

LAMPIRAN

Lampiran 1. Surat Riset



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET
DAN TEKNOLOGI
UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN JAKARTA
FAKULTAS ILMU KOMPUTER

Jalan Rumah Sakit Fatmawati, Pondok Labu, Jakarta Selatan 12450
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Nomor : 431 /UN61/HK.09/2023
Hal : Permohonan Riset Mahasiswa

13 April 2023

Yth. **Drs. H. NASRUDIN, M.M.Pd.**

a Dinas Pemberdayaan Perempuan, Perlindungan Anak dan Keluarga Berencana

Dalam rangka penulisan Tugas Akhir/ Skripsi bagi Mahasiswa Fakultas Ilmu Komputer, dengan ini kami mohon kesediaan Bapak/Ibu berkenan menerima mahasiswa di bawah ini untuk melakukan riset sebagai bahan penyusunan Skripsi/Tugas Akhir dengan judul "Prediksi Stunting pada Balita Kabupaten Majalengka Menggunakan Metode Random Forest".

No.	Nama Mahasiswa	NIM	Program Studi	No. HP
1.	Rizky Yaomal Malik	2010512081	S1 Sistem informasi	89509916647

Kegiatan riset untuk mendapatkan data yang akan dilaksanakan selama 5 bulan. Terhitung dimulai pada bulan April 2023 sampai dengan September 2023.

Demikian untuk menjadi maklum atas perhatian serta kerja sama yang diberikan kami mengucapkan terimakasih.



Dr. Ermatita, M.Kom
NIP. 196709132006042001

Lampiran 2. Surat Pengantar Penelitian



PEMERINTAH KABUPATEN MAJALENGKA
BADAN KESATUAN BANGSA DAN POLITIK

Jalan K.H. Abdul Halim No. 522, Majalengka 45413
 Telp/Fax (0233) 282511, email : Bakesbangpol@majalengkakab.go.id
 Website : bakesbangpol.majalengkakab.go.id

Majalengka, 03 Mei 2023

Kepada :

- Yth. 1. Kepala Dinas Kesehatan Kab. Majalengka
 2. Kepala Dinas Pemberdayaan Perempuan, Perlindungan Anak dan Keluarga Berencana Kab. Majalengka
 di
 MAJALENGKA

SURAT PENGANTAR

Nomor : PP.05.01/164/Kesbang

- A. Dasar** :
1. Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 3 Tahun 2018 Tentang Penerbitan Surat Keterangan Penelitian, pasal 5 ayat (1) dan (2);
 2. Surat Kepala Badan Kesatuan Bangsa dan Politik Nomor 070/310/Bakesbangpol Tanggal 27 Oktober 2021 tentang Sosialisasi Terkait Ketentuan Surat Keterangan Penelitian;
- B. Mempertimbangkan** :
- Surat dari Dekan Fakultas Ilmu Komputer Universitas Pembangunan Nasional Veteran Jakarta, Nomor 431/UN61/HK.09/2023, Tanggal 13 April 2023, Perihal Permohonan Rekomendasi Riset Mahasiswa
- Dengan ini kami sampaikan bahwa :
1. Nama : Rizky Yaomal Melik
 2. Tempat, Tanggal Lahir : Majalengka, 24-11-2000
 3. Nomor Telepon : 089509916647
 4. NIM/NPM/NRP/NIDN/NPP/NIPD : 2010512081
 5. Agama : Islam
 6. Pekerjaan : Pelajar/Mahasiswa
 7. Alamat : Blok Jumat RT/RW 002/009 Desa Sukasari Kaler Kecamatan Argapura Kabupaten Majalengka
 8. Judul : Analisis Faktor Penyebab Prediksi Stunting pada Balita Kabupaten Majalengka Menggunakan Metode Random Forest
 9. Lokasi : Dinas Kesehatan Kab. Majalengka dan Dinas Pemberdayaan Perempuan, Perlindungan Anak dan Keluarga Berencana Kab. Majalengka
 10. Waktu : 03 Mei – 30 September 2023
- C. Surat pengantar ini diberikan kepada yang bersangkutan, sesuai dengan ketentuan bahwa :**
1. Setiap peneliti dalam melakukan penelitian harus memiliki SKP;
 2. SKP dikecualikan terhadap :
 - a. Penelitian yang dilakukan dalam rangka tugas akhir pendidikan/sekolah di dalam negeri; dan
 - b. Penelitian yang dilakukan instansi pemerintah yang sumber pendanaan penelitiannya bersumber dari Anggaran Pendapatan dan Belanja Negara/Anggaran Pendapatan dan Belanja Daerah;
 3. Untuk penelitian sebagaimana angka 2, Pimpinan Badan Kesbangpol dan Dinas/Instansi/Badan/Lembaga/Perusahaan Daerah berhak untuk menolak apabila penelitian menimbulkan dampak negatif, serta wajib menerapkan protokol kesehatan dengan pendekatan 5 M;
 4. Surat pengantar ini dibuat untuk pencatatan dan pengendalian terhadap kegiatan penelitian dan pelaksanaan pelaporan hasil kajian.
- D. Setelah melaksanakan kegiatan penelitian agar melaporkan kepada Bupati Majalengka Cq. Kepala Badan Kesatuan Bangsa dan Politik Kabupaten Majalengka berbentuk *hard copy dan soft copy*.**

Kepala Badan Kesatuan Bangsa dan Politik



Dr. H. Hari Rahyubi, M.Pd.
 Pembina Utama Muda
 NIP.196608221989031005

Tembusan disampaikan kepada :

1. Yth. Bapak Bupati Majalengka (sebagai laporan);
2. Yth. Kepala Bappedalitbang Kabupaten Majalengka;
3. Yth. Dekan Fakultas Ilmu Komputer Universitas Pembangunan Nasional Veteran Jakarta.

Lampiran 3. Hasil Cek Plagiasi

Analisis Prediksi Keluarga Beresiko Stunting Menggunakan Metode Naive Bayes dan SMOTE

by Rizky Yaomal Malik 2010512081


Submission date: 14-Mar-2024 11:43AM (UTC+0700)

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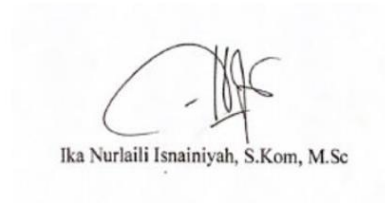
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INSTALL LIBRARY

```
!pip install autoviz
!pip install pycaret
```

```

Requirement already satisfied: autoviz in /usr/local/lib/python3.10/dist-packages (0.1.808)
Requirement already satisfied: emoji in /usr/local/lib/python3.10/dist-packages (from autoviz) (2.11.0)
Requirement already satisfied: fsspec>=0.8.3 in /usr/local/lib/python3.10/dist-packages (from autoviz) (2023.6.0)
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Requirement already satisfied: statsmodels in /usr/local/lib/python3.10/dist-packages (from autoviz) (0.14.1)
Requirement already satisfied: textblob in /usr/local/lib/python3.10/dist-packages (from autoviz) (0.17.1)
Requirement already satisfied: typing-extensions>=4.1.1 in /usr/local/lib/python3.10/dist-packages (from autoviz) (4.11.0)
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Requirement already satisfied: colorcet in /usr/local/lib/python3.10/dist-packages (from holoviews<=1.14.9->autoviz) (3.1.0)
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Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib<=3.7.4->autoviz) (1.2.1)
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```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report
from sklearn.metrics import accuracy_score
```

DATA SELECTION

```
#LOAD DATA
df = pd.read_csv('/content/datasetbrst.csv')
```

```
df.head(10)
```

```

sumber air minum
buruk
sanitasi buruk
terlalu muda
istri
terlalu tua
istri
terlalu dekat
umur
terlalu banyak
anak
beresiko
stunting
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
2      0.0      0.0      0.0      0.0      0.0      0.0      0      0
3      0.0      0.0      0.0      0.0      0.0      0.0      0      0
4      0.0      0.0      0.0      0.0      0.0      0.0      0      0
5      0.0      0.0      0.0      0.0      0.0      0.0      0      0
6      0.0      0.0      0.0      0.0      0.0      0.0      0      0
7      0.0      0.0      0.0      0.0      1.0      0.0      1      1
8      0.0      0.0      0.0      0.0      1.0      0.0      0      1
```

```
df.info()
```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7517 entries, 0 to 7516
Data columns (total 7 columns):
#   Column              Non-Null Count  Dtype
---  -
0   sumber air minum  7514 non-null    float64
1   sanitasi buruk     7514 non-null    float64
2   terlalu muda istri  6728 non-null    float64
3   terlalu tua istri   6730 non-null    float64
4   terlalu dekat umur  6725 non-null    float64
5   terlalu banyak anak 6731 non-null    object
6   beresiko stunting  6732 non-null    object
dtypes: float64(5), object(2)
memory usage: 411.2+ KB
```

```
pd.concat([df.head(6), df.tail(4)])
```

7/21/24, 10:03 AM

keluarga_beresiko_stunting - Colab

	sumber air minum buruk	sanitasi buruk	terlalu muda istri	terlalu tua istri	terlalu dekat umur	terlalu banyak anak	beresiko stunting
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
2	0.0	0.0	0.0	0.0	0.0	0	0
3	0.0	0.0	0.0	0.0	0.0	0	0
4	0.0	0.0	0.0	0.0	0.0	0	0
5	0.0	0.0	0.0	0.0	0.0	0	0
7513	0.0	1.0	0.0	0.0	0.0	0	1
7514	0.0	1.0	0.0	0.0	0.0	0	1
7515	0.0	1.0	0.0	0.0	0.0	0	1

PREPROCESSING DATA

```
#MENGHITUNG MISSING VALUE
df.isnull().sum()
```

```
sumber air minum buruk    3
sanitasi buruk              3
terlalu muda istri         789
terlalu tua istri          787
terlalu dekat umur         792
terlalu banyak anak        786
beresiko stunting          785
dtype: int64
```

```
#MENGHAPUS MISSING VALUE
df.dropna(inplace=True)
df.reset_index(drop=True, inplace=True)
```

```
# Menampilkan DataFrame setelah penghapusan
pd.concat([df.head(5), df.tail(5)])
```

	sumber air minum buruk	sanitasi buruk	terlalu muda istri	terlalu tua istri	terlalu dekat umur	terlalu banyak anak	beresiko stunting
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
2	0.0	0.0	0.0	0.0	0.0	0	0
3	0.0	0.0	0.0	0.0	0.0	0	0
4	0.0	0.0	0.0	0.0	0.0	0	0
6704	0.0	1.0	0.0	0.0	0.0	0	1
6705	0.0	1.0	0.0	0.0	0.0	0	1
6706	0.0	1.0	0.0	0.0	0.0	0	1
6707	0.0	1.0	0.0	0.0	0.0	0	1

```
#MISSING VALUE SETELAH PREPROCESSING
df.isnull().sum()
```

```
sumber air minum buruk    0
sanitasi buruk              0
terlalu muda istri         0
terlalu tua istri          0
terlalu dekat umur         0
terlalu banyak anak        0
beresiko stunting          0
dtype: int64
```

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```
#INFORMASI DATA SETELAH PREPROCESSING
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6709 entries, 0 to 6708
Data columns (total 7 columns):
#   Column                Non-Null Count  Dtype
---  ---                ---
0   sumber air minum buruk  6709 non-null   float64
1   sanitasi buruk          6709 non-null   float64
2   terlalu muda istri      6709 non-null   float64
3   terlalu tua istri       6709 non-null   float64
4   terlalu dekat umur      6709 non-null   float64
5   terlalu banyak anak     6709 non-null   object
6   beresiko stunting       6709 non-null   object
dtypes: float64(5), object(2)
memory usage: 367.0+ KB
```

▼ TRANSFORMATION DATA

```
#TRANSFORMASI DATA
df = df.astype(int)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6709 entries, 0 to 6708
Data columns (total 7 columns):
#   Column                Non-Null Count  Dtype
---  ---                ---
0   sumber air minum buruk  6709 non-null   int64
1   sanitasi buruk          6709 non-null   int64
2   terlalu muda istri      6709 non-null   int64
3   terlalu tua istri       6709 non-null   int64
4   terlalu dekat umur      6709 non-null   int64
5   terlalu banyak anak     6709 non-null   int64
6   beresiko stunting       6709 non-null   int64
dtypes: int64(7)
memory usage: 367.0 KB
```

```
# Menampilkan DataFrame setelah transformasi data
pd.concat([df.head(5), df.tail(5)])
```

```

sumber    sumber    terlalu    terlalu    terlalu    terlalu    beresiko
air        air        muda      tua        dekat      banyak
minum     minum   muda      tua        dekat      banyak
buruk     buruk   istri     istri     umur      anak
stunting

0         0         0         0         0         0         0
1         0         0         0         0         0         0
2         0         0         0         0         0         0
3         0         0         0         0         0         0
4         0         0         0         0         0         0
6704      0         1         0         0         0         1
6705      0         1         0         0         0         1
6706      0         1         0         0         0         1
6707      0         1         0         0         0         1
```

▼ DATA MINING

PEMBAGIAN VARIABEL X DAN Y

```
#MEMBAGI VARIABEL X DAN Y
x = df.iloc[:, :-1].values
y = df.iloc[:, -1].values
```

```
print(x)
```

https://colab.research.google.com/drive/1RuPpw-qC-taGKyDXdmNiRT-kA2ElpLS#scrollTo=8hBnc_n8of2p&printMode=true

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```

↳ [[0 0 0 0 0]
   [0 0 0 0 0]
   [0 0 0 0 0]
   ...
   [0 1 0 0 0]
   [0 1 0 0 0]
   [0 1 0 0 0]]

```

```
print (y)
```

```
↳ [0 0 0 ... 1 1 1]
```

DATA TRAINING & DATA TESTING

```

#MEMBAGI DATA TRAINING & DATA TESTING
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.2, random_state=42)

```

```

print("x_train = ", len(x_train))
print("x_test = ", len(x_test))
print("y_train = ", len(y_train))
print("y_test = ", len(y_test))

```

```

↳ x_train = 5367
   x_test = 1342
   y_train = 5367
   y_test = 1342

```

DATA ANALISIS

```

#ANALISIS DATA PADA KOLOM BERESIKO STUNTING
class_distribution = np.bincount(y_train)
print(class_distribution)

```

```
↳ [3736 1631]
```

```

# MENGHITUNG
kategori_counts = np.bincount(y_train)

```

```

labels = ['0', '1']
sizes = kategori_counts

```

```

# Warna dan eksplosi
colors = ['#1368d6', '#37acf0']
explode = (0, 0)

```

```

# Membuat exploded pie chart
plt.figure(figsize=(6, 6))
plt.pie(sizes, explode=explode, labels=labels, colors=colors, autopct='%1.1f%%', startangle=55)
plt.title('Distribusi Kategori Beresiko Stunting')
plt.show()

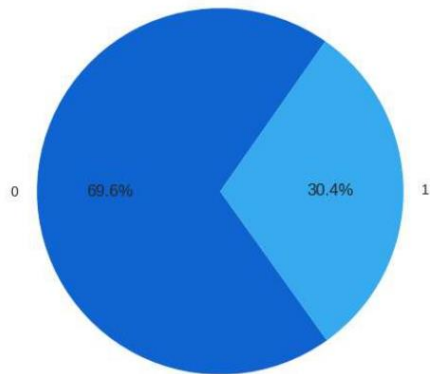
```


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Distribusi Kategori Beresiko Stunting



METODE OVERSAMPLING SMOTE

```
#Penerapan Oversampling SMOTE
from imblearn.over_sampling import SMOTE
sm = SMOTE(random_state=123)

x_train_resampled, y_train_resampled = sm.fit_resample(x_train, y_train)
y_train_resampled_series = pd.Series(y_train_resampled)

#PERBANDINGAN DATA OVERSAMPLING
print('Before Sampling')
print(pd.Series(y_train).value_counts())
print('')
print('After Sampling')
print(y_train_resampled_series.value_counts())
```

Before Sampling

```
0    3736
1    1631
dtype: int64
```

After Sampling

```
1    3736
0    3736
dtype: int64
```

```
x_resampled = pd.DataFrame(x_train_resampled, columns=[f'feature_{i}' for i in range(x_train_resampled.shape[1])])
y_resampled = pd.Series(y_train_resampled, name='target')

train_data = pd.concat([x_resampled, y_resampled], axis=1)

#MENGECEK MISSING VALUES SETELAH OVERSAMPLING
print(pd.Series(y_train).isna().sum())
```

0

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```

# Hitung frekuensi masing-masing kategori
kategori_ytrain = y_train_resampled_series.value_counts()
# Data untuk pie chart
labels = kategori_ytrain.index
sizes = kategori_ytrain.values

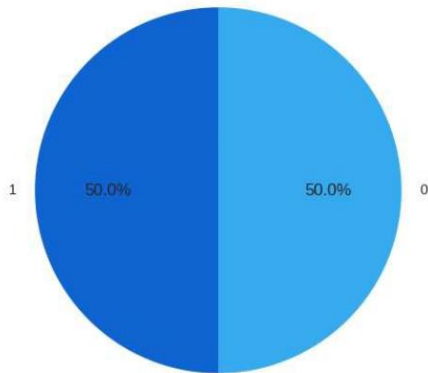
# Warna dan eksplosi
colors = ['#1368d6', '#37acf0']
explode = (1, 0)

# Membuat exploded pie chart
plt.figure(figsize=(6, 6))
plt.pie(sizes, explode=None, labels=labels, colors=colors, autopct='%1.1f%%', startangle=90)
plt.title('Distribusi Kategori Beresiko Stunting Setelah SMOTE')
plt.show()

```



Distribusi Kategori Beresiko Stunting Setelah SMOTE



```

# Inisialisasi Environment PyCaret
#from pycaret.classification import *
#exp1 = setup(data=df, target='beresiko stunting')

```

```

# Perbandingan Model Terbaik
#best_model = compare_models()

```

KORELASI DATA

```

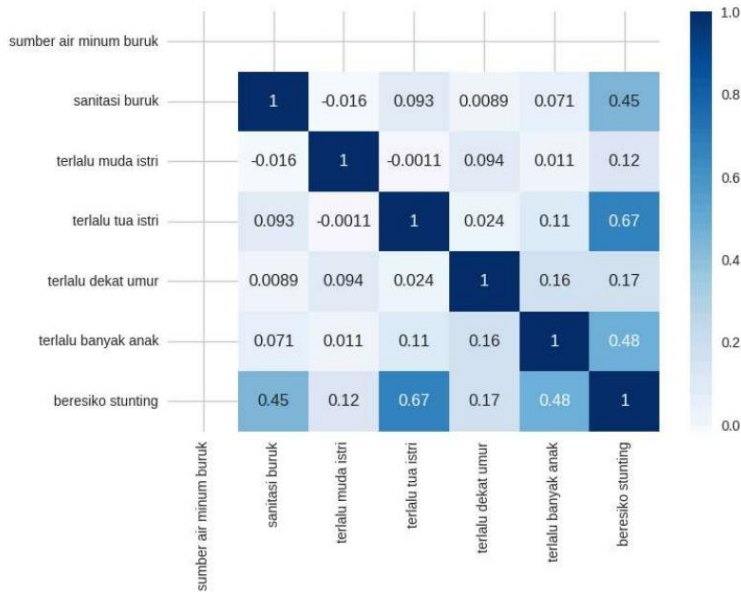
#KORELASI DATA
sns.heatmap(df.corr(), cmap="Blues", annot=True)

```

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<Axes: >



```
df.corr().style.background_gradient().set_precision(1)
```

<Axes: >

	sumber air minum buruk	sanitasi buruk	terlalu muda istri	terlalu tua istri	terlalu dekat umur	terlalu banyak anak	beresiko stunting
sumber air minum buruk	nan	nan	nan	nan	nan	nan	nan
sanitasi buruk	nan	1.0	-0.0	0.1	0.0	0.1	0.4
terlalu muda istri	nan	-0.0	1.0	-0.0	0.1	0.0	0.1
terlalu tua istri	nan	0.1	-0.0	1.0	0.0	0.1	0.7
terlalu dekat umur	nan	0.0	0.1	0.0	1.0	0.2	0.2
terlalu banyak anak	nan	0.1	0.0	0.1	0.2	1.0	0.5

PEMBUATAN MODEL NAIVE BAYES

```
#PEMBUATAN MODEL NAIVE BAYES
classifier = GaussianNB()
classifier.fit(x_train, y_train)
```

<Axes: >

```
GaussianNB()
```

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

<Axes: >

```
array([0, 0, 0, ..., 0, 0, 0])
```

```
classifier.predict_proba(x_test)
```

<Axes: >

```
array([[9.99990257e-01, 9.74307669e-06],
       [9.99990257e-01, 9.74307669e-06],
       [9.99990257e-01, 9.74307669e-06],
       ...,
       [9.99990257e-01, 9.74307669e-06],
```

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```
[9.99990257e-01, 9.74307669e-06],
 [0.00000000e+00, 0.74307669e-06]]
```

▼ EVALUASI MODEL

```
#AKURASI MODEL
```

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

```

precision    recall  f1-score   support

   0         1.00      0.98      0.99         945
   1         0.96      0.99      0.98         397

 accuracy          0.99         1342
 macro avg          0.98         1342
 weighted avg       0.99         1342
```

```
#AKURASI DALAM BENTUK PERSEN
```

```
akurasi = accuracy_score(y_test, y_pred)
print("Tingkat Akurasi : %d" %(akurasi*100), "%")
```

```
Tingkat Akurasi : 98 %
```

```
# Membuat DataFrame untuk menampilkan perbandingan y_test dan y_pred
result_df = pd.DataFrame({'y_test': y_test, 'y_pred': y_pred})
print(result_df)
```

```

y_test  y_pred
0        0        0
1        0        0
2        0        0
3        0        0
4        1        1
...     ...     ...
1337    0        0
1338    0        0
1339    0        0
1340    0        0
1341    0        0
```

```
[1342 rows x 2 columns]
```

```
#CONFUSION MATRIX
```

```
cm = confusion_matrix(y_test, y_pred)
print(cm)
```

```
[[927  18]
 [  2 395]]
```

```
# Visualisasi confusion matrix
```

```
cm = pd.DataFrame(cm, index=['Actual 0', 'Actual 1'], columns=['Predicted 0', 'Predicted 1'])
```

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```

1337    0    0
1338    0    0
1339    0    0
1340    0    0
1341    0    0

```

```
[1342 rows x 2 columns]
```

```
#CONFUSION MATRIX
```

```
cm = confusion_matrix(y_test, y_pred)
print(cm)
```

```
[[927  18]
 [   2 395]]
```

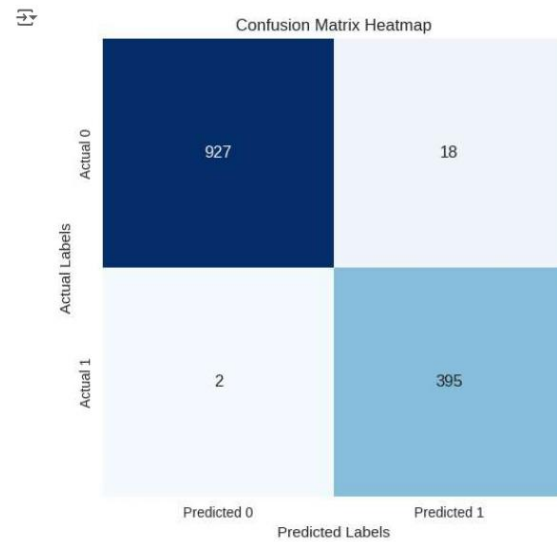
```
# Visualisasi confusion matrix
```

```
cm = pd.DataFrame(cm, index=['Actual 0', 'Actual 1'], columns=['Predicted 0', 'Predicted 1'])
```

```
plt.figure(figsize=(6, 6))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', cbar=False)
```

```
plt.xlabel('Predicted Labels')
plt.ylabel('Actual Labels')
plt.title('Confusion Matrix Heatmap')
```

```
plt.show()
```



EXPORT MODEL

```
#MENYIMPAN MODEL
```

```
import pickle
model = 'kbst_model.sav'
pickle.dump(classifier, open(model, 'wb'))
```

```
#MENYIMPAN DATASET BERSIH
```

```
df.to_excel('databersinkbst.xlsx', index=False)
```

```
#from google.colab import files
```

```
#files.download('hasildataset.csv')
```


DAFTAR RIWAYAT HIDUP



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