Tugas Pertemuan Minggu ke - 5 - Klasifikasi dengan Naive Bayes

April 2, 2022

0.1 Tugas Pertemuan Minggu ke-5 - Klasifikasi dengan Naive Bayes

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Kerjakan Latihan tahapan klasifikasi dengan naïve bayes pada latihan sebelumnya, dataset bisa diganti / dimodifikasi, simpan dalam naive_bayes.py atau naive_bayes.ipynb, repositorikan file pada github.com dan kirimkan URL github melalui Assignment pada kulino (Pada blok Minggu ke-5).

Link Github : https://github.com/wahyu-adi-n/data-mining-46ug/tree/main/T5

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
dataset = pd.read_excel("../DATASET/datapemilukpu.xls")
```

[3]:
```
dataset.head(5)
```

[3]:
```
   NAMA PARTAI POLITIK        NAMA CALON LEGESLATIF JENIS KELAMIN  KECAMATAN  \
0  HATI NURANI RAKYAT              TOTO SUKISNO,BSc             L   LEBAKSIU
1  HATI NURANI RAKYAT               EDI PURYANTO,SH             L      SLAWI
2  HATI NURANI RAKYAT              ELI RETNOWATI,SH             P      SLAWI
3  HATI NURANI RAKYAT                      SAHYUDIN             L  DUKUHWARU
4  HATI NURANI RAKYAT   H.FAJAR SIGIT KUSUMAJAYA,SH             L      SLAWI

   NO.URUT PARPOL  SUARA SAH PARTAI  JUML.PEROLEHAN KURSI  DAERAH PEMILIHAN  \
0               1             18578                     1                 1
1               1             18578                     1                 1
2               1             18578                     1                 1
3               1             18578                     1                 1
4               1             18578                     1                 2

   NO.URUT CALEG  SUARA SAH CALEG TERPILIH ATAU TIDAK
0            1.0              594               TIDAK
1            2.0              943               TIDAK
2            3.0             1730               TIDAK
3            4.0             2508                  YA
4            1.0              923               TIDAK
```

[4]:

```
x = dataset.iloc[:, :-1].values
y = dataset.iloc[:, -1].values
```

[5]:

```
from sklearn.impute import SimpleImputer
imputer = SimpleImputer(missing_values=np.nan, strategy="constant",␣
 ↪fill_value=1)
x[:, 8:9] = imputer.fit_transform(x[:, 8:9])
```

[6]:

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
y = le.fit_transform(y)
```

[7]:

```
x = x[:, 8:10]
```

[8]:

```
print(x)
```

```
[[1.0 594]
 [2.0 943]
 [3.0 1730]
 [4.0 2508]
 [1.0 923]
 [2.0 308]
 [3.0 54]
 [1.0 1682]
 [2.0 918]
 [3.0 87]
 [1.0 728]
 [2.0 346]
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 [3.0 128]
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 [1.0 804]
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 [1.0 130]
```

```
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[1.0 265]
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[1.0 106]
[1.0 111]
[1.0 93]
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[7.0 1076]
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[9.0 338]
[1.0 720]
```

```
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```

```
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[5.0 2288]
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```

```
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```

```
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```

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```

```
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[4.0 594]
```

```
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 [2.0 79]
 [3.0 82]
 [1.0 1669]
 [2.0 125]
 [3.0 2568]
 [4.0 469]]
```

```
[9]: print(y)
```

```
[0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 0
 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
 1 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0
 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 1 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 1 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 1
 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1
 0 0 1 0 0 1 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
```

[10]:

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.25,␣
 ↪random_state=0)
```

[11]:

```
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
x_train = sc.fit_transform(x_train)
x_test = sc.transform(x_test)
```

[12]:

```
print(x_train)
```

```
[[ 2.69369947 -0.34082057]
 [-0.95373712 -0.71640086]
 [ 1.07261654 -0.66397761]
 [ 0.26207507 -0.50383534]
 [-0.95373712 -0.0384892 ]
 [ 2.28842873  0.39525936]
 [-0.14319566 -0.1483626 ]
 [ 1.883158    0.73062456]
 [-0.54846639 -0.7630791 ]
 [-0.95373712 -0.67905827]
 [-0.14319566 -0.65751447]
 [-0.14319566  0.1467875 ]
 [-0.95373712 -0.72573651]
 [-0.54846639 -0.56415799]
 [-0.54846639 -0.08660369]
 [-0.95373712 -0.47439215]
 [ 2.28842873  0.69759073]
 [-0.95373712 -0.29773296]
 [-0.54846639  0.53098532]
 [-0.54846639  1.19668883]
 [ 1.07261654 -0.75446158]
 [-0.95373712 -0.72860902]
 [ 0.66734581  0.93098193]
 [-0.14319566  0.4017225 ]
 [-0.14319566 -0.25177285]
 [-0.95373712  4.79163141]
 [-0.95373712 -0.58785617]
 [-0.54846639 -0.4758284 ]
 [ 2.28842873  2.90223989]
 [ 0.66734581 -0.48013716]
 [-0.95373712 -0.74009905]
 [-0.95373712  0.31482917]
 [-0.95373712 -0.67834015]
 [ 0.26207507  0.10585428]
 [-0.54846639 -0.61945375]
 [ 1.883158   -0.66613199]
 [ 0.66734581 -0.47008339]
```

```
[-0.95373712  2.16831434]
[ 0.66734581  3.79128083]
[-0.54846639 -0.72142775]
[-0.95373712  0.80890038]
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[-0.14319566 -0.70060208]
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[ 1.07261654 -0.47941903]
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[ 1.47788727 -0.63884317]
[-0.95373712 -0.75374346]
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[-0.95373712 -0.4944997 ]
[-0.54846639 -0.66182323]
[ 0.26207507 -0.53615105]
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[-0.14319566 -0.5052716 ]
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[ 0.26207507  3.0580734 ]
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```

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[-0.95373712 -0.61442686]
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[-0.14319566 -0.7120921 ]
[-0.95373712 -0.70850147]
[-0.95373712 -0.17852392]
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```

```
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[-0.54846639 -0.39611633]
[ 1.883158   -0.60006433]
[ 0.66734581 -0.56056736]
[-0.95373712 -0.6395613 ]
[ 0.26207507  1.32595165]
[ 1.07261654 -0.6611051 ]
[-0.95373712  1.12272177]
[-0.54846639  2.05844095]
[-0.54846639 -0.11963752]
[ 2.69369947 -0.43417705]
[-0.95373712  2.81031967]
[-0.95373712 -0.71783712]
[ 2.28842873 -0.68193078]
[-0.14319566 -0.48085529]
[-0.54846639 -0.60221871]
[-0.54846639 -0.76810599]
[-0.14319566  0.01824281]
[-0.54846639  0.88071306]
[-0.54846639  2.03115213]
[ 1.07261654 -0.74440781]
[-0.95373712  0.49938774]
[-0.54846639 -0.70275646]
[-0.14319566  1.05952662]
[-0.14319566 -0.60293684]
[-0.14319566  2.31768471]
[-0.95373712 -0.72645464]
[ 1.07261654 -0.70993772]
[ 1.883158    0.82326291]
[ 0.26207507  0.57191855]
```

```
[-0.14319566  0.41177628]
[ 0.66734581 -0.67618577]
[ 0.26207507 -0.32573991]
[-0.95373712 -0.17924205]
[ 1.07261654 -0.63884317]
[-0.95373712  0.11375367]
[-0.14319566 -0.365955  ]
[ 1.47788727 -0.11173813]
[ 1.47788727 -0.31065924]
[-0.95373712 -0.65392384]
[-0.95373712 -0.42268702]
[-0.54846639 -0.33220305]
[-0.95373712 -0.05931488]
[-0.54846639  0.35791677]
[-0.95373712 -0.72070963]
[-0.95373712 -0.59431932]
[-0.54846639 -0.60150058]
[ 1.07261654  0.27245969]
[-0.54846639 -0.65966885]
[-0.95373712 -0.7013202 ]
[-0.95373712 -0.17565141]
[-0.95373712  1.10979549]
[ 1.883158   -0.74871657]
[-0.95373712 -0.75805222]
[ 0.26207507  0.66671128]
[-0.54846639 -0.64027943]
[-0.95373712 -0.69126643]
[-0.95373712 -0.62735315]
[-0.95373712 -0.212994  ]
[-0.14319566  1.63402803]
[-0.95373712  1.04157345]
[-0.95373712 -0.76451536]
[-0.54846639 -0.19791334]
[-0.95373712  0.83188044]
[-0.14319566  0.06492105]
[-0.14319566 -0.2316653 ]
[-0.14319566  0.85414237]
[ 1.07261654 -0.50670785]
[ 1.47788727  0.23368084]
[ 0.26207507 -0.32645803]
[ 0.26207507  0.21357329]
[-0.14319566 -0.32071302]
[-0.54846639 -0.48875468]
[-0.54846639 -0.47367402]
[-0.14319566 -0.47439215]
[-0.54846639  1.54498031]
[-0.54846639 -0.5454867 ]
[-0.54846639  3.76399201]
```

```
 [ 1.07261654  0.6243418 ]
 [ 0.66734581  1.20889699]
 [ 1.07261654 -0.69126643]
 [-0.54846639  0.00890717]
 [-0.54846639 -0.70060208]
 [ 3.0989702  -0.37026377]
 [ 1.883158    0.34929925]
 [-0.54846639 -0.48731843]
 [-0.95373712  0.43403821]
 [-0.95373712 -0.28480668]
 [-0.54846639  0.75432275]
 [-0.54846639  0.01608843]
 [ 1.07261654 -0.31424988]
 [-0.95373712 -0.72286401]
 [-0.14319566 -0.72214588]
 [ 0.26207507 -0.77744164]
 [-0.54846639  0.09220987]
 [-0.95373712 -0.2208934 ]
 [-0.54846639  0.26671467]
 [ 2.69369947  1.94354066]
 [ 0.26207507  2.95969003]
 [-0.54846639 -0.42986829]
 [ 0.26207507  1.33456917]]
```

[13]:

```
print(x_test)
```

```
[[-0.54846639  0.1467875 ]
 [-0.14319566  0.27317781]
 [ 2.69369947  0.56186477]
 [-0.14319566 -0.42268702]
 [ 1.07261654 -0.43130454]
 [-0.14319566 -0.67546764]
 [-0.95373712 -0.74225343]
 [-0.54846639  0.0742567 ]
 [ 1.47788727 -0.76236098]
 [-0.95373712 -0.76882412]
 [-0.95373712  0.58843546]
 [ 0.26207507  1.05378161]
 [ 2.69369947 -0.59575557]
 [ 1.47788727  2.48285386]
 [-0.14319566 -0.65248758]
 [-0.54846639 -0.64458819]
 [-0.95373712 -0.72932715]
 [ 1.07261654 -0.76666974]
 [-0.95373712  0.37443369]
 [-0.95373712 -0.71424648]
 [-0.54846639  0.80028286]
 [-0.54846639  0.64732186]
```

```
[-0.54846639  0.69974511]
[-0.14319566  0.74139646]
[-0.95373712  2.22791886]
[ 1.47788727  0.41393066]
[ 2.28842873 -0.54189606]
[-0.14319566 -0.69270268]
[-0.95373712  0.64014059]
[ 2.28842873 -0.50598972]
[-0.54846639 -0.23741031]
[ 1.47788727  0.49507898]
[-0.14319566 -0.78462291]
[-0.95373712  1.27711903]
[-0.14319566 -0.77169663]
[ 1.47788727 -0.01191851]
[ 0.26207507  0.43691072]
[ 0.66734581  0.85845113]
[ 0.66734581 -0.05428799]
[ 0.26207507 -0.44782146]
[ 1.47788727 -0.37170002]
[-0.95373712  6.34278521]
[-0.14319566 -0.74584406]
[-0.54846639 -0.10742937]
[-0.95373712  1.10692299]
[-0.14319566  0.16904943]
[-0.14319566 -0.1993496 ]
[ 0.66734581 -0.48085529]
[-0.14319566  0.18484822]
[ 0.26207507 -0.21730276]
[ 1.47788727 -0.42627765]
[-0.14319566 -0.65536009]
[-0.95373712 -0.67762202]
[-0.14319566  0.37946058]
[-0.14319566 -0.71927337]
[ 0.26207507 -0.64961508]
[-0.95373712 -0.14477196]
[-0.95373712 -0.26182662]
[-0.95373712 -0.20724899]
[ 0.26207507 -0.61442686]
[ 0.66734581 -0.1806783 ]
[-0.95373712  0.90082061]
[-0.95373712 -0.12179191]
[-0.95373712 -0.58570179]
[ 2.28842873 -0.57421177]
[ 0.26207507  0.06635731]
[ 0.26207507 -0.64387006]
[-0.54846639 -0.56343986]
[-0.95373712 -0.75877034]
[ 0.26207507  0.38089683]
```

```
 [-0.95373712  0.42326631]
 [-0.95373712  0.34427236]
 [-0.95373712 -0.70491084]
 [-0.95373712 -0.08660369]
 [ 0.26207507 -0.57205739]
 [-0.54846639 -0.67834015]
 [-0.95373712 -0.70347458]
 [ 1.883158   -0.61873563]
 [-0.95373712  1.17945379]
 [ 1.883158   -0.78390478]
 [ 0.66734581 -0.43920393]
 [-0.54846639 -0.69772957]
 [-0.95373712  0.143915  ]
 [-0.14319566 -0.4542846 ]
 [ 0.26207507  0.76796715]
 [ 0.66734581  0.75073211]
 [ 2.28842873 -0.69413894]
 [-0.54846639 -0.51891601]
 [-0.14319566 -0.72573651]
 [ 0.26207507  0.93241818]
 [-0.95373712  0.97119703]
 [-0.14319566 -0.32573991]
 [-0.54846639 -0.13687257]
 [-0.54846639 -0.12538254]
 [ 1.883158   -0.11173813]
 [ 0.66734581 -0.37313627]
 [-0.95373712  0.08646486]
 [-0.95373712 -0.72573651]
 [-0.95373712  0.24086211]
 [-0.95373712  0.76078589]]
```

[14]:

```python
print(f"Number of elemen x_train : {len(x_train)}")
print(f"Number of elemen x_test : {len(x_test)}")
print(f"Number of elemen y_train : {len(y_train)}")
print(f"Number of elemen y_train : {len(y_test)}")
```

```
Number of elemen x_train : 300
Number of elemen x_test : 100
Number of elemen y_train : 300
Number of elemen y_train : 100
```

[15]:

```python
from sklearn.naive_bayes import GaussianNB
classifier = GaussianNB()
classifier.fit(x_train, y_train)
```

[15]:

```
GaussianNB()
```

[16]:

```python
y_pred = classifier.predict(x_test)
```

[17]:

```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
```

[18]:

```
print(cm)
```

```
[[88  1]
 [ 7  4]]
```

[19]:

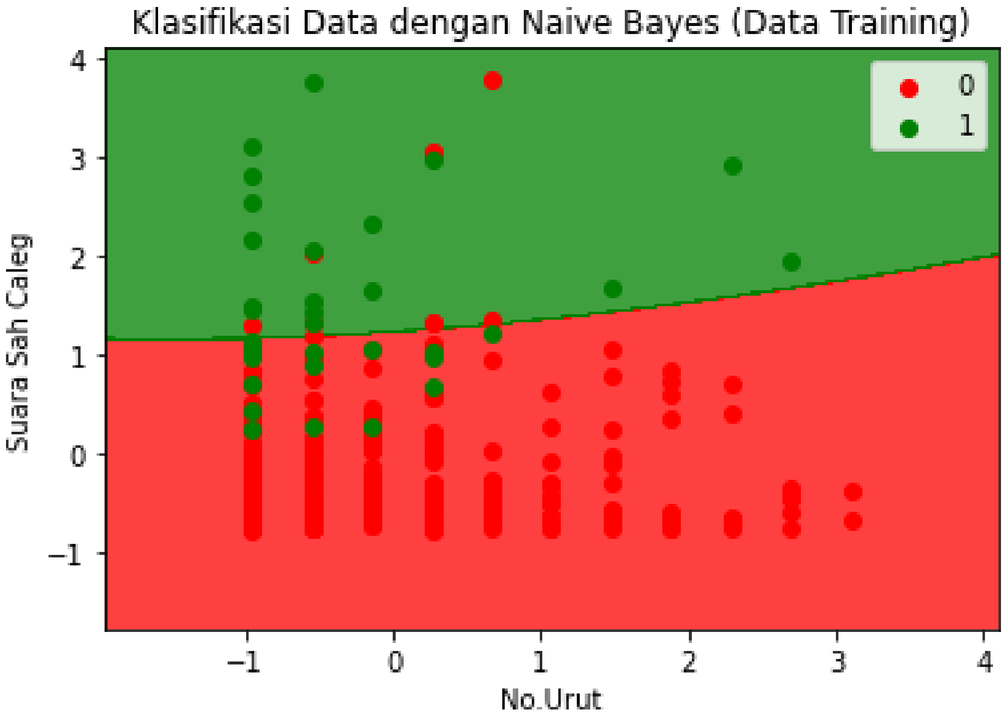
```
from matplotlib.colors import ListedColormap
x_set, y_set = x_train, y_train
```

[20]:

```
x1, x2 = np.meshgrid(
    np.arange(start=x_set[:, 0].min() - 1, stop=x_set[:, 0].max() + 1, step=0.
 ↪01),
    np.arange(start=x_set[:, 1].min() - 1, stop=x_set[:, 0].max() + 1, step=0.
 ↪01),
)

plt.contourf(x1,x2, classifier.predict(np.array([x1.ravel(), x2.ravel()]).T).
 ↪reshape(x1.shape), alpha=0.75, cmap = ListedColormap(("red", "green")))
plt.xlim(x1.min(), x1.max())
plt.ylim(x2.min(), x2.max())
for i,j in enumerate(np.unique(y_set)):
    plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1],
                c = ListedColormap(("red", "green"))(i), label = j)
plt.title("Klasifikasi Data dengan Naive Bayes (Data Training)")
plt.xlabel("No.Urut")
plt.ylabel("Suara Sah Caleg")
plt.legend()
plt.show()
```

```
*c* argument looks like a single numeric RGB or RGBA sequence, which should be
avoided as value-mapping will have precedence in case its length matches with
*x* & *y*.  Please use the *color* keyword-argument or provide a 2-D array with
a single row if you intend to specify the same RGB or RGBA value for all points.
*c* argument looks like a single numeric RGB or RGBA sequence, which should be
avoided as value-mapping will have precedence in case its length matches with
*x* & *y*.  Please use the *color* keyword-argument or provide a 2-D array with
a single row if you intend to specify the same RGB or RGBA value for all points.
```

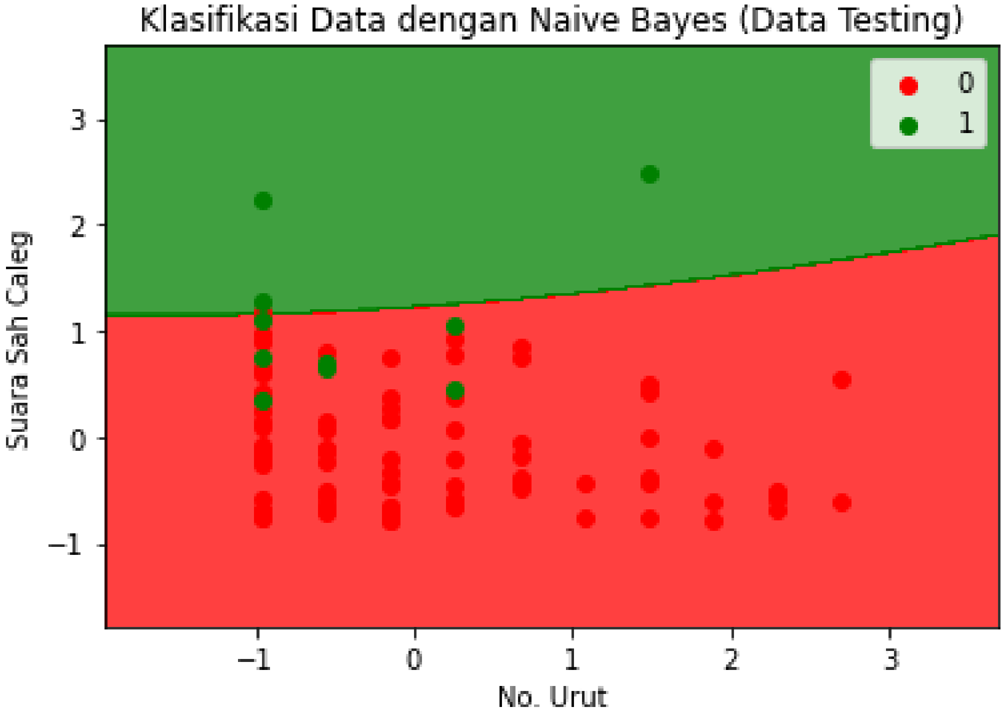


```
[21]: x_set, y_set = x_test, y_test
      x1, x2 = np.meshgrid(
          np.arange(start=x_set[:, 0].min() - 1, stop=x_set[:, 0].max() + 1, step=0.
       ↪01),
          np.arange(start=x_set[:, 1].min() - 1, stop=x_set[:, 0].max() + 1, step=0.
       ↪01),
      )

      plt.contourf(x1,x2, classifier.predict(np.array([x1.ravel(), x2.ravel()]).T).
       ↪reshape(x1.shape), alpha=0.75, cmap = ListedColormap(("red", "green")))
      plt.xlim(x1.min(), x1.max())
      plt.ylim(x2.min(), x2.max())
      for i,j in enumerate(np.unique(y_set)):
          plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1],
                      c = ListedColormap(("red", "green"))(i), label = j)
      plt.title("Klasifikasi Data dengan Naive Bayes (Data Testing)")
      plt.xlabel("No. Urut")
      plt.ylabel("Suara Sah Caleg")
      plt.legend()
      plt.show()
```

```
*c* argument looks like a single numeric RGB or RGBA sequence, which should be
avoided as value-mapping will have precedence in case its length matches with
*x* & *y*.  Please use the *color* keyword-argument or provide a 2-D array with
```

```
a single row if you intend to specify the same RGB or RGBA value for all points.
*c* argument looks like a single numeric RGB or RGBA sequence, which should be
avoided as value-mapping will have precedence in case its length matches with
*x* & *y*.  Please use the *color* keyword-argument or provide a 2-D array with
a single row if you intend to specify the same RGB or RGBA value for all points.
```


Klasifikasi Data dengan Naive Bayes (Data Testing)
● 0
● 1
Suara Sah Caleg
No. Urut