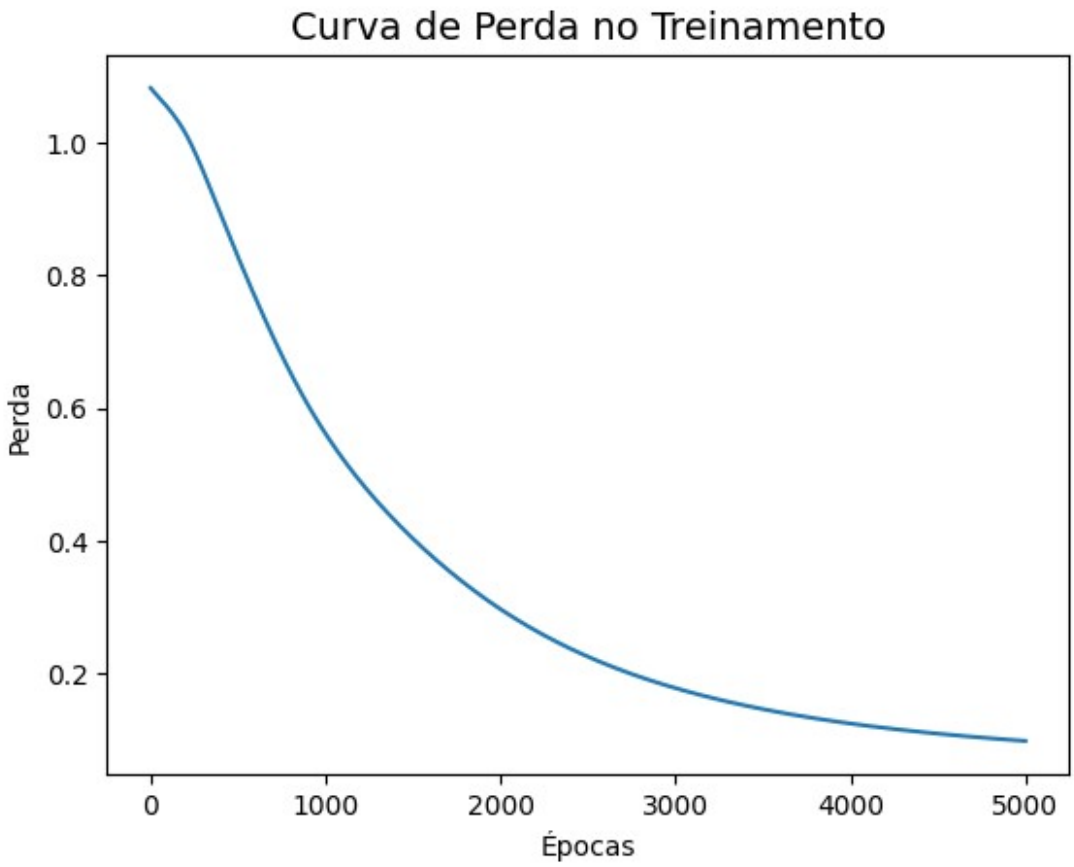
```
from loguru import logger
import matplotlib.pyplot as plt
from sklearn.metrics import (accuracy_score, balanced_accuracy_score,
confusion_matrix,
                             classification_report,
ConfusionMatrixDisplay)
from sklearn import metrics

def evaluate_model(model, X_test, y_test):
    y_pred = model.predict(X_test)

    logger.info("\nMÉTRICAS DA CLASSIFICAÇÃO")
    logger.info(f"Acurácia das amostras na classificação não
apresentadas no treinamento: {accuracy_score(y_test, y_pred)}")
    logger.info(f"Acurácia balanceada na classificação das amostras
não apresentadas no treinamento: {balanced_accuracy_score(y_test,
y_pred)}")
    logger.info(f"Matriz de confusão das amostras não apresentadas no
treinamento:\n {confusion_matrix(y_test, y_pred)}")
```

```
    relatorio = classification_report(y_test, y_pred,
target_names=["tipoA", "tipoB", "tipoC"])
    logger.info("Relatório de classificação das amostras não
apresentadas no treinamento:")
    logger.info(f"\n{relatorio}")

    conf_matrix = confusion_matrix(y_test, y_pred)
    cm_display = ConfusionMatrixDisplay(confusion_matrix=conf_matrix,
display_labels=["tipoA", "tipoB", "tipoC"])
    cm_display.plot()
    plt.show()

    # Plotando o gráfico de erros no processo de treinamento
    plt.plot(model.loss_curve_)
    plt.title("Curva de Perda no Treinamento", fontsize=14)
