## Dataset and Learning

|  |  |
| --- | --- |
| **Variable** | **Description** |
| 1. nim | Unique identifier |
| 2. sex | (1 = L; 2 = P) |
| 3. kota\_asal | (1 = Semarang; 2 = Luar Semarang) |
| 4. jml\_ajuan\_cuti | (1 = Pernah Cuti, 2 = Tidak Pernah Cuti) |
| 5. jml\_tunggakan | (1 = Pernah Ada Tunggakan, 2 = Tidak Pernah Ada Tunggakan) |
| 6. usia | (1 = kurang dari sama dengan 21 tahun, 2 = 22 sampai 25 tahun, 3 = diatas usia 25 tahun) |
| 7. beasiswa | (1 = Menerima beasiswa, 2 = Tidak Pernah Menerima Beasiswa) |
| 8. marital | (1 = sudah menikah, 2 = belum menikah) |
| 9. jml\_aktivitas\_kemahasiswaan | (1 = aktif mengikuti , 2 = tidak memiliki aktivitas kemahasiswaan) |
| 10. jml\_prestasi | (1 = mempunyai piagam penghargaan, 2 = tidak punya piagam) |
| 11. ips | (Nilai Index Prestasi semester >>> 1 = IPS kurang dari 2, 2 = IPS >2 dan kurang dari 3, 3 = IPS lebih dari 3) |
| 12. label | (1 = Lulus kurang dari sama dengan 8 Semester, 2 = Lulus lebih dari 8 Semester) |

**Dataset** : 2293 Records (Data Mahasiswa Lulus Prodi A11 Tahun masuk 2012 – 2017)

**Label 1** : 1356 (Tahun Masuk 2012 – 2017; Masa Studi 38 – 50 Bulan)

**Label 2** : 937 (Tahun masuk 2012 – 2016; Masa Studi 52 – 88 Bulan)

Data lengkap : ***siadin.xlsx***

Data terfilter : ***siadin\_a11-fs.csv***

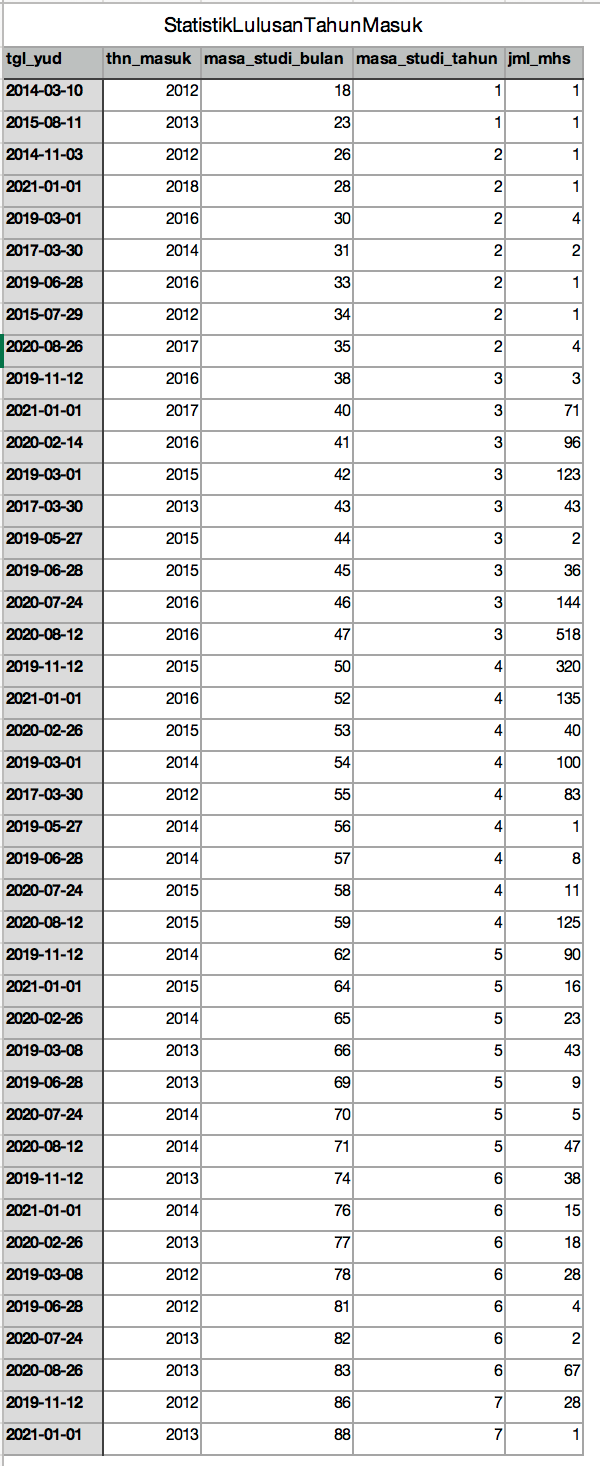
Dump SQL : ***siadin\_klasifikasi.sql***

