# UAS - SISTEM CERDAS

Kelompok 1

# TUGAS 7

PEMBUATAN MACHINE LEARNING MENGGUNAKAN NAIVE BAYES

# STUDI KASUS

Klasifikasi buah pisang, termasuk kedalam kategori bagus atau tidak.

# ALGORITMA

Algoritma Naive Bayes adalah algoritma klasifikasi berbasis teori probabilitas Bayes yang digunakan dalam pembelajaran mesin (machine learning).

# DATASET

Pada dataset terdapat 7 karakter pisang yang bisa digunakan sebagai variable dalam input (independen/X), yang akan memprediksi hasil label output (dependen/Y), yaitu Quality.

# DATASET

- DATASET ORIGINAL

```
1     Size,Weight,Sweetness,Softness,HarvestTime,Ripeness,Acidity,Quality
2     -1.9249682,0.46807805,3.0778325,-1.4721768,0.2947986,2.4355695,0.27129033,Good
3     -2.4097514,0.48686993,0.34692144,-2.4950993,-0.8922133,2.0675488,0.30732512,Good
4     -0.3576066,1.4831762,1.5684522,-2.6451454,-0.64726734,3.0906434,1.427322,Good
5     -0.8685235,1.5662014,1.8896049,-1.2737614,-1.0062776,1.8730015,0.47786173,Good
6     0.65182525,1.3191992,-0.022458995,-1.2097088,-1.430692,1.0783454,2.8124418,Good
7     -2.8077223,1.1381357,3.4476268,-1.7133021,-2.2209115,2.07941,2.2812028,Good
8     -0.23020804,2.7834713,1.6811839,-0.52977854,-1.9584678,1.3481431,2.1817663,Good
9     -1.3485153,3.2322812,4.0118165,-0.89060634,-0.031993963,2.3959174,1.0428779,Good
10    -2.0122256,1.9280338,0.69874644,-0.95977193,-1.3497207,1.3118018,1.048762,Good
11    0.05303478,1.3099926,-0.26413944,-2.9692972,0.30398348,3.8893588,1.9313319,Good
12    -1.5878931,1.4466584,0.13883868,-2.8589776,-1.7612225,2.4337273,1.7631273,Good
13    -2.0318587,1.3767682,2.2734401,-2.2057126,0.41215587,3.757726,3.1004484,Good
```

# DATASET

- DATASET TRAINING

```
Size,Weight,Sweetness,Softness,HarvestTime,Ripeness,Acidity,Quality
-2.8077223,1.1381357,3.4476268,-1.7133021,-2.2209115,2.07941,2.2812028,Good
-0.23020804,2.7834713,1.6811839,-0.52977854,-1.9584678,1.3481431,2.1817663,Good
-1.3485153,3.2322812,4.0118165,-0.89060634,-0.031993963,2.3959174,1.0428779,Good
-2.0122256,1.9280338,0.69874644,-0.95977193,-1.3497207,1.3118018,1.048762,Good
0.05303478,1.3099926,-0.26413944,-2.9692972,0.30398348,3.8893588,1.9313319,Good
-1.5878931,1.4466584,0.13883868,-2.8589776,-1.7612225,2.4337273,1.7631273,Good
-2.0318587,1.3767682,2.2734401,-2.2057126,0.41215587,3.757726,3.1004484,Good
2.0621698,1.5615295,2.5703752,-1.8647795,-0.44219488,2.2499652,4.70331,Good
-0.8612225,1.4269999,3.349791,-0.022131119,-1.8131022,-0.07608548,0.37977022,Good
-4.1782064,-1.4760928,-3.2664933,-5.056084,-3.8299162,4.167432,-0.4254814,Good
0.6720202,0.5434322,0.00204258,-3.0155904,-0.22510463,3.2022051,-0.2020209,Good
```

# DATASET

- DATASET TESTING

| Size | Weight | Sweetness | Softness | HarvestTime | Ripeness | Acidity |
|---|---|---|---|---|---|---|
| -1.9249682 | 0.46807805 | 3.0778325 | -1.4721768 | 0.2947986 | 2.4355695 | 0.27129033 |
| -1.3120325 | 1.0096532 | 1.1234508 | -2.1500666 | -2.495496 | 1.7741758 | 0.25558656 |
| -2.4097514 | 0.48686993 | 0.34692144 | -2.4950993 | -0.8922133 | 2.0675488 | 0.30732512 |
| -0.3576066 | 1.4831762 | 1.5684522 | -2.6451454 | -0.64726734 | 3.0906434 | 1.427322 |
| -1.3120325 | 1.0096532 | 1.1234508 | -2.1500666 | -2.495496 | 1.7741758 | 0.25558656 |
| -0.8685235 | 1.5662014 | 1.8896049 | -1.2737614 | -1.0062776 | 1.8730015 | 0.47786173 |
| -3.4158523 | 0.66085887 | -1.2913183 | -3.0183363 | -2.2248836 | 2.830545 | -1.4335482 |
| 0.65182525 | 1.3191992 | -0.022458995 | -1.2097088 | -1.430692 | 1.0783454 | 2.8124418 |

# OUTPUT

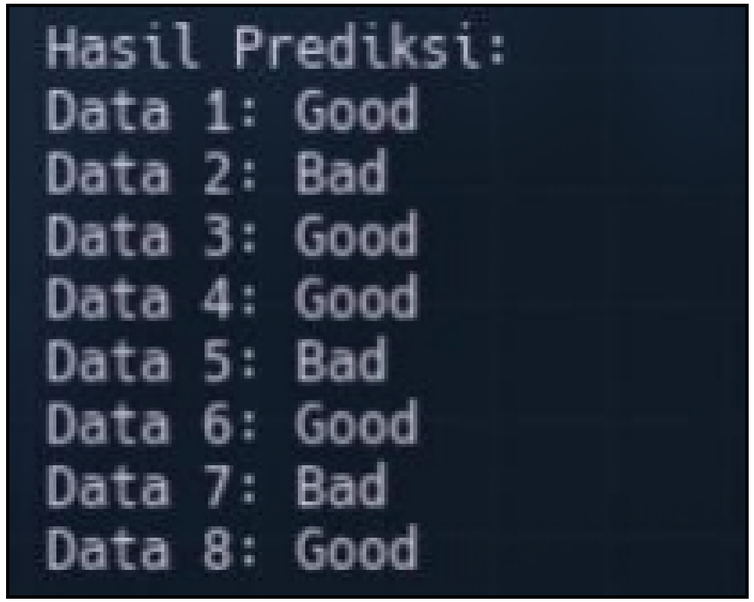
- OUTPUT

  Pada label yang dihasilkan dari beberapa karakteristik buah pisang/variable maka output akan dilabel kan menjadi 2 kategori yaitu:

  1. **Good** (Pisang berkualitas baik)
  2. **Bad** (Pisang berkulitas buruk)

# OUTPUT

- OUTPUT DATA TESTING



# CODE

Code dari program ini dapat dilihat di screen yang akan ditampilkan.

# TUGAS 9

Implementasi algoritma K-Means Clustering yang dirancang untuk menganalisis dan mengelompokkan data ke dalam sejumlah cluster