    plt.xlabel('Épocas')
    plt.ylabel('Perda')
    plt.show()

    logger.info("\nMÉTRICAS DO TREINAMENTO")

    logger.info(f"Melhor loss do treinamento: {model.best_loss_}")
    logger.info(f"Último valor do loss para convergência:
{model.loss_}")
    logger.info(f"Mean Absolute Error (MAE):
{metrics.mean_absolute_error(y_test, y_pred)}")
    logger.info(f"Mean Squared Error (MSE):
{metrics.mean_squared_error(y_test, y_pred)}")
    logger.info(f"Root Mean Squared Error (RMSE):
{metrics.mean_squared_error(y_test, y_pred, squared=False)}")
    logger.info(f"Mean Absolute Percentage Error (MAPE):
{metrics.mean_absolute_percentage_error(y_test, y_pred)}")
    logger.info(f"R2: {metrics.r2_score(y_test, y_pred)}")


evaluate_model(mlp_5, X_test, y_test)
evaluate_model(mlp_10, X_test, y_test)
evaluate_model(mlp_15, X_test, y_test)
```

```
2024-06-03 13:05:58.314 | INFO     | __main__:evaluate_model:10 -
MÉTRICAS DA CLASSIFICAÇÃO
2024-06-03 13:05:58.319 | INFO     | __main__:evaluate_model:11 -
Acurácia das amostras na classificação não apresentadas no
treinamento: 0.9555555555555556
2024-06-03 13:05:58.326 | INFO     | __main__:evaluate_model:12 -
Acurácia balanceada na classificação das amostras não apresentadas no
treinamento: 0.9583333333333334
2024-06-03 13:05:58.331 | INFO     | __main__:evaluate_model:13 -
Matriz de confusão das amostras não apresentadas no treinamento:
 [[13  0  0]
```