***Catatan lain-lain***

Percobaan 1 atribut IPS hanya sampai dengan IPS 4

### Lampiran

Catatan : ditemukan beberapa anomaly lulus kurang dari 2 tahun   
*(dilakukan proses filter data hanya diambil data minimal 38 bulan masa studi), indikasi adanya salah input operator SIADIN.*

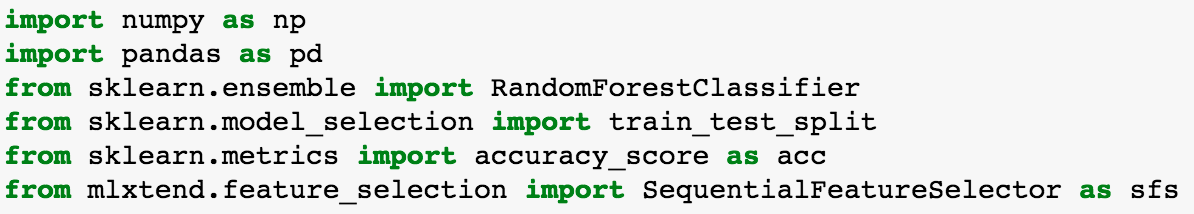


## **#1 Feature Selection**

**Hasil Eksperimen seleksi fitur :**

Dari penelitian yang dilakukan proses seleksi fitur tidak menambah nilai akurasi, atribut lengkap (**13** Atribut) tetap memiliki nilai akurasi yang lebih baik.

Library :

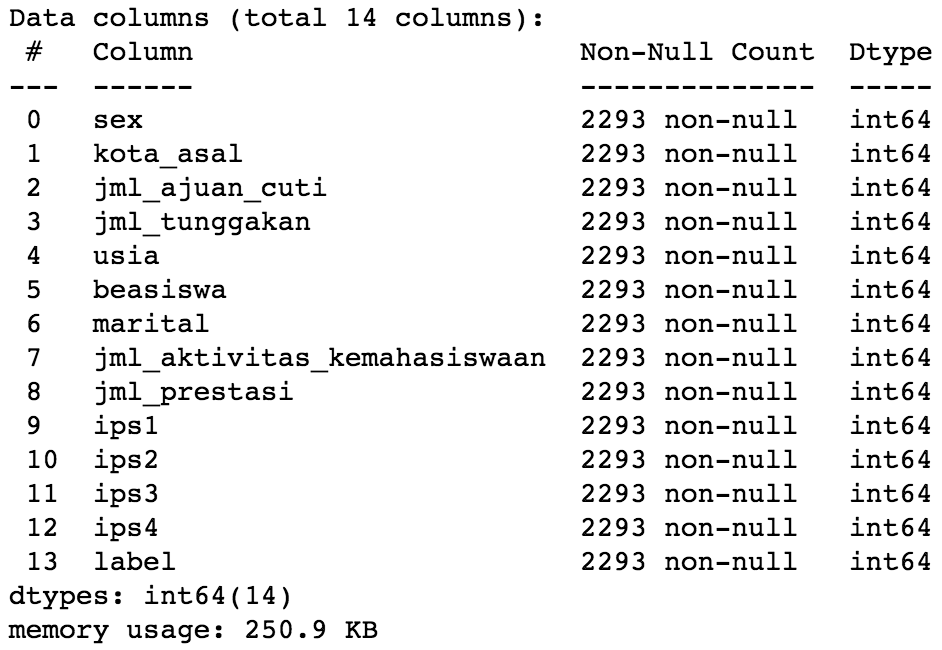


Data training dan testing:

Training dataset shape: (1719, 13) (1719,)

Testing dataset shape: (574, 13) (574,)

Atribut:



Akurasi (Data Testing 25%) – Full Atribut

Training accuracy on all features: **0.741**

Testing accuracy on all features: **0.774**

**Setting**

Random Forest (random\_state = 1, max\_depth=4)

**Proses Klasifikasi**

RandomForestClassifier

**Seleksi Atribut**

SequentialFeatureSelection

**Direction**

forward (*Sequential Forward Selection*)

Cross Validator

cv=5

Kombinasi 5 Atribut Terbaik :

[2, 5, 6, 7, 12]

Training accuracy on selected features: 0.724

Testing accuracy on selected features: 0.709

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 2.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 9.0s finished

[2021-10-15 11:11:33] Features: 1/5 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 6.5s finished

[2021-10-15 11:11:39] Features: 2/5 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 6.0s finished

[2021-10-15 11:11:46] Features: 3/5 -- score: 0.7178622279476575[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 5.6s finished

[2021-10-15 11:11:51] Features: 4/5 -- score: 0.7184436232964948[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.4s finished

[2021-10-15 11:11:56] Features: 5/5 -- score: 0.7190233236151603

Kombinasi 6 Atribut Terbaik :

[1, 2, 4, 6, 7, 12]

Training accuracy on selected features: 0.721

Testing accuracy on selected features: 0.735

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 8.0s finished

[2021-10-15 11:23:18] Features: 1/6 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 6.9s finished

[2021-10-15 11:23:25] Features: 2/6 -- score: 0.7155400366126518[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 6.4s finished

[2021-10-15 11:23:31] Features: 3/6 -- score: 0.7178605329174859[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 5.7s finished

[2021-10-15 11:23:37] Features: 4/6 -- score: 0.7184419282663231[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.4s finished

[2021-10-15 11:23:42] Features: 5/6 -- score: 0.7207692046918435[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 4.7s finished

[2021-10-15 11:23:47] Features: 6/6 -- score: 0.7207692046918435

Kombinasi 7 Atribut Terbaik :

[1, 2, 3, 5, 6, 7, 12]

Training accuracy on selected features: 0.725

Testing accuracy on selected features: 0.713

Training accuracy on selected features: 0.725

Testing accuracy on selected features: 0.713

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 7.0s finished

[2021-10-15 11:27:27] Features: 1/7 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 6.4s finished

[2021-10-15 11:27:34] Features: 2/7 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 6.0s finished

[2021-10-15 11:27:40] Features: 3/7 -- score: 0.7184436232964948[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 5.4s finished

[2021-10-15 11:27:45] Features: 4/7 -- score: 0.717863922977829[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 4.9s finished

[2021-10-15 11:27:50] Features: 5/7 -- score: 0.7201895043731779[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 4.3s finished

[2021-10-15 11:27:54] Features: 6/7 -- score: 0.7201878093430063[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 7 out of 7 | elapsed: 3.8s finished

[2021-10-15 11:27:58] Features: 7/7 -- score: 0.7213522950708522

Kombinasi 8 Atribut Terbaik :

[1, 2, 3, 4, 5, 6, 7, 12]

Training accuracy on selected features: 0.720

Testing accuracy on selected features: 0.728

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 2.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 10.2s finished

[2021-10-15 14:14:11] Features: 1/8 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 7.8s finished

[2021-10-15 14:14:18] Features: 2/8 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 7.4s finished

[2021-10-15 14:14:26] Features: 3/8 -- score: 0.7184436232964948[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 6.5s finished

[2021-10-15 14:14:32] Features: 4/8 -- score: 0.7213489050105092[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.8s finished

[2021-10-15 14:14:38] Features: 5/8 -- score: 0.7190233236151603[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 5.0s finished

[2021-10-15 14:14:43] Features: 6/8 -- score: 0.7207675096616719[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 7 out of 7 | elapsed: 4.5s finished

[2021-10-15 14:14:48] Features: 7/8 -- score: 0.7201861143128349[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 6 out of 6 | elapsed: 4.0s finished

[2021-10-15 14:14:52] Features: 8/8 -- score: 0.7178605329174859

Kombinasi 9 Atribut Terbaik :

[1, 2, 3, 4, 5, 6, 7, 9, 12]

Training accuracy on selected features: 0.722

Testing accuracy on selected features: 0.740

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 7.1s finished

[2021-10-15 14:00:58] Features: 1/9 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 7.2s finished

[2021-10-15 14:01:06] Features: 2/9 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 6.8s finished

[2021-10-15 14:01:12] Features: 3/9 -- score: 0.7184436232964947[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.8s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 7.7s finished

[2021-10-15 14:01:20] Features: 4/9 -- score: 0.7207658146315005[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.5s finished

[2021-10-15 14:01:25] Features: 5/9 -- score: 0.7196064139941691[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.8s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 6.0s finished

[2021-10-15 14:01:31] Features: 6/9 -- score: 0.7213506000406806[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 7 out of 7 | elapsed: 4.8s finished

[2021-10-15 14:01:36] Features: 7/9 -- score: 0.7225133907383551[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 6 out of 6 | elapsed: 4.6s finished

[2021-10-15 14:01:41] Features: 8/9 -- score: 0.7178605329174859[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.8s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 5 out of 5 | elapsed: 3.5s finished

[2021-10-15 14:01:44] Features: 9/9 -- score: 0.7178520577666282

Kombinasi 10 Atribut Terbaik :

[1, 2, 3, 4, 5, 6, 7, 8, 9, 12]

Training accuracy on selected features: 0.721

Testing accuracy on selected features: 0.740

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 7.2s finished

[2021-10-15 11:30:29] Features: 1/10 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 6.9s finished

[2021-10-15 11:30:36] Features: 2/10 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 6.2s finished

[2021-10-15 11:30:43] Features: 3/10 -- score: 0.7178622279476575[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 5.8s finished

[2021-10-15 11:30:48] Features: 4/10 -- score: 0.7213489050105092[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.4s finished

[2021-10-15 11:30:54] Features: 5/10 -- score: 0.7207658146315005[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 5.1s finished

[2021-10-15 11:30:59] Features: 6/10 -- score: 0.7213506000406806[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 7 out of 7 | elapsed: 4.4s finished

[2021-10-15 11:31:03] Features: 7/10 -- score: 0.7207675096616719[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 6 out of 6 | elapsed: 3.7s finished

[2021-10-15 11:31:07] Features: 8/10 -- score: 0.7207692046918435[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 5 out of 5 | elapsed: 2.8s finished

[2021-10-15 11:31:10] Features: 9/10 -- score: 0.7190148484643026[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 4 out of 4 | elapsed: 2.4s finished

[2021-10-15 11:31:12] Features: 10/10 -- score: 0.713199199945759

Kombinasi 11 Atribut Terbaik :

[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 12]

Training accuracy on selected features: 0.725

Testing accuracy on selected features: 0.742

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 7.0s finished

[2021-10-15 13:57:06] Features: 1/11 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 6.5s finished

[2021-10-15 13:57:12] Features: 2/11 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 5.9s finished

[2021-10-15 13:57:18] Features: 3/11 -- score: 0.7184436232964948[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 5.7s finished

[2021-10-15 13:57:24] Features: 4/11 -- score: 0.7207658146315005[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.1s finished

[2021-10-15 13:57:29] Features: 5/11 -- score: 0.7219319953895178[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 4.6s finished

[2021-10-15 13:57:33] Features: 6/11 -- score: 0.7219319953895179[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 7 out of 7 | elapsed: 3.9s finished

[2021-10-15 13:57:37] Features: 7/11 -- score: 0.7225184758288699[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 6 out of 6 | elapsed: 3.4s finished

[2021-10-15 13:57:41] Features: 8/11 -- score: 0.7195979388433115[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 5 out of 5 | elapsed: 2.9s finished

[2021-10-15 13:57:44] Features: 9/11 -- score: 0.7201776391619772[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 4 out of 4 | elapsed: 2.7s finished

[2021-10-15 13:57:46] Features: 10/11 -- score: 0.715528171401451[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 3 out of 3 | elapsed: 1.9s finished

[2021-10-15 13:57:48] Features: 11/11 -- score: 0.7132059800664452

Kombinasi 12 Atribut Terbaik :

[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12]

Training accuracy on selected features: 0.732

Testing accuracy on selected features: 0.765

[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 2.3s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 13 out of 13 | elapsed: 8.8s finished

[2021-10-15 13:49:54] Features: 1/12 -- score: 0.7097159129432503[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 12 out of 12 | elapsed: 7.0s finished

[2021-10-15 13:50:01] Features: 2/12 -- score: 0.716121431961489[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 11 out of 11 | elapsed: 6.4s finished

[2021-10-15 13:50:07] Features: 3/12 -- score: 0.717860532917486[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 10 out of 10 | elapsed: 5.5s finished

[2021-10-15 13:50:13] Features: 4/12 -- score: 0.7213489050105092[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 9 out of 9 | elapsed: 5.1s finished

[2021-10-15 13:50:18] Features: 5/12 -- score: 0.7225133907383551[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 8 out of 8 | elapsed: 4.9s finished

[2021-10-15 13:50:23] Features: 6/12 -- score: 0.7207692046918435[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.5s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 7 out of 7 | elapsed: 3.8s finished

[2021-10-15 13:50:27] Features: 7/12 -- score: 0.7201861143128347[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 6 out of 6 | elapsed: 3.6s finished

[2021-10-15 13:50:30] Features: 8/12 -- score: 0.7207692046918435[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 5 out of 5 | elapsed: 3.0s finished

[2021-10-15 13:50:33] Features: 9/12 -- score: 0.7195996338734829[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.6s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 4 out of 4 | elapsed: 2.6s finished

[2021-10-15 13:50:36] Features: 10/12 -- score: 0.71843853820598[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 3 out of 3 | elapsed: 1.9s finished

[2021-10-15 13:50:38] Features: 11/12 -- score: 0.7126364499288087[Parallel(n\_jobs=1)]: Using backend SequentialBackend with 1 concurrent workers.

[Parallel(n\_jobs=1)]: Done 1 out of 1 | elapsed: 0.7s remaining: 0.0s

[Parallel(n\_jobs=1)]: Done 2 out of 2 | elapsed: 1.3s finished

[2021-10-15 13:50:39] Features: 12/12 -- score: 0.702742558817547

## **#2 Metode Klasifikasi**

**Atribut**

***feature\_cols*** *= ['sex', 'kota\_asal', 'jml\_ajuan\_cuti', 'jml\_tunggakan', 'usia', 'beasiswa', 'marital', 'jml\_aktivitas\_kemahasiswaan', 'jml\_prestasi', 'ips1', 'ips2', 'ips3','ips4']*

**Setting Parameter :**

* *random\_state=1*
* *test\_size:0,25 (Data Testing 25%)*

**Nilai Akurasi :**

* Naïve Bayes : **0.7073**
* Random Forest : **0.7300**
* D.Tree : **0.7247**
* KNN : **0.7177**
* SVM : **0.6637**

**Teknik Klasifikasi Terpilih (**Sementara**)**

Random Forest (random\_state = 42, max\_depth=4) : **0.7735**

## **#3 Proses Eksekusi Data Mahasiswa Semester 5 (Mahasiswa tahun masuk 2019)**

Data Mahasiswa A11 Tahun masuk 2019 = 682 Records (test\_final.csv)

Random Forest (random\_state = 42, max\_depth=4)

Hasil : result-final.csv

**[Label, nim]**

|  |
| --- |
| 1, 6542 |
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| 2, 6553 |
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| 1, 6593 |
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| 2, 9915 |
| 2, 9916 |
| 1, 9928 |
| 2, 9930 |

Resume :

Jumlah Records MHS Tahun masuk 2019 : 682 Records

Label 1 : 571

Label 2 : 111

***Kesimpulan :*** perlu dilakukan perhatian khusus untuk 111 mahasiswa yang terprediksi masa studi lebih dari 8 semester pada semester 5 ini.

Catatan : sebelum eksekusi dilakukan sample testing untuk 100 record data training dengan label 1, didapatkan 91 data masuk kelas 1, 9 data masuk kelas 2 (akurasi 91 %)

## **#4 D.Tree Rules**

**Eksperimen 1 : Default (DecisionTreeClassifier()) – sklearn**

Rule : siadin\_2021-Tree-GINI.log & siadin\_2021-Tree-GINI-ifelse.log

Tree : siadin\_2021-Tree-GINI.png

Accuracy: 0.7299651567944251

Confusion matrix:

[[257 73]

[ 82 162]]

**Eksperimen 2 : Default (DecisionTreeClassifier(max\_depth = 5)) – sklearn**

Rule : siadin\_2021-Tree-GINI-max\_depth-5.log & siadin\_2021-Tree-GINI-max\_depth-5-ifelse.log

Tree : siadin\_2021-Tree-GINI-max\_depth-5.png

Accuracy: 0.7299651567944251

[[257 73]

[ 82 162]]

**Eksperimen 3 : (DecisionTreeClassifier(criterion='entropy')) – sklearn**

Rule : siadin\_2021-Tree-ENTROPY.log & siadin\_2021-Tree-ENTROPY-ifelse.log

Tree : siadin\_2021-Tree-ENTROPY.png

Accuracy: 0.7229965156794426

Confusion Matrix

[[269 61]

[ 98 146]]

**Eksperimen 4 : (DecisionTreeClassifier(criterion='entropy' max\_depth = 5)) – sklearn**

Rule : siadin\_2021-Tree-ENTROPI-max\_depth-5.log & siadin\_2021-Tree-ENTROPI-max\_depth-5-ifelse.log

Tree : siadin\_2021-Tree-ENTROPI-max\_depth-5.png

Accuracy: 0.7160278745644599

Confusin Matrix

[[265 65]

[ 98 146]]

## **#5 Fitur Aplikasi**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| 1. nim | Unique identifier |
| 2. sex | (1 = L; 2 = P) |
| 3. kota\_asal | (1 = Semarang; 2 = Luar Semarang) |
| 4. jml\_ajuan\_cuti | (1 = Pernah Cuti, 2 = Tidak Pernah Cuti) |
| