experiment_iris

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1 Pembelajaran Mesin

1.1 Dataset Iris Internal Sklearn

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1.1.1 Persiapan

- Melakukan import yang diperlukan

```
In [1]: %matplotlib inline
        from sklearn.datasets import load_iris
        from sklearn import tree
        from sklearn.neural_network import MLPClassifier
        from sklearn.model_selection import cross_val_score, train_test_split
        from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
        import matplotlib.pyplot as plt
        import itertools
        import numpy as np
        import seaborn as sns
        import pandas as pd
        import graphviz
```

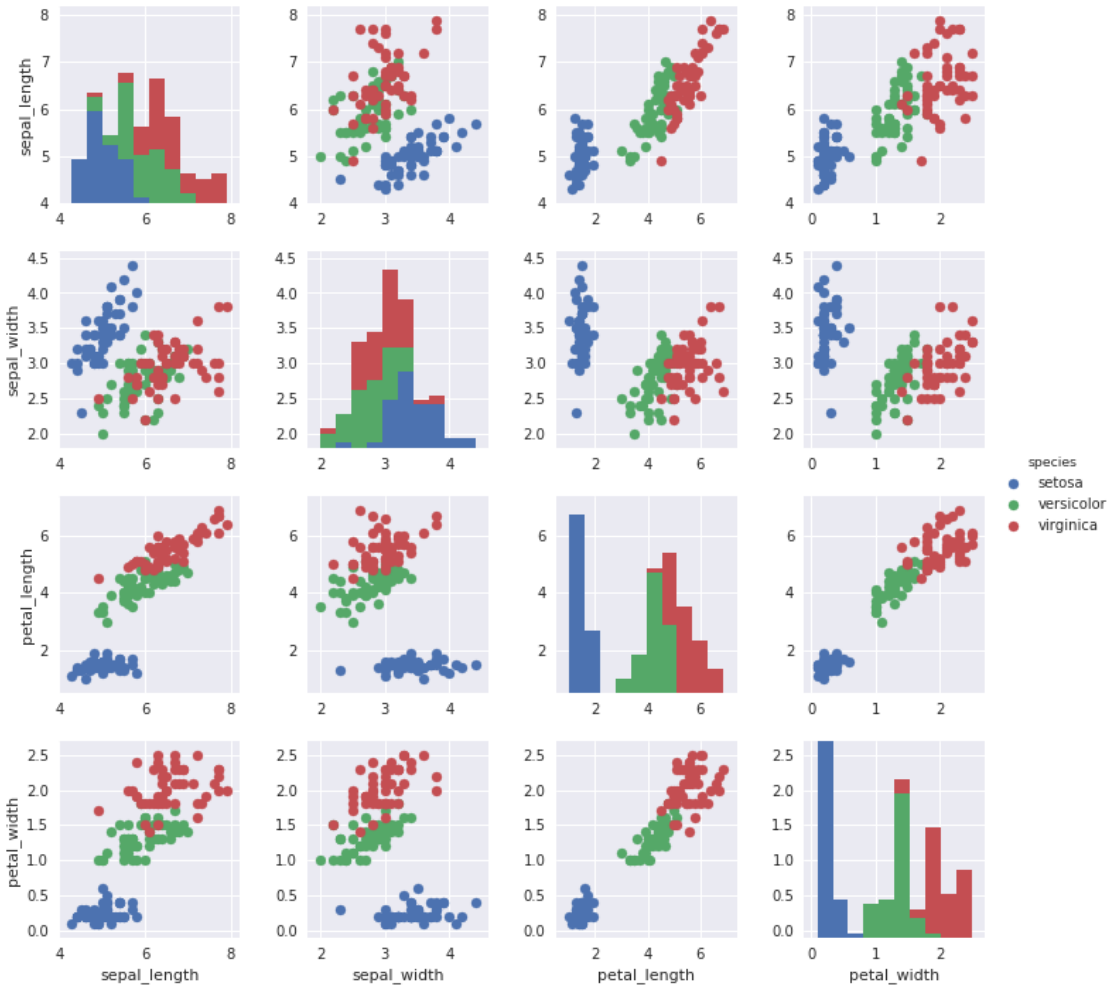
- Mengambil atau men-load data iris internal dari sklearn.datasets

```
In [2]: iris = load_iris()
```

