

Tugas Pertemuan 3

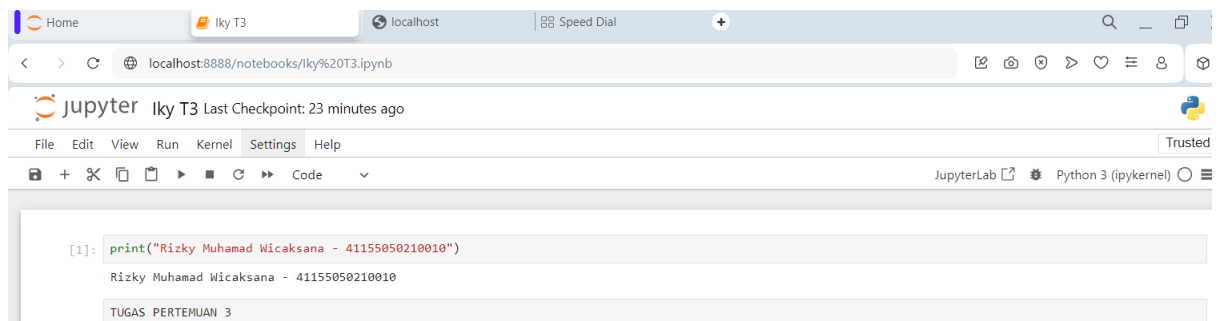
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NPM : 41155050210010

Informatika A1

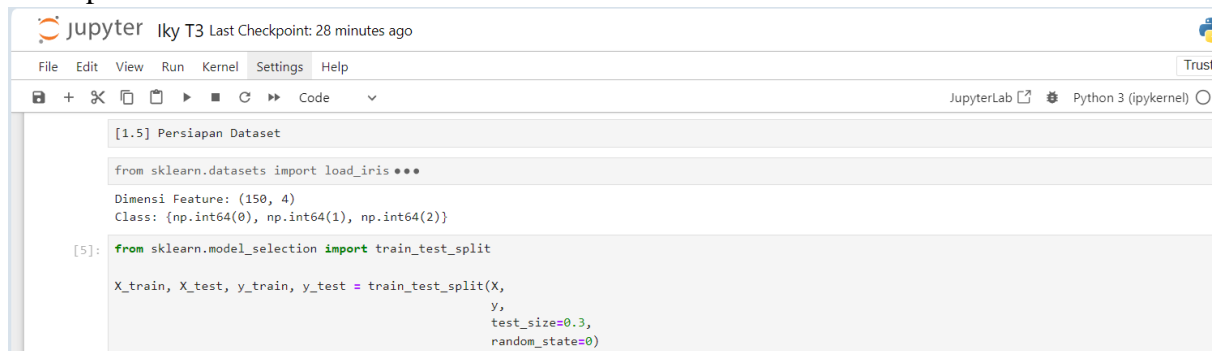
Machine Learning

1. 1.1 Classisfication Task dengan Decision Tree
Terminology: root node, internal node, leaf node
Algoritma Decision Tree
 - ID3
 - C4.5
 - C5.0
- 1.2 Pengenalan Gini Impurity
- 1.3 Pengenalan Information Gain
- 1.4 Membangun Decision Tree



The screenshot shows a JupyterLab window with a single code cell. The code cell contains a print statement: `print("Rizky Muhamad Wicaksana - 41155050210010")`. The output of the cell is displayed below the code, showing the same text: "Rizky Muhamad Wicaksana - 41155050210010". The JupyterLab interface includes a menu bar (File, Edit, View, Run, Kernel, Settings, Help) and a toolbar with various icons for file operations and execution. The status bar at the bottom indicates "JupyterLab" and "Python 3 (ipykernel)".

1.5 Persiapan Dataset



The screenshot shows a JupyterLab window with a code cell. The code cell contains the following code: `from sklearn.datasets import load_iris`, `Dimensi Feature: (150, 4)`, `Class: {np.int64(0), np.int64(1), np.int64(2)}`, `from sklearn.model_selection import train_test_split`, and `X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=0)`. The JupyterLab interface includes a menu bar (File, Edit, View, Run, Kernel, Settings, Help) and a toolbar with various icons for file operations and execution. The status bar at the bottom indicates "JupyterLab" and "Python 3 (ipykernel)".