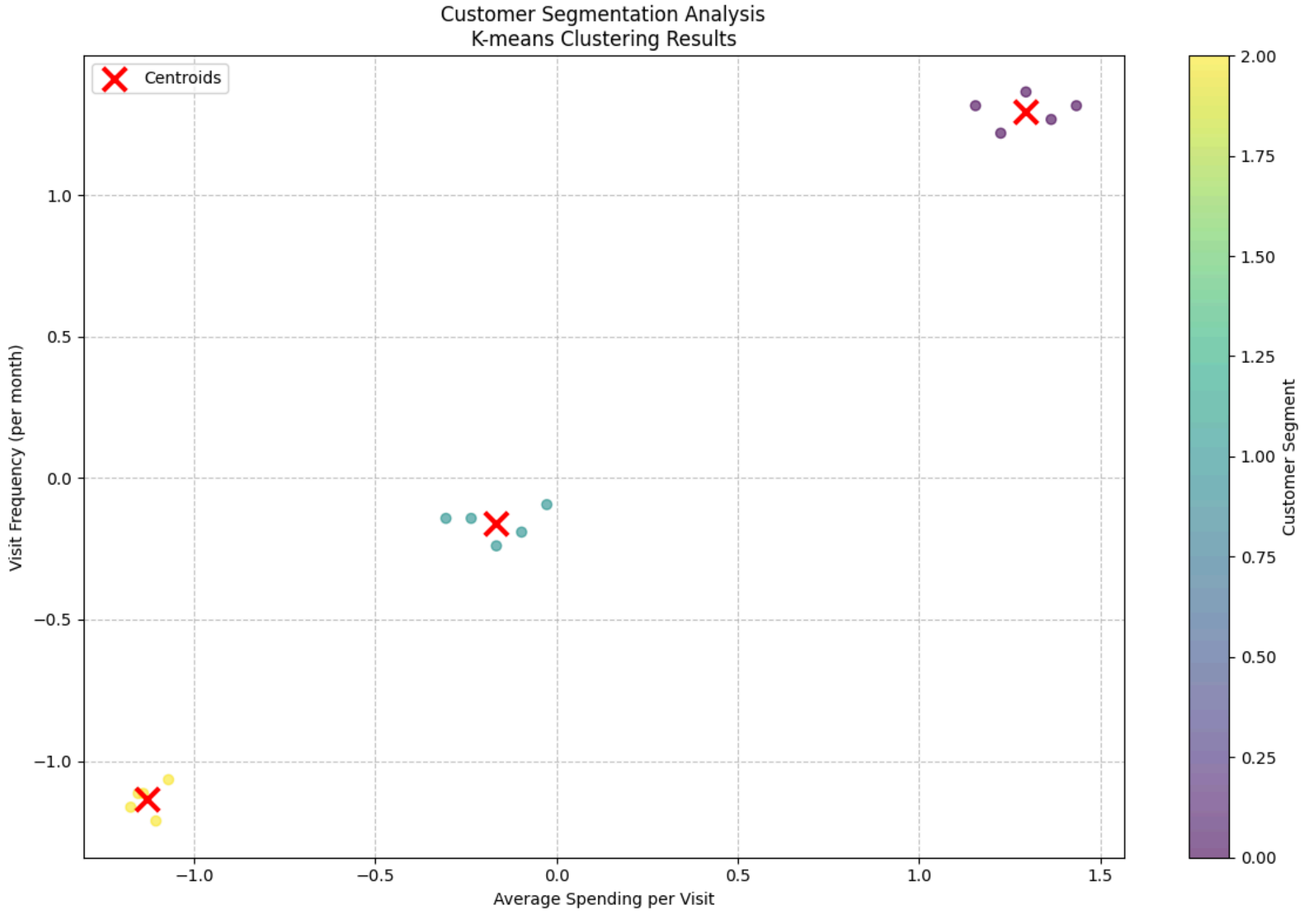
# TUJUAN

Tujuan utama program ini adalah membantu pengguna dalam memisahkan data menjadi beberapa kelompok berdasarkan pola atau karakteristik tertentu.

# SAMPLE DATA

| average_spending | visit_frequency |
|---|---|
| 120 | 3.2 |
| 115 | 3.1 |
| 125 | 3.0 |
| 130 | 3.3 |
| 118 | 3.2 |
| 450 | 8.2 |
| 480 | 8.1 |
| 460 | 8.0 |
| 470 | 8.3 |
| 490 | 8.2 |
| 250 | 5.2 |
| 270 | 5.1 |
| 260 | 5.0 |
| 280 | 5.3 |
| 240 | 5.2 |

# HASIL


Customer Segmentation Analysis
K-means Clustering Results
Centroids
Visit Frequency (per month)
Average Spending per Visit
Customer Segment
1.0
0.5
0.0
−0.5
−1.0
−1.0
−0.5
0.0
0.5
1.0
1.5
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00

# CODE

Code dari program ini dapat dilihat di screen yang akan ditampilkan.

# TUGAS 10

PENDETEKSI ANOMALI (ANOMALY DETECTION) dengan Supervised Learning

# TUJUAN

Deteksi anomali (anomaly detection) adalah salah satu jenis tugas dalam machine learning yang bertujuan untuk mengidentifikasi data atau pola yang menyimpang secara signifikan dari mayoritas data lainnya. Data yang menyimpang ini disebut sebagai anomali, outlier, atau abnormal.