- Visualisasi hubungan antar fitur

Agar mudah data yang digunakan yaitu pada seaborn sehingga struktur data sesuai dengan yang dibutuhkan untuk menggambar hubungan antar features.

```
In [3]: sns.set(color_codes=True)
        iris_features = sns.load_dataset("iris")
        g = sns.PairGrid(iris_features, hue="species")
        g.map_diag(plt.hist)
        g.map_offdiag(plt.scatter)
        g.add_legend();
```



1.1.2 Pembelajaran dengan Full Training

- Melakukan pembelajaran full training dengan DTL

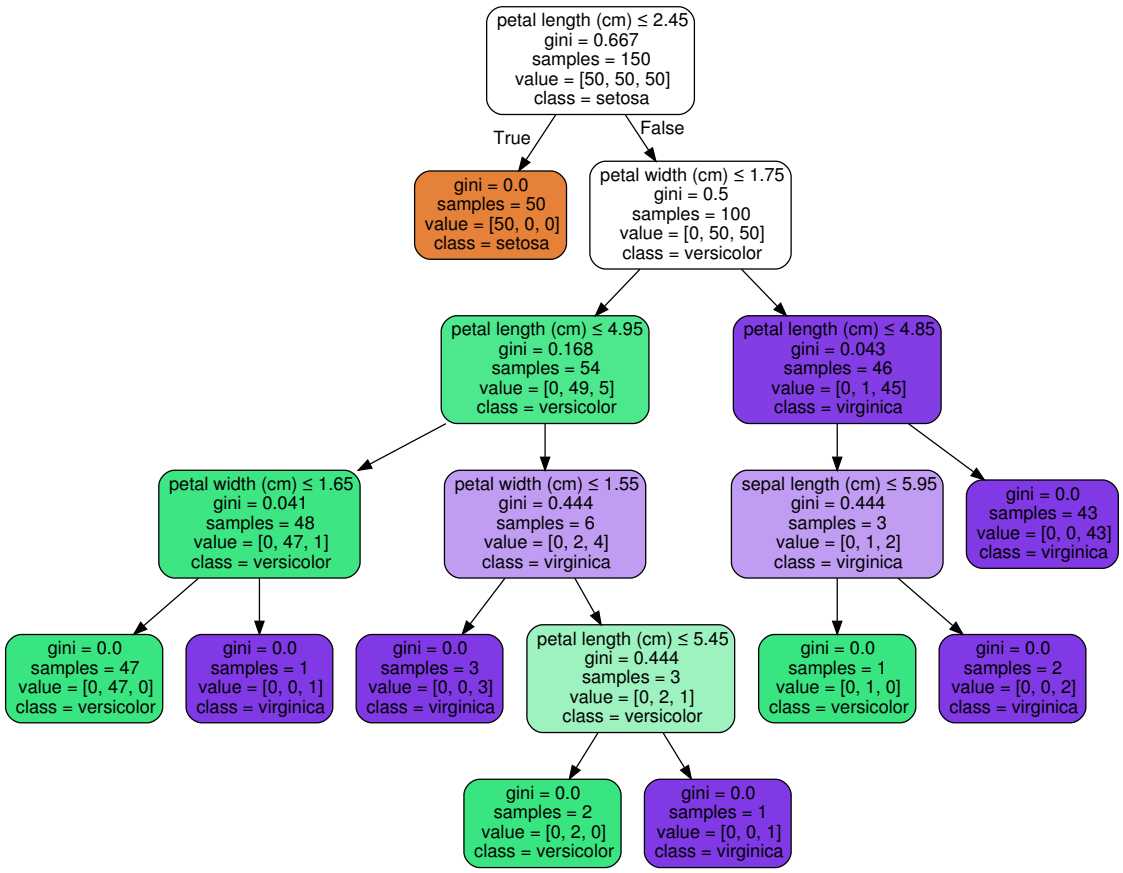
```
In [4]: clf = tree.DecisionTreeClassifier()
        clf = clf.fit(iris.data, iris.target)
        clf
```

```
Out[4]: DecisionTreeClassifier(class_weight=None, criterion='gini', max_depth=None,
                    max_features=None, max_leaf_nodes=None,
                    min_impurity_decrease=0.0, min_impurity_split=None,
                    min_samples_leaf=1, min_samples_split=2,
                    min_weight_fraction_leaf=0.0, presort=False, random_state=None,
                    splitter='best')
```