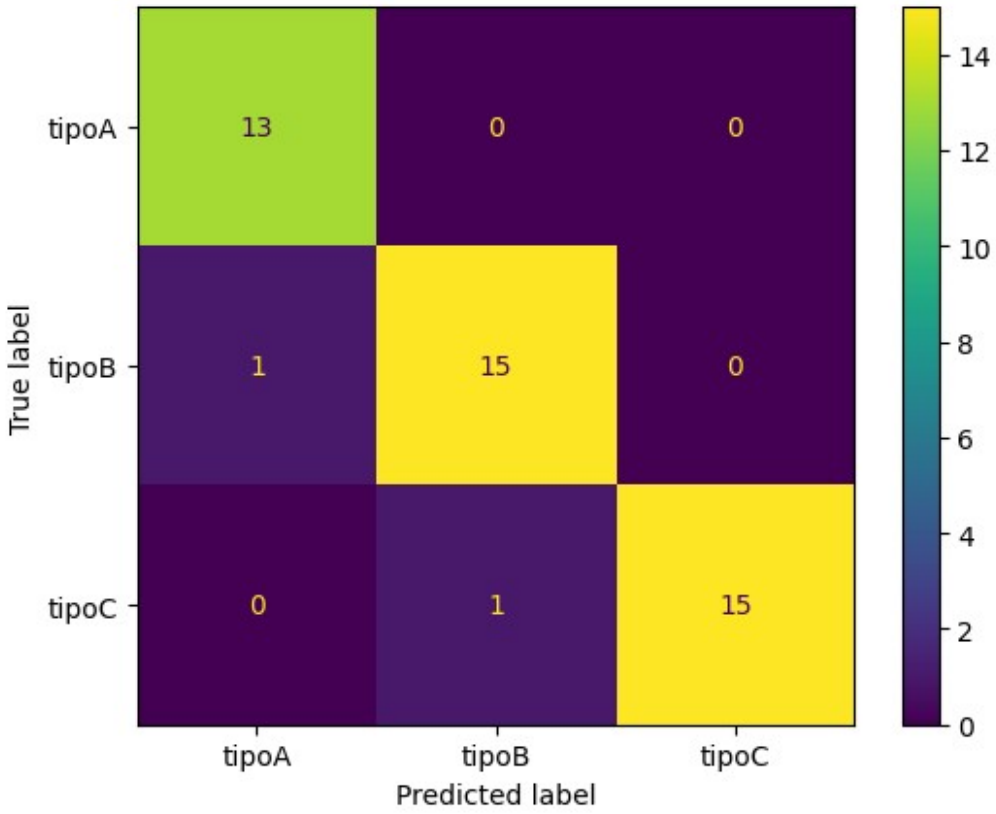
```
 [ 1 15  0]
 [ 0  1 15]]
2024-06-03 13:05:58.341 | INFO     | __main__:evaluate_model:16 -
Relatório de classificação das amostras não apresentadas no
treinamento:
2024-06-03 13:05:58.342 | INFO     | __main__:evaluate_model:17 -
              precision    recall  f1-score   support

       tipoA       0.93      1.00      0.96        13
       tipoB       0.94      0.94      0.94        16
       tipoC       1.00      0.94      0.97        16

    accuracy                           0.96        45
   macro avg       0.96      0.96      0.96        45
weighted avg       0.96      0.96      0.96        45
```