1.6 Training model Decision Tree Classifier

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JupyterLab Python 3 (ipykernel)

[1.6] Classification dengan DecisionTreeClassifier

[6]: from sklearn.tree import DecisionTreeClassifier

model = DecisionTreeClassifier(max_depth=4)

model.fit(X_train, y_train)

[6]: DecisionTreeClassifier
DecisionTreeClassifier(max_depth=4)
```

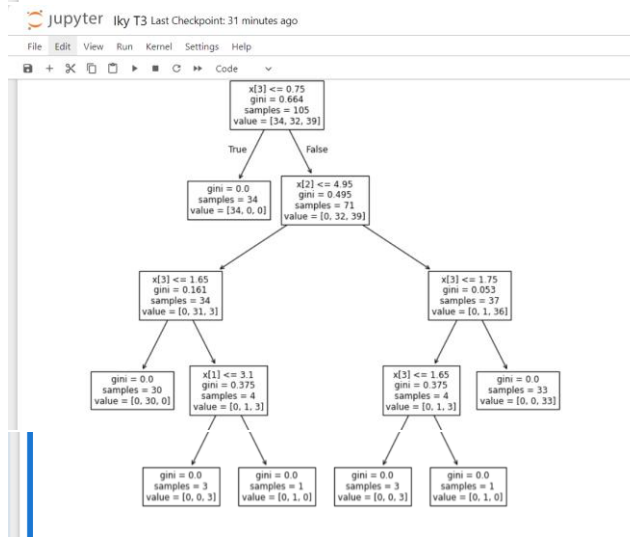
1.7 Visualisasi model Decision Tree

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JupyterLab Python 3 (ipykernel)

[1.7] Visualisasi Model

[8]: import matplotlib.pyplot as plt
from sklearn import tree

plt.rcParams['figure.dpi'] = 85
plt.subplots(figsize=(10, 10))
tree.plot_tree(model, fontsize=10)
plt.show()
```



1.8 Evaluasi model Decision Tree

```
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+ - X Copy Paste Run Code
JupyterLab Python 3 (ipykernel)

[1.8] Evaluasi Model

[9]: from sklearn.metrics import classification_report

y_pred = model.predict(X_test)

print(classification_report(y_test, y_pred))

              precision    recall  f1-score   support

     0       1.00        1.00        1.00        16
     1       1.00        0.94        0.97        18
     2       0.92        1.00        0.96        11

 accuracy          0.98          0.98          0.98          45
  macro avg       0.97          0.98          0.98          45
 weighted avg     0.98          0.98          0.98          45
```

2.0. Classification Task dengan Random Forest

(Model ini termasuk model yang umum ditemui dan merupakan pengembangan dari model Decision Tree)

2.1. Proses training model Machine Learning secara umum

(Proses training selalu diawali dengan Training Set, [x_train], [y_train])

2.2. Pengenalan Ensemble Learning

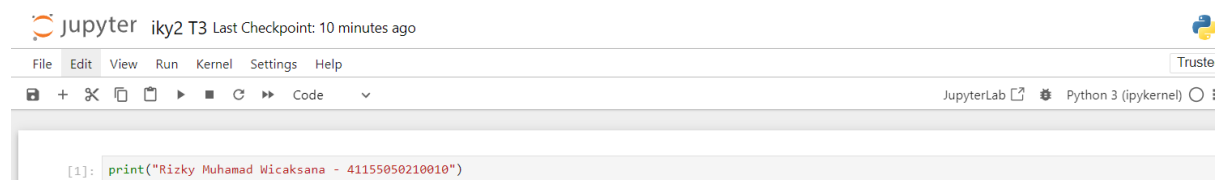
(Merupakan suatu Teknik penggabungan beberapa model untuk melakukan prediksi)

2.3. Pengenalan Bootstrap Aggregating | Bagging

(Mekanisme dasar bagging menerapkan proses Random Sampling with Replacement terhadap Training Set yang kita miliki)

2.4. Pengenalan Random Forest | Hutan Acak

(Random Forest merupakan implementasi yang menerapkan Decision Tree)



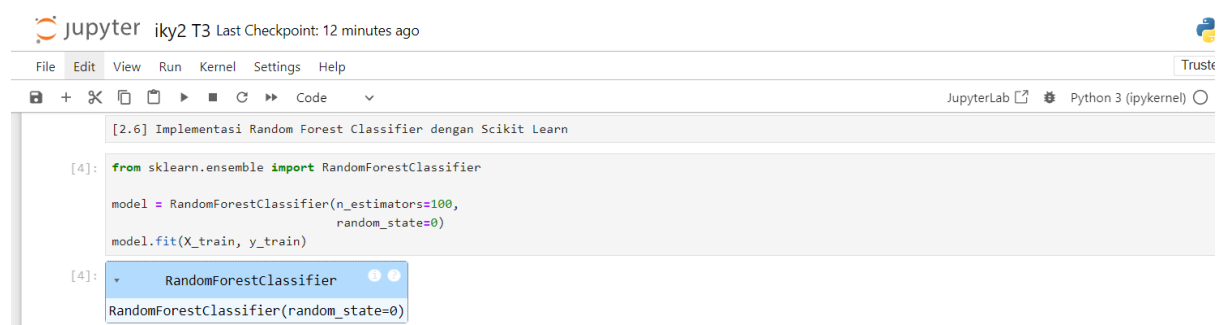
JupyterLab interface showing a single code cell. The code cell contains a print statement: `print("Rizky Muhamad Wicaksana - 41155050210010")`. The output of the cell is: `Rizky Muhamad Wicaksana - 41155050210010`. The interface includes a menu bar (File, Edit, View, Run, Kernel, Settings, Help) and a toolbar with icons for file operations, running, and code execution. The status bar at the bottom indicates "Python 3 (ipykernel)".

2.5. Persiapan dataset | Iris Flower Dataset



JupyterLab interface showing two code cells. The first code cell, labeled "[2.5] Dataset", contains the following code: `from sklearn.datasets import load_iris`, `X, y = load_iris(return_X_y=True)`, `print(f'Dimensi Feature: {X.shape}')`, and `print(f'Class: {set(y)}')`. The output of this cell is: `Dimensi Feature: (150, 4)` and `Class: {np.int64(0), np.int64(1), np.int64(2)}`. The second code cell, labeled "[3]", contains the following code: `from sklearn.model_selection import train_test_split`, `X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=0)`. The interface includes a menu bar (File, Edit, View, Run, Kernel, Settings, Help) and a toolbar with icons for file operations, running, and code execution. The status bar at the bottom indicates "Python 3 (ipykernel)".

2.6. Implementasi Random Forest Classifier dengan Scikit Learn



JupyterLab interface showing two code cells. The first code cell, labeled "[4]", contains the following code: `from sklearn.ensemble import RandomForestClassifier`, `model = RandomForestClassifier(n_estimators=100, random_state=0)`, and `model.fit(X_train, y_train)`. The second code cell, labeled "[4]", contains the following code: `RandomForestClassifier(random_state=0)`. The interface includes a menu bar (File, Edit, View, Run, Kernel, Settings, Help) and a toolbar with icons for file operations, running, and code execution. The status bar at the bottom indicates "Python 3 (ipykernel)".

2.7. Evaluasi model dengan Classification Report

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JupyterLab Python 3 (ipykernel)

```
[2.7] Evaluasi model dengan Classification Report
```

```
[5]: from sklearn.metrics import classification_report

y_pred = model.predict(X_test)

print(classification_report(y_test, y_pred))
```

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 1.00 | 1.00 | 1.00 | 16 |
| 1 | 1.00 | 0.94 | 0.97 | 18 |
| 2 | 0.92 | 1.00 | 0.96 | 11 |
| accuracy | | | 0.98 | 45 |
| macro avg | 0.97 | 0.98 | 0.98 | 45 |
| weighted avg | 0.98 | 0.98 | 0.98 | 45 |