- Hasil Pohon

```
In [5]: dot_data = tree.export_graphviz(clf, out_file=None,
                                        feature_names=iris.feature_names,
                                        class_names=iris.target_names,
                                        filled=True, rounded=True,
                                        special_characters=True)
        graph = graphviz.Source(dot_data)
        graph
```

Out[5]:



- Full training dengan ANN (Multi Layer Perceptron)

```
In [6]: ann = MLPClassifier(solver='lbfgs', alpha=1e-5, hidden_layer_sizes=(5, 2), random_state=
        ann.fit(iris.data, iris.target)
```

```
Out[6]: MLPClassifier(activation='relu', alpha=1e-05, batch_size='auto', beta_1=0.9,
                beta_2=0.999, early_stopping=False, epsilon=1e-08,
                hidden_layer_sizes=(5, 2), learning_rate='constant',
                learning_rate_init=0.001, max_iter=200, momentum=0.9,
                nesterovs_momentum=True, power_t=0.5, random_state=1, shuffle=True,
                solver='lbfgs', tol=0.0001, validation_fraction=0.1, verbose=False,
                warm_start=False)
```

- Menampilkan weigth pada hidden layer

```
In [7]: ann.coefs_
```

```
Out[7]: [array([[-0.13550239,  0.3597881 , -0.81630916, -0.3227893 , -0.57684476],
                [-0.66570776, -0.51233452, -0.25219808, -0.16857787,  0.06338741],
                [-0.1319547 ,  0.30246194, -0.48262707,  0.6174627 , -0.77177221],
                [ 0.27837206, -0.13504058,  0.09584001, -0.5872452 , -0.49299781]]),
         array([[ 0.73066898, -0.76834821],
                [-0.85350401, -0.61135478],
                [ 0.7001833 , -0.74371656],
                [-0.14608018,  0.84784599],
                [ 0.06141013,  0.35528709]]),
         array([[ 0.73312753, -1.05537667,  0.5480383 ],
                [ 1.07104013,  0.54370328, -0.48102273]])]
```

- Vector bias

```
In [8]: ann.intercepts_
```

```
Out[8]: [array([ 0.49111382,  0.76466795, -0.30467704,  0.31406152,  0.61464091]),
         array([-0.34159867,  0.34533261]),
         array([-0.11660927, -0.11662606, -0.11643325])]
```

1.1.3 Pembelajaran dengan Split Training

- Membagi data

```
In [9]: X_train, X_test, y_train, y_test = train_test_split(iris.data, iris.target, test_size=0.
```

- Pembelajaran dengan DTL dan akurasinya

```
In [10]: split = tree.DecisionTreeClassifier()
         split = split.fit(X_train, y_train)
         y_predict = split.predict(X_test)
         accuracy = accuracy_score(y_test, y_predict)
         print('Akurasi: {} %'.format(accuracy * 100))
```

```
Akurasi: 100.0 %
```

- Fungsi untuk menggambarkan confusion matrix

```
In [11]: def plot_confusion_matrix(cm, classes,
                                   normalize=False,
                                   title='Confusion matrix',
                                   cmap=plt.cm.Blues):
             """
             This function prints and plots the confusion matrix.
             Normalization can be applied by setting `normalize=True`.
```

```
    """
    if normalize:
        cm = cm.astype('float') / cm.sum(axis=1)[:, np.newaxis]
        print("Normalized confusion matrix")
    else:
        print('Confusion matrix, without normalization')

    print(cm)

    plt.imshow(cm, interpolation='nearest', cmap=cmap)
    plt.title(title)
    plt.colorbar()
    tick_marks = np.arange(len(classes))
    plt.xticks(tick_marks, classes, rotation=45)
    plt.yticks(tick_marks, classes)

    fmt = '.2f' if normalize else 'd'
    thresh = cm.max() / 2.
    for i, j in itertools.product(range(cm.shape[0]), range(cm.shape[1])):
        plt.text(j, i, format(cm[i, j], fmt),
                 horizontalalignment="center",
                 color="white" if cm[i, j] > thresh else "black")

    plt.tight_layout()
    plt.ylabel('True label')
    plt.xlabel('Predicted label')
```

- Hasil klasifikasi dengan DTL

```
In [12]: print(classification_report(y_test, y_predict, target_names=iris.target_names))
```

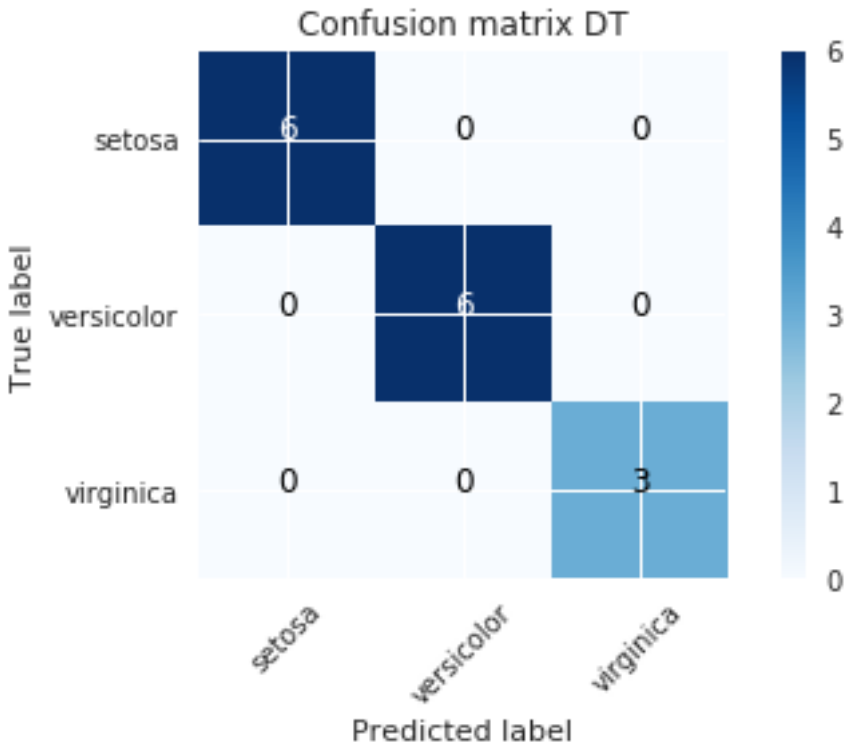
```
             precision    recall  f1-score   support

     setosa       1.00      1.00      1.00         6
 versicolor       1.00      1.00      1.00         6
  virginica       1.00      1.00      1.00         3

avg / total       1.00      1.00      1.00        15
```

- Confusion Matrix pada DTL

```
In [13]: cnf_matrix = confusion_matrix(y_test, y_predict)
         plt.figure()
         plot_confusion_matrix(cnf_matrix, classes=iris.target_names,
                               title='Confusion matrix DT')
```

```
Confusion matrix, without normalization
[[6 0 0]
```

```
[0 6 0]
[0 0 3]]
```



- Pembelajaran dengan ANN dan akurasinya

```
In [14]: ann_split = MLPClassifier(solver='lbfgs', alpha=1e-5, hidden_layer_sizes=(5, 2), random
         ann_split.fit(X_train, y_train)
         y_ann_predict = ann_split.predict(X_test)
         accuracy_ann = accuracy_score(y_test, y_ann_predict)
         print('Akurasi: {} %'.format(accuracy_ann * 100))

Akurasi: 20.0 %
```

- Hasil klasifikasi dengan ANN

```
In [15]: print(classification_report(y_test, y_ann_predict, target_names=iris.target_names))

             precision    recall  f1-score   support

     setosa       0.00      0.00      0.00         6
 versicolor       0.00      0.00      0.00         6
  virginica       0.20      1.00      0.33         3
```

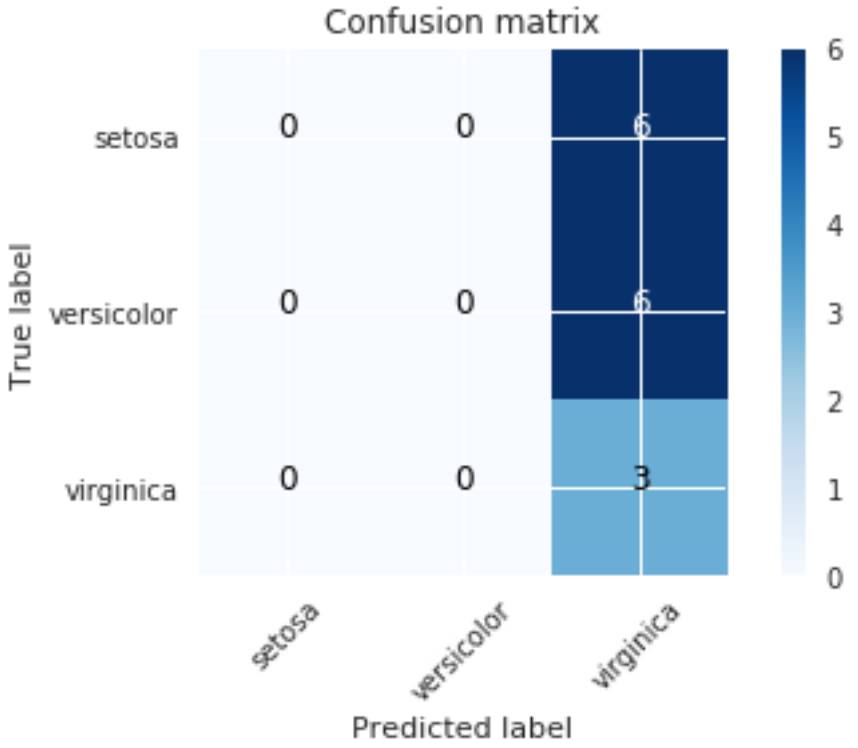
```
avg / total       0.04      0.20      0.07        15
```

```
/usr/local/lib/python3.5/dist-packages/sklearn/metrics/classification.py:1135: UndefinedMetricWa
  'precision', 'predicted', average, warn_for)
```

- Confusion Matrix pada ANN

```
In [16]: cnf_matrix_ann = confusion_matrix(y_test, y_ann_predict)
         plt.figure()
         plot_confusion_matrix(cnf_matrix_ann, classes=iris.target_names,
                               title='Confusion matrix')
```

```
Confusion matrix, without normalization
[[0 0 6]
 [0 0 6]
 [0 0 3]]
```



1.1.4 Pembelajaran dengan 10-fold cross validation

- Pembelajaran dengan DTL

```
In [17]: scores = cross_val_score(clf, iris.data, iris.target, cv=10)
         print("Accuracy: %0.2f (+/- %0.2f)" % (scores.mean(), scores.std() * 2))
```

```
Accuracy: 0.96 (+/- 0.09)
```

- Pembelajaran dengan ANN

```
In [18]: scores = cross_val_score(ann, iris.data, iris.target, cv=10)
         print("Accuracy: %0.2f (+/- %0.2f)" % (scores.mean(), scores.std() * 2))
```

```
Accuracy: 0.33 (+/- 0.00)
```

1.1.5 Melakukan Save Model

```
In [19]: from sklearn.externals import joblib
         joblib.dump(clf, 'full_train_dtl.pkl')
         joblib.dump(ann, 'full_train_ann.pkl')
```

```
Out[19]: ['full_train_ann.pkl']
```

1.1.6 Melakukan Load Model

```
In [20]: loaded_model_dtl = joblib.load('full_train_dtl.pkl')
         loaded_model_ann = joblib.load('full_train_ann.pkl')
```

1.1.7 Predict New Instance

- New Instance

```
In [21]: new_instance = []
         for iris_attr in iris.feature_names:
             value = input("Value for "+iris_attr+": ")
             new_instance.append(value)

         print(new_instance)
```

```
Value for sepal length (cm): 5.1
Value for sepal width (cm): 3.5
Value for petal length (cm): 1.4
Value for petal width (cm): 0.2
['5.1', '3.5', '1.4', '0.2']
```

- Predict with DTL

```
In [22]: instance = []
         instance.append(new_instance)
         loaded_model_dtl.predict(instance)

Out[22]: array([0])
```

- Predict with ANN

```
In [23]: instance_in_float = [float(i) for i in new_instance]
         instance_ann = []
         instance_ann.append(instance_in_float)
         loaded_model_ann.predict(instance_ann)

Out[23]: array([2])
```