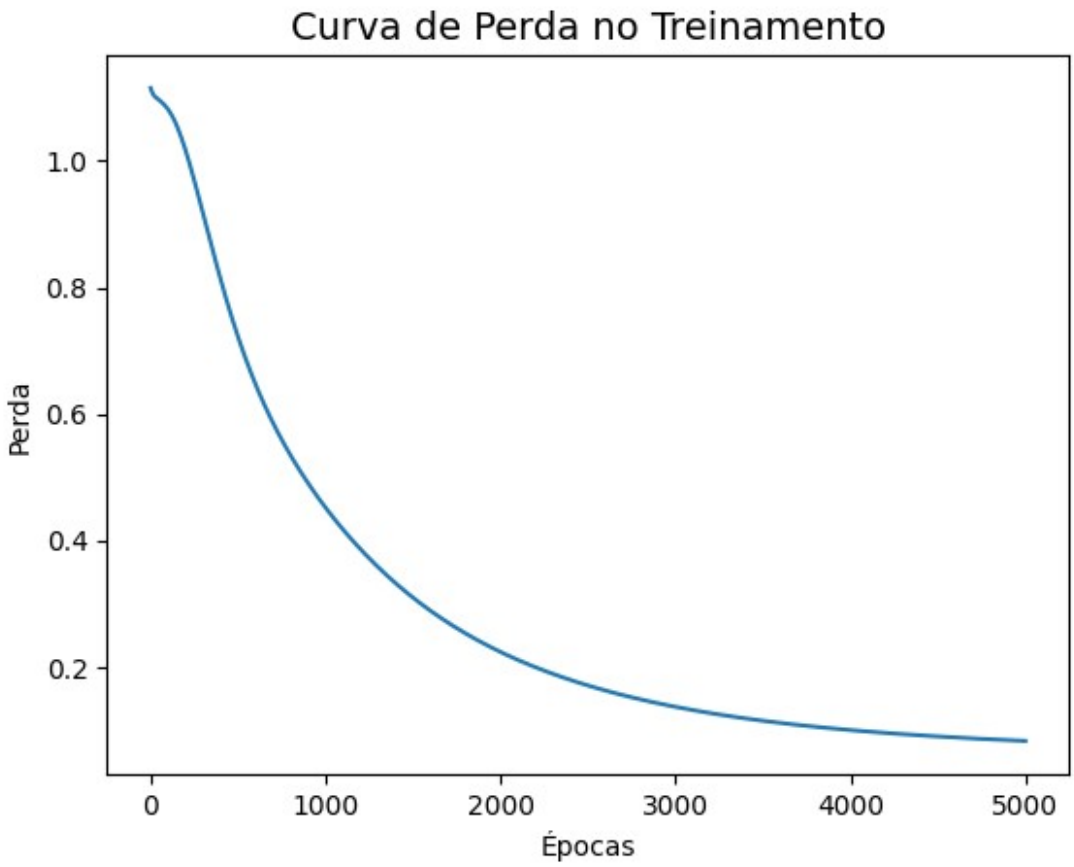





```
2024-06-03 13:05:58.531 | INFO     | __main__:evaluate_model:31 -
MÉTRICAS DO TREINAMENTO
2024-06-03 13:05:58.532 | INFO     | __main__:evaluate_model:33 -
Melhor loss do treinamento: 0.09834194950756614
2024-06-03 13:05:58.532 | INFO     | __main__:evaluate_model:34 -
Último valor do loss para convergência: 0.09834194950756614
2024-06-03 13:05:58.534 | INFO     | __main__:evaluate_model:35 - Mean
Absolute Error (MAE): 0.044444444444444446
2024-06-03 13:05:58.536 | INFO     | __main__:evaluate_model:36 - Mean
Squared Error (MSE): 0.044444444444444446
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
metrics/_regression.py:492: FutureWarning: 'squared' is deprecated in
version 1.4 and will be removed in 1.6. To calculate the root mean
squared error, use the function'root_mean_squared_error'.
  warnings.warn(
2024-06-03 13:05:58.537 | INFO     | __main__:evaluate_model:37 - Root
Mean Squared Error (RMSE): 0.21081851067789195
2024-06-03 13:05:58.539 | INFO     | __main__:evaluate_model:38 - Mean
Absolute Percentage Error (MAPE): 0.018518518518518517
2024-06-03 13:05:58.542 | INFO     | __main__:evaluate_model:39 - R2:
0.9305555555555556
2024-06-03 13:05:58.543 | INFO     | __main__:evaluate_model:10 -
MÉTRICAS DA CLASSIFICAÇÃO
```

