1. Run Python code “hyper_parameter.py”

A report on hyperparameter tuning results.

[I 2024-08-02 12:23:00,681] A new study created in memory with name: no-name-570883ed-1b17-4dc4-90bd-d6d6b3aedd43
[I 2024-08-02 12:23:01,506] Trial 0 finished with value: -1.0 and parameters: {'n_estimators': 751, 'max_depth': 8, 'min_samples_split': 8, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:02,415] Trial 1 finished with value: -1.0 and parameters: {'n_estimators': 849, 'max_depth': 4, 'min_samples_split': 5, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:02,914] Trial 2 finished with value: -1.0 and parameters: {'n_estimators': 425, 'max_depth': 5, 'min_samples_split': 8, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:03,873] Trial 3 finished with value: -1.0 and parameters: {'n_estimators': 930, 'max_depth': 7, 'min_samples_split': 6, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:04,720] Trial 4 finished with value: -1.0 and parameters: {'n_estimators': 790, 'max_depth': 9, 'min_samples_split': 2, 'min_samples_leaf': 5}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:05,292] Trial 5 finished with value: -1.0 and parameters: {'n_estimators': 499, 'max_depth': 2, 'min_samples_split': 9, 'min_samples_leaf': 7}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:05,547] Trial 6 finished with value: -1.0 and parameters: {'n_estimators': 242, 'max_depth': 10, 'min_samples_split': 5, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:06,589] Trial 7 finished with value: -1.0 and parameters: {'n_estimators': 836, 'max_depth': 9, 'min_samples_split': 3, 'min_samples_leaf': 7}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:07,808] Trial 8 finished with value: -1.0 and parameters: {'n_estimators': 910, 'max_depth': 8, 'min_samples_split': 4, 'min_samples_leaf': 4}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:08,881] Trial 9 finished with value: -1.0 and parameters: {'n_estimators': 952, 'max_depth': 3, 'min_samples_split': 9, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:09,611] Trial 10 finished with value: -1.0 and parameters: {'n_estimators': 637, 'max_depth': 6, 'min_samples_split': 7, 'min_samples_leaf': 10}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:10,331] Trial 11 finished with value: -1.0 and parameters: {'n_estimators': 678, 'max_depth': 4, 'min_samples_split': 6, 'min_samples_leaf': 4}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:10,403] Trial 12 finished with value: -0.9666666666666667 and parameters: {'n_estimators': 31, 'max_depth': 1, 'min_samples_split': 10, 'min_samples_leaf': 9}. Best is trial 0 with value: -1.0.

[I 2024-08-02 12:23:11,190] Trial 13 finished with value: -1.0 and parameters: {'n_estimators': 699, 'max_depth': 6, 'min_samples_split': 7, 'min_samples_leaf': 1}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:11,864] Trial 14 finished with value: -1.0 and parameters: {'n_estimators': 581, 'max_depth': 4, 'min_samples_split': 4, 'min_samples_leaf': 8}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:12,681] Trial 15 finished with value: -1.0 and parameters: {'n_estimators': 775, 'max_depth': 7, 'min_samples_split': 7, 'min_samples_leaf': 4}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:13,757] Trial 16 finished with value: -1.0 and parameters: {'n_estimators': 995, 'max_depth': 5, 'min_samples_split': 5, 'min_samples_leaf': 5}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:14,255] Trial 17 finished with value: -1.0 and parameters: {'n_estimators': 414, 'max_depth': 3, 'min_samples_split': 8, 'min_samples_leaf': 3}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:15,156] Trial 18 finished with value: -1.0 and parameters: {'n_estimators': 823, 'max_depth': 7, 'min_samples_split': 10, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:15,771] Trial 19 finished with value: -1.0 and parameters: {'n_estimators': 576, 'max_depth': 8, 'min_samples_split': 5, 'min_samples_leaf': 1}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:16,596] Trial 20 finished with value: -1.0 and parameters: {'n_estimators': 740, 'max_depth': 10, 'min_samples_split': 2, 'min_samples_leaf': 7}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:17,017] Trial 21 finished with value: -1.0 and parameters: {'n_estimators': 380, 'max_depth': 5, 'min_samples_split': 8, 'min_samples_leaf': 3}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:17,299] Trial 22 finished with value: -1.0 and parameters: {'n_estimators': 240, 'max_depth': 4, 'min_samples_split': 8, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:17,803] Trial 23 finished with value: -1.0 and parameters: {'n_estimators': 440, 'max_depth': 5, 'min_samples_split': 9, 'min_samples_leaf': 3}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:18,060] Trial 24 finished with value: -1.0 and parameters: {'n_estimators': 222, 'max_depth': 3, 'min_samples_split': 6, 'min_samples_leaf': 1}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:18,507] Trial 25 finished with value: -1.0 and parameters: {'n_estimators': 339, 'max_depth': 6, 'min_samples_split': 7, 'min_samples_leaf': 5}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:19,072] Trial 26 finished with value: -1.0 and parameters: {'n_estimators': 540, 'max_depth': 2, 'min_samples_split': 8, 'min_samples_leaf': 3}. Best is trial 0 with value: -1.0.

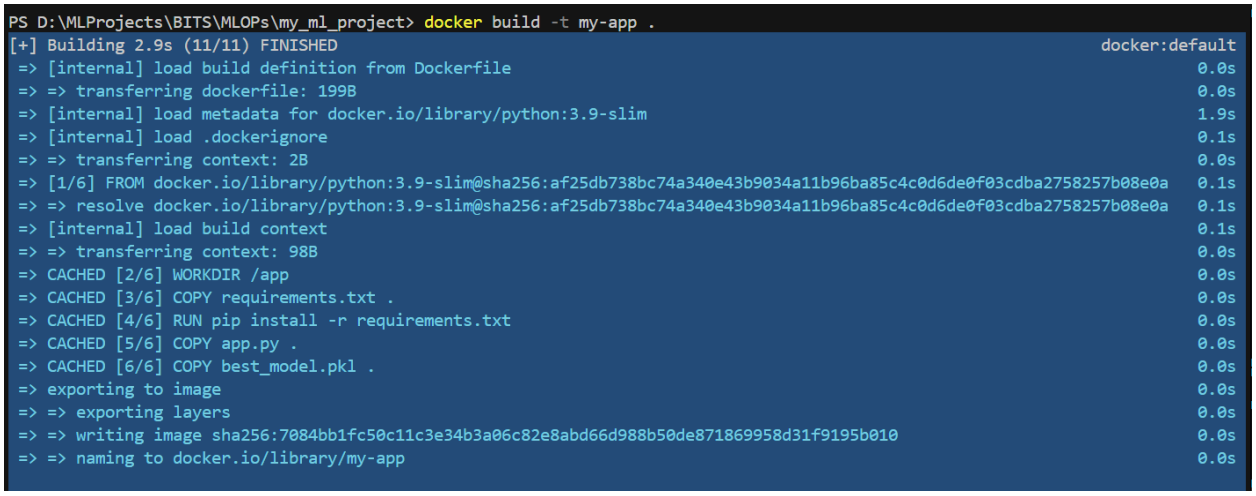
[I 2024-08-02 12:23:19,998] Trial 27 finished with value: -1.0 and parameters: {'n_estimators': 866, 'max_depth': 4, 'min_samples_split': 4, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:20,720] Trial 28 finished with value: -1.0 and parameters: {'n_estimators': 629, 'max_depth': 8, 'min_samples_split': 6, 'min_samples_leaf': 4}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:21,260] Trial 29 finished with value: -1.0 and parameters: {'n_estimators': 489, 'max_depth': 7, 'min_samples_split': 9, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:21,609] Trial 30 finished with value: -1.0 and parameters: {'n_estimators': 314, 'max_depth': 5, 'min_samples_split': 5, 'min_samples_leaf': 9}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:22,571] Trial 31 finished with value: -1.0 and parameters: {'n_estimators': 910, 'max_depth': 9, 'min_samples_split': 6, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:23,433] Trial 32 finished with value: -1.0 and parameters: {'n_estimators': 766, 'max_depth': 7, 'min_samples_split': 7, 'min_samples_leaf': 7}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:24,486] Trial 33 finished with value: -1.0 and parameters: {'n_estimators': 996, 'max_depth': 8, 'min_samples_split': 6, 'min_samples_leaf': 5}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:25,456] Trial 34 finished with value: -1.0 and parameters: {'n_estimators': 887, 'max_depth': 6, 'min_samples_split': 5, 'min_samples_leaf': 8}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:26,325] Trial 35 finished with value: -1.0 and parameters: {'n_estimators': 823, 'max_depth': 7, 'min_samples_split': 3, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:27,366] Trial 36 finished with value: -1.0 and parameters: {'n_estimators': 930, 'max_depth': 9, 'min_samples_split': 8, 'min_samples_leaf': 5}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:27,530] Trial 37 finished with value: -1.0 and parameters: {'n_estimators': 130, 'max_depth': 8, 'min_samples_split': 9, 'min_samples_leaf': 8}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:28,307] Trial 38 finished with value: -1.0 and parameters: {'n_estimators': 728, 'max_depth': 2, 'min_samples_split': 4, 'min_samples_leaf': 7}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:29,239] Trial 39 finished with value: -1.0 and parameters: {'n_estimators': 862, 'max_depth': 9, 'min_samples_split': 6, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:29,971] Trial 40 finished with value: -1.0 and parameters: {'n_estimators': 642, 'max_depth': 6, 'min_samples_split': 10, 'min_samples_leaf': 4}. Best is trial 0 with value: -1.0.

[I 2024-08-02 12:23:30,850] Trial 41 finished with value: -1.0 and parameters: {'n_estimators': 800, 'max_depth': 10, 'min_samples_split': 2, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:31,617] Trial 42 finished with value: -1.0 and parameters: {'n_estimators': 691, 'max_depth': 10, 'min_samples_split': 3, 'min_samples_leaf': 1}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:32,144] Trial 43 finished with value: -1.0 and parameters: {'n_estimators': 478, 'max_depth': 8, 'min_samples_split': 3, 'min_samples_leaf': 4}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:33,188] Trial 44 finished with value: -1.0 and parameters: {'n_estimators': 953, 'max_depth': 9, 'min_samples_split': 7, 'min_samples_leaf': 5}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:34,240] Trial 45 finished with value: -1.0 and parameters: {'n_estimators': 946, 'max_depth': 4, 'min_samples_split': 4, 'min_samples_leaf': 3}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:35,098] Trial 46 finished with value: -1.0 and parameters: {'n_estimators': 777, 'max_depth': 9, 'min_samples_split': 2, 'min_samples_leaf': 7}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:36,233] Trial 47 finished with value: -1.0 and parameters: {'n_estimators': 841, 'max_depth': 6, 'min_samples_split': 7, 'min_samples_leaf': 8}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:37,145] Trial 48 finished with value: -1.0 and parameters: {'n_estimators': 725, 'max_depth': 7, 'min_samples_split': 8, 'min_samples_leaf': 2}. Best is trial 0 with value: -1.0.
[I 2024-08-02 12:23:37,884] Trial 49 finished with value: -1.0 and parameters: {'n_estimators': 641, 'max_depth': 5, 'min_samples_split': 5, 'min_samples_leaf': 6}. Best is trial 0 with value: -1.0.
Best hyperparameters: {'n_estimators': 751, 'max_depth': 8, 'min_samples_split': 8, 'min_samples_leaf': 6}
Best accuracy: 1.0

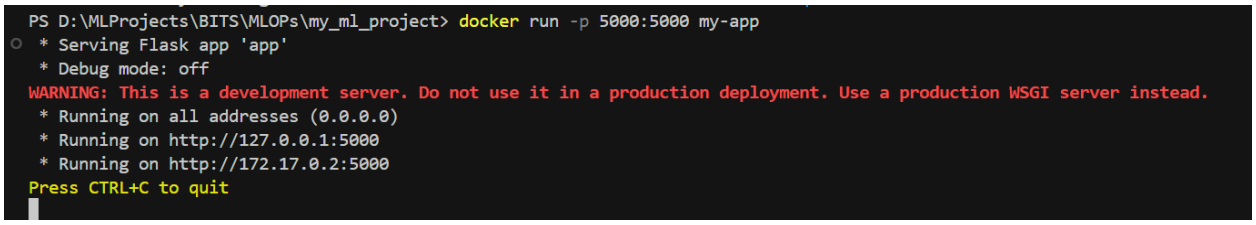
A Dockerfile and Flask application code. – “Dockerfile” & “App.py” file

Screenshots of the model running in a Docker container.

1. docker build -t my-app .



2. docker run -p 5000:5000 my-app



3. In a new poweshell run:

   Invoke-WebRequest -Uri "http://localhost:5000/predict" -Method POST -Headers @{"Content-Type"="application/json"} -Body '{"sepal length (cm)": [5.1], "sepal width (cm)": [3.5], "petal length (cm)": [1.4], "petal width (cm)": [0.2]}'

```
StatusCode        : 200
StatusDescription : OK
Content           : {"prediction":[0]}

RawContent        : HTTP/1.1 200 OK
                    Connection: close
                    Content-Length: 19
                    Content-Type: application/json
                    Date: Fri, 02 Aug 2024 07:02:36 GMT
                    Server: Werkzeug/3.0.3 Python/3.9.19

                    {"prediction":[0]}

Forms             : {}
Headers           : {[Connection, close], [Content-Length, 19], [Content-Type, application/json], [Date,
                    Fri, 02 Aug 2024 07:02:36 GMT]...}
Images            : {}
InputFields       : {}
Links             : {}
ParsedHtml        : System.__ComObject
RawContentLength  : 19
```