# DATASET

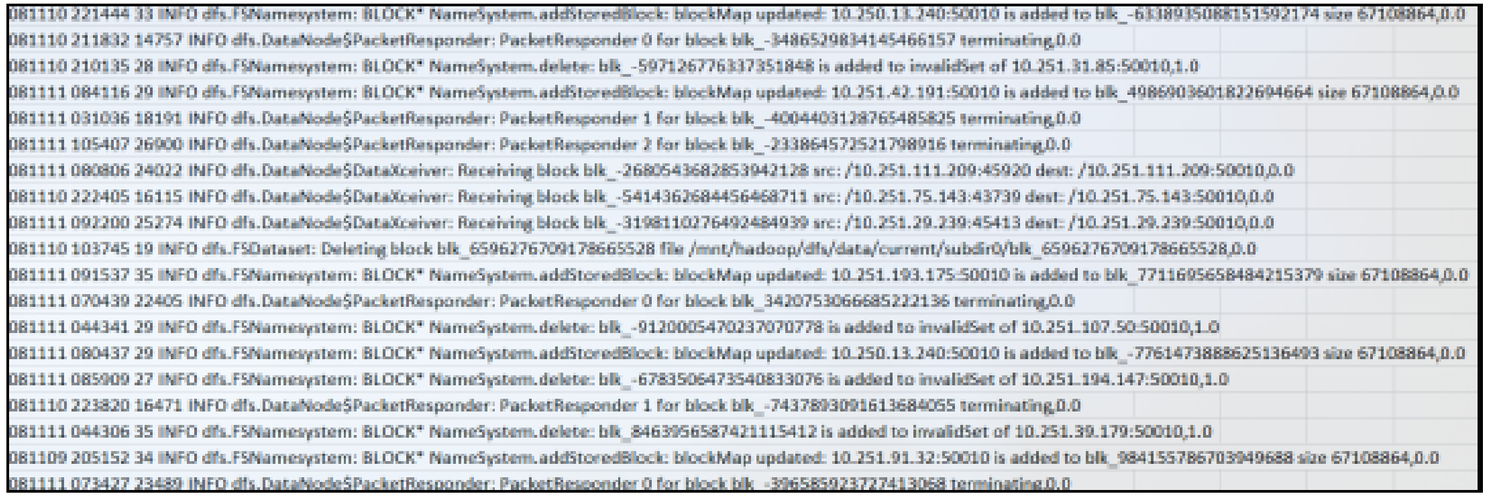
- DATASET ORIGINAL

  Dataset original dapat diakses secara publik pada kaggle.

  https://www.kaggle.com/datasets/krishd123/log-data-for-anomaly-detection

# DATASET

- DATASET TRAINING

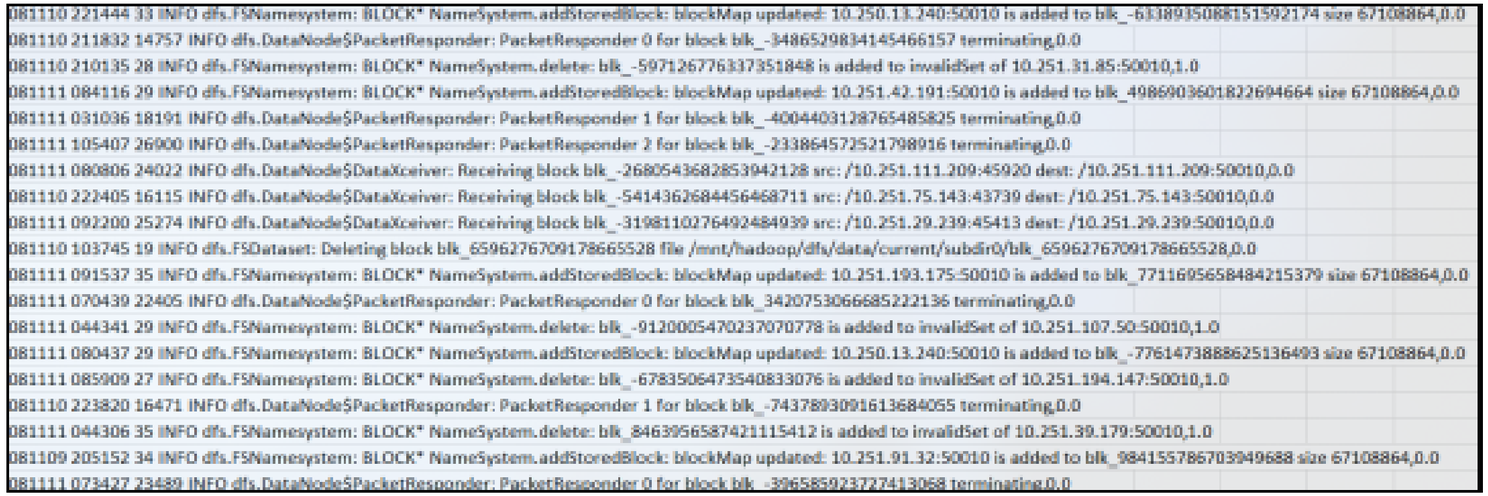


| |
|---|
| 081110 221444 33 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.250.13.240:50010 is added to blk_-6338935088151592174 size 67108864,0.0 |
| 081110 211832 14757 INFO dfs.DataNode$PacketResponder: PacketResponder 0 for block blk_-3486529834145466157 terminating,0.0 |
| 081110 210135 28 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_-5971267763373518 48 is added to invalidSet of 10.251.31.85:50010,1.0 |
| 081111 084116 29 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.251.42.191:50010 is added to blk_4986903601822694664 size 67108864,0.0 |
| 081111 031036 18191 INFO dfs.DataNode$PacketResponder: PacketResponder 1 for block blk_-4004403128765485825 terminating,0.0 |
| 081111 105407 26900 INFO dfs.DataNode$PacketResponder: PacketResponder 2 for block blk_-233864572521798916 terminating,0.0 |
| 081111 080806 24022 INFO dfs.DataNode$DataXceiver: Receiving block blk_-2680543682853942128 src: /10.251.111.209:45920 dest: /10.251.111.209:50010,0.0 |
| 081110 222405 16115 INFO dfs.DataNode$DataXceiver: Receiving block blk_-5414362684456468711 src: /10.251.75.143:43739 dest: /10.251.75.143:50010,0.0 |
| 081111 092200 25274 INFO dfs.DataNode$DataXceiver: Receiving block blk_-3198110276492484939 src: /10.251.29.239:45413 dest: /10.251.29.239:50010,0.0 |
| 081110 103745 19 INFO dfs.FSDataset: Deleting block blk_6596276709178665528 file /mnt/hadoop/dfs/data/current/subdir0/blk_6596276709178665528,0.0 |
| 081111 091537 35 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.251.193.175:50010 is added to blk_7711695658484215379 size 67108864,0.0 |
| 081111 070439 22405 INFO dfs.DataNode$PacketResponder: PacketResponder 0 for block blk_3420753066685222136 terminating,0.0 |
| 081111 044341 29 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_-9120005470237070778 is added to invalidSet of 10.251.107.50:50010,1.0 |
| 081111 080437 29 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.250.13.240:50010 is added to blk_-7761473888625136493 size 67108864,0.0 |
| 081111 085909 27 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_-6783506473540833076 is added to invalidSet of 10.251.194.147:50010,1.0 |
| 081110 223820 16471 INFO dfs.DataNode$PacketResponder: PacketResponder 1 for block blk_-7437893091613684055 terminating,0.0 |
| 081111 044306 35 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_8463956587421115412 is added to invalidSet of 10.251.39.179:50010,1.0 |
| 081109 205152 34 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.251.91.32:50010 is added to blk_984155786703949688 size 67108864,0.0 |
| 081111 073427 23489 INFO dfs.DataNode$PacketResponder: PacketResponder 0 for block blk_-3965859237274 13068 terminating,0.0 |

Dataset Traning yang kami gunakan ada sebanyak 1.048.576 data.

# DATASET

- DATASET TESTING



081110 221444 33 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.250.13.240:50010 is added to blk_-6338935088151592174 size 67108864,0.0
081110 211832 14757 INFO dfs.DataNode$PacketResponder: PacketResponder 0 for block blk_-3486529834145466157 terminating,0.0
081110 210135 28 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_-5971267763373518 48 is added to invalidSet of 10.251.31.85:50010,1.0
081111 084116 29 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.251.42.191:50010 is added to blk_4986903601822694664 size 67108864,0.0
081111 031036 18191 INFO dfs.DataNode$PacketResponder: PacketResponder 1 for block blk_-4004403128765485825 terminating,0.0
081111 105407 26900 INFO dfs.DataNode$PacketResponder: PacketResponder 2 for block blk_-233864572521798916 terminating,0.0
081111 080806 24022 INFO dfs.DataNode$DataXceiver: Receiving block blk_-2680543682853942128 src: /10.251.111.209:45920 dest: /10.251.111.209:50010,0.0
081110 222405 16115 INFO dfs.DataNode$DataXceiver: Receiving block blk_-5414362684456468711 src: /10.251.75.143:43739 dest: /10.251.75.143:50010,0.0
081111 092200 25274 INFO dfs.DataNode$DataXceiver: Receiving block blk_-3198110276492484939 src: /10.251.29.239:45413 dest: /10.251.29.239:50010,0.0
081110 103745 19 INFO dfs.FSDataset: Deleting block blk_6596276709178665528 file /mnt/hadoop/dfs/data/current/subdir0/blk_6596276709178665528,0.0
081111 091537 35 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.251.193.175:50010 is added to blk_7711695658484215379 size 67108864,0.0
081111 070439 22405 INFO dfs.DataNode$PacketResponder: PacketResponder 0 for block blk_3420753066685222136 terminating,0.0
081111 044341 29 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_-9120005470237070778 is added to invalidSet of 10.251.107.50:50010,1.0
081111 080437 29 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.250.13.240:50010 is added to blk_-7761473888625136493 size 67108864,0.0
081111 085909 27 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_-6783506473540833076 is added to invalidSet of 10.251.194.147:50010,1.0
081110 223820 16471 INFO dfs.DataNode$PacketResponder: PacketResponder 1 for block blk_-7437893091613684055 terminating,0.0
081111 044306 35 INFO dfs.FSNamesystem: BLOCK* NameSystem.delete: blk_8463956587421115412 is added to invalidSet of 10.251.39.179:50010,1.0
081109 205152 34 INFO dfs.FSNamesystem: BLOCK* NameSystem.addStoredBlock: blockMap updated: 10.251.91.32:50010 is added to blk_9841557867039496 88 size 67108864,0.0
081111 073427 23489 INFO dfs.DataNode$PacketResponder: PacketResponder 0 for block blk_-3965859237274130 68 terminating,0.0

Dataset Testing yang kami gunakan ada sebanyak 1.048.576 data.

# OUTPUT

- OUTPUT DATA TESTING

```
Total log yang dianalisis: 2239541
Jumlah anomali terdeteksi: 1158967

Anomali Teratas:
--------------------------------------------------------------------------------
Index: 76
Skor: 0.7259
Log: 081111 110513 19 INFO dfs.FSNamesystem: BLOCK* ask 10.250.5.237:50010 to delete  blk_6240211623492079493 blk_51818173222797858
--------------------------------------------------------------------------------
Index: 1758
Skor: 0.7259
Log: 081110 103316 19 INFO dfs.FSNamesystem: BLOCK* ask 10.250.14.38:50010 to delete  blk_-223438534269164604 blk_85141115273658588
--------------------------------------------------------------------------------
Index: 2070
Skor: 0.7259
Log: 081110 103416 19 INFO dfs.FSNamesystem: BLOCK* ask 10.251.91.229:50010 to delete  blk_-6027962917485800010 blk_8088265428258255
--------------------------------------------------------------------------------
Index: 3416
Skor: 0.7259
Log: 081110 220726 19 INFO dfs.FSNamesystem: BLOCK* ask 10.251.71.193:50010 to delete  blk_-1473834037204851337 blk_-70943122921603
--------------------------------------------------------------------------------
Index: 4523
Skor: 0.7259
Log: 081111 075719 19 INFO dfs.FSNamesystem: BLOCK* ask 10.251.43.115:50010 to delete  blk_6231963138498822919 blk_-5504585483394847
--------------------------------------------------------------------------------
```

# CODE

Code dari program ini dapat dilihat di screen yang akan ditampilkan.

# TERIMAKASIH