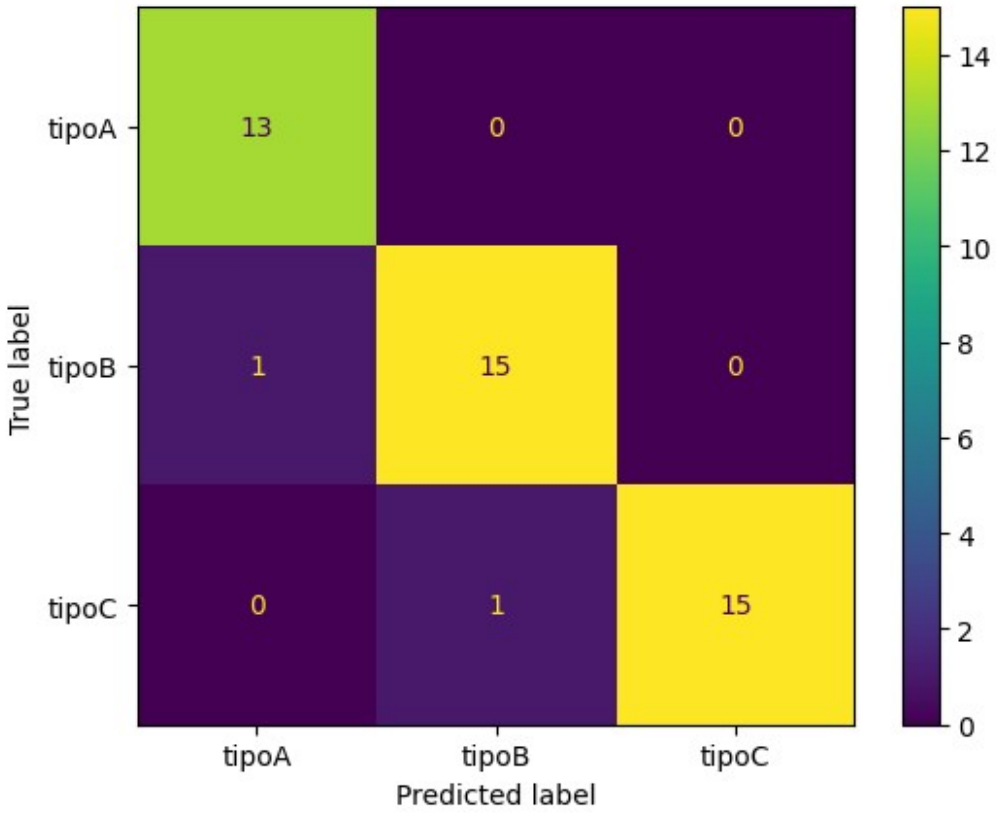
```
2024-06-03 13:05:58.546 | INFO     | __main__:evaluate_model:11 -
Acurácia das amostras na classificação não apresentadas no
treinamento: 0.9555555555555556
2024-06-03 13:05:58.550 | INFO     | __main__:evaluate_model:12 -
Acurácia balanceada na classificação das amostras não apresentadas no
treinamento: 0.9583333333333334
2024-06-03 13:05:58.554 | INFO     | __main__:evaluate_model:13 -
Matriz de confusão das amostras não apresentadas no treinamento:
 [[13  0  0]
 [ 1 15  0]
 [ 0  1 15]]
2024-06-03 13:05:58.564 | INFO     | __main__:evaluate_model:16 -
Relatório de classificação das amostras não apresentadas no
treinamento:
2024-06-03 13:05:58.564 | INFO     | __main__:evaluate_model:17 -
              precision    recall  f1-score   support

       tipoA       0.93      1.00      0.96        13
       tipoB       0.94      0.94      0.94        16
       tipoC       1.00      0.94      0.97        16

    accuracy                           0.96        45
   macro avg       0.96      0.96      0.96        45
weighted avg       0.96      0.96      0.96        45
```

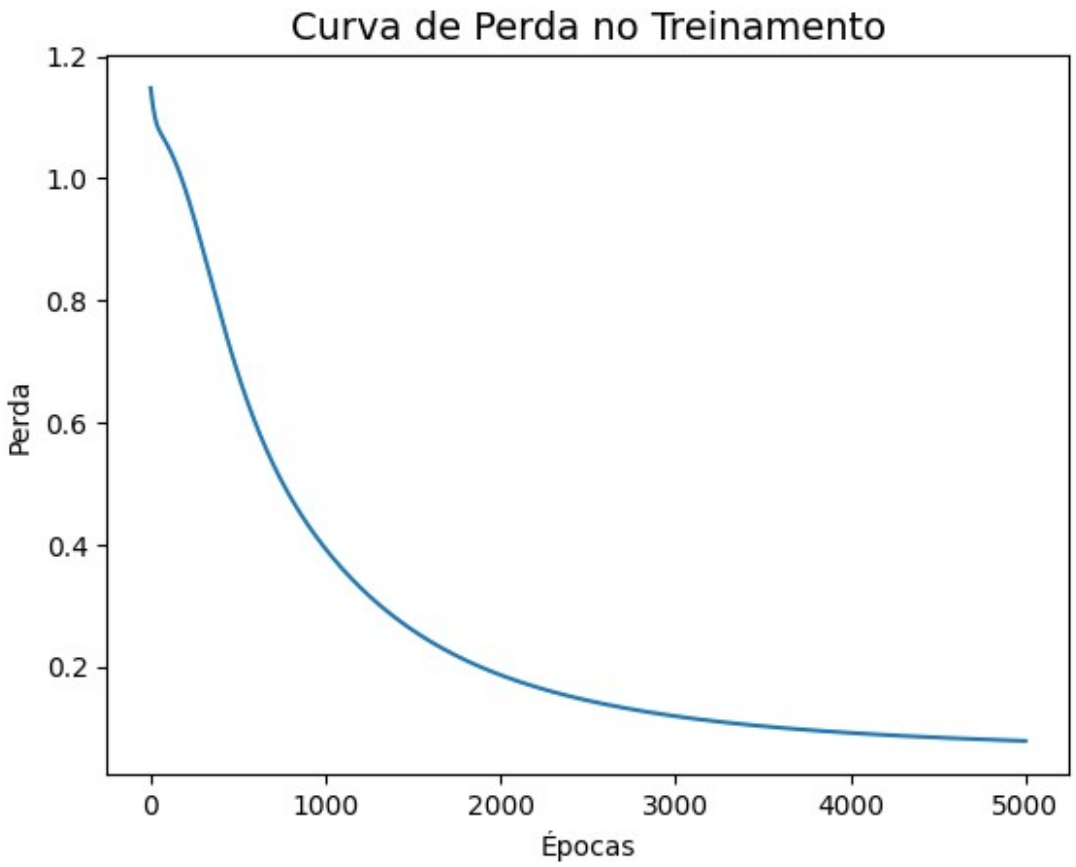

tipoA
tipoB
tipoC
True label
13
0
0
1
15
0
0
1
15
tipoA
tipoB
tipoC
Predicted label
14
12
10
8
6
4
2
0




```
2024-06-03 13:05:58.743 | INFO     | __main__:evaluate_model:31 -
MÉTRICAS DO TREINAMENTO
2024-06-03 13:05:58.744 | INFO     | __main__:evaluate_model:33 -
Melhor loss do treinamento: 0.0830825821055602
2024-06-03 13:05:58.744 | INFO     | __main__:evaluate_model:34 -
Último valor do loss para convergência: 0.0830825821055602
2024-06-03 13:05:58.746 | INFO     | __main__:evaluate_model:35 - Mean
Absolute Error (MAE): 0.044444444444444446
2024-06-03 13:05:58.747 | INFO     | __main__:evaluate_model:36 - Mean
Squared Error (MSE): 0.044444444444444446
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
metrics/_regression.py:492: FutureWarning: 'squared' is deprecated in
version 1.4 and will be removed in 1.6. To calculate the root mean
squared error, use the function'root_mean_squared_error'.
  warnings.warn(
2024-06-03 13:05:58.748 | INFO     | __main__:evaluate_model:37 - Root
Mean Squared Error (RMSE): 0.21081851067789195
2024-06-03 13:05:58.749 | INFO     | __main__:evaluate_model:38 - Mean
Absolute Percentage Error (MAPE): 0.018518518518518517
2024-06-03 13:05:58.750 | INFO     | __main__:evaluate_model:39 - R2:
0.9305555555555556
2024-06-03 13:05:58.751 | INFO     | __main__:evaluate_model:10 -
MÉTRICAS DA CLASSIFICAÇÃO
```

```
2024-06-03 13:05:58.754 | INFO     | __main__:evaluate_model:11 -
Acurácia das amostras na classificação não apresentadas no
treinamento: 0.9555555555555556
2024-06-03 13:05:58.757 | INFO     | __main__:evaluate_model:12 -
Acurácia balanceada na classificação das amostras não apresentadas no
treinamento: 0.9583333333333334
2024-06-03 13:05:58.762 | INFO     | __main__:evaluate_model:13 -
Matriz de confusão das amostras não apresentadas no treinamento:
 [[13  0  0]
 [ 1 15  0]
 [ 0  1 15]]
2024-06-03 13:05:58.772 | INFO     | __main__:evaluate_model:16 -
Relatório de classificação das amostras não apresentadas no
treinamento:
2024-06-03 13:05:58.773 | INFO     | __main__:evaluate_model:17 -
              precision    recall  f1-score   support

       tipoA       0.93      1.00      0.96        13
       tipoB       0.94      0.94      0.94        16
       tipoC       1.00      0.94      0.97        16

    accuracy                           0.96        45
   macro avg       0.96      0.96      0.96        45
weighted avg       0.96      0.96      0.96        45
```


tipoA
tipoB
tipoC
True label
13
0
0
1
15
0
0
1
15
tipoA
tipoB
tipoC
Predicted label
14
12
10
8
6
4
2
0




```
2024-06-03 13:05:59.069 | INFO     | __main__:evaluate_model:31 -
MÉTRICAS DO TREINAMENTO
2024-06-03 13:05:59.070 | INFO     | __main__:evaluate_model:33 -
Melhor loss do treinamento: 0.07854957189726301
2024-06-03 13:05:59.070 | INFO     | __main__:evaluate_model:34 -
Último valor do loss para convergência: 0.07854957189726301
2024-06-03 13:05:59.072 | INFO     | __main__:evaluate_model:35 - Mean
Absolute Error (MAE): 0.044444444444444446
2024-06-03 13:05:59.073 | INFO     | __main__:evaluate_model:36 - Mean
Squared Error (MSE): 0.044444444444444446
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
metrics/_regression.py:492: FutureWarning: 'squared' is deprecated in
version 1.4 and will be removed in 1.6. To calculate the root mean
squared error, use the function'root_mean_squared_error'.
  warnings.warn(
2024-06-03 13:05:59.074 | INFO     | __main__:evaluate_model:37 - Root
Mean Squared Error (RMSE): 0.21081851067789195
2024-06-03 13:05:59.075 | INFO     | __main__:evaluate_model:38 - Mean
Absolute Percentage Error (MAPE): 0.018518518518518517
2024-06-03 13:05:59.077 | INFO     | __main__:evaluate_model:39 - R2:
0.9305555555555556
```

▶ Avaliação do modelo considerando o método de validação cruzada utilizando o conjunto completo de dados e Pipeline para organizar a sequência de operações

```
from loguru import logger
from sklearn.pipeline import Pipeline
from sklearn.preprocessing import StandardScaler
from sklearn.neural_network import MLPClassifier
from sklearn.model_selection import cross_val_score
from numpy import mean, std

def evaluate_pipeline(X, y, hidden_layer_size=20, random_state=12,
max_iter=10000, epsilon=1e-10, learning_rate_init=0.0001, cv=5):
    logger.info("Criando uma sequência de operações com Pipeline.")

    # Criando uma sequência de operações com Pipeline
    MLP_pipeline = Pipeline(steps=[
      ("Padronização", StandardScaler()),
      ("MLP", MLPClassifier(hidden_layer_sizes=(hidden_layer_size,),
                            random_state=random_state,
                            max_iter=max_iter,
                            tol=epsilon,
                            learning_rate='constant',
                            learning_rate_init=learning_rate_init))
    ])

    logger.info("Testando o dataset completo utilizando a validação
cruzada.")
    scores_cross_val = cross_val_score(MLP_pipeline, X, y, cv=cv)

    logger.info("Resultados da validação cruzada do conjunto completo
de dados:")
    logger.info(scores_cross_val)
    logger.info(f"Média: {mean(scores_cross_val)}")
    logger.info(f"Desvio Padrão: {std(scores_cross_val)}")


evaluate_pipeline(Xcv, target)
```

```
2024-06-03 12:51:29.746 | INFO     | __main__:evaluate_pipeline:9 -
Criando uma sequência de operações com Pipeline.
2024-06-03 12:51:29.747 | INFO     | __main__:evaluate_pipeline:22 -
Testando o dataset completo utilizando a validação cruzada.
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (10000) reached and the
```

```
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (10000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (10000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (10000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (10000) reached and the
optimization hasn't converged yet.
  warnings.warn(
2024-06-03 12:51:39.266 | INFO     | __main__:evaluate_pipeline:25 -
Resultados da validação cruzada do conjunto completo de dados:
2024-06-03 12:51:39.267 | INFO     | __main__:evaluate_pipeline:26 -
[0.93333333 0.9        0.9        0.93103448 1.        ]
2024-06-03 12:51:39.268 | INFO     | __main__:evaluate_pipeline:27 -
Média: 0.9328735632183907
```

```
2024-06-03 12:51:39.268 | INFO     | __main__:evaluate_pipeline:28 -
Desvio Padrão: 0.03652641356015821
```

▶ Sintonizador dos melhores Hiperparâmetros

```
from loguru import logger
from sklearn.model_selection import GridSearchCV
from sklearn.neural_network import MLPClassifier

def perform_grid_search(X, y):
    logger.info("Iniciando a busca em grade para MLPClassifier.")

    mlp = MLPClassifier()
    param_grid = {
        'hidden_layer_sizes': [(5,), (10,), (15,)],
        'max_iter': [2000, 5000],
        'activation': ['logistic'],
        'solver': ['sgd', 'adam'],
        'learning_rate': ['constant', 'adaptive'],
    }

    grid = GridSearchCV(mlp, param_grid, n_jobs=-1, cv=10)
    logger.info("Realizando o ajuste do grid search com os dados
fornecidos.")
    grid.fit(X, y)

    logger.info("Grid search completo.")
    logger.info(f"Melhores parâmetros: {grid.best_params_}")
    logger.info(f"Melhor pontuação: {grid.best_score_}")

    return grid


grid_result = perform_grid_search(X, target)
```

```
2024-06-03 12:52:10.403 | INFO     | __main__:perform_grid_search:6 -
Iniciando a busca em grade para MLPClassifier.
2024-06-03 12:52:10.405 | INFO     | __main__:perform_grid_search:18 -
Realizando o ajuste do grid search com os dados fornecidos.
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
```

```
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
```

```
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
```

```
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
```

```
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
```

```
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
```

```
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
```

```
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
```

```
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
```

```
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
```

```
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
```

```
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
```

```
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
```

```
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
```

```
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
```

```
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
```

```
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
```

```
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

```
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
```

```
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:1105: DataConversionWarning:
A column-vector y was passed when a 1d array was expected. Please
change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
/home/juannascimento/Modelos/env/lib/python3.10/site-packages/sklearn/
neural_network/_multilayer_perceptron.py:690: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (2000) reached and the
optimization hasn't converged yet.
  warnings.warn(
2024-06-03 12:52:30.225 | INFO     | __main__:perform_grid_search:21 -
Grid search completo.
2024-06-03 12:52:30.225 | INFO     | __main__:perform_grid_search:22 -
Melhores parâmetros: {'activation': 'logistic', 'hidden_layer_sizes':
(10,), 'learning_rate': 'constant', 'max_iter': 2000, 'solver':
'adam'}
2024-06-03 12:52:30.226 | INFO     | __main__:perform_grid_search:23 -
Melhor pontuação: 0.9461904761904762

from loguru import logger

def log_grid_search_results(grid):
    logger.info("Melhores valores dos parâmetros do grid:")
    logger.info(grid.best_params_)
```

```
    logger.info("Parâmetros mais relevantes para estimar:")
    logger.info(grid.best_estimator_)
    logger.info("Melhor acurácia:")
    logger.info(grid.best_score_)

log_grid_search_results(grid_result)
```

```
2024-06-03 12:52:48.312 | INFO     | __main__:log_grid_search_results:4 - Melhores valores dos parâmetros do grid:
2024-06-03 12:52:48.313 | INFO     | __main__:log_grid_search_results:5 - {'activation': 'logistic', 'hidden_layer_sizes': (10,), 'learning_rate': 'constant', 'max_iter': 2000, 'solver': 'adam'}
2024-06-03 12:52:48.314 | INFO     | __main__:log_grid_search_results:6 - Parâmetros mais relevantes para estimar:
2024-06-03 12:52:48.315 | INFO     | __main__:log_grid_search_results:7 - MLPClassifier(activation='logistic', hidden_layer_sizes=(10,), max_iter=2000)
2024-06-03 12:52:48.317 | INFO     | __main__:log_grid_search_results:8 - Melhor acurácia:
2024-06-03 12:52:48.317 | INFO     | __main__:log_grid_search_results:9 - 0.9461904761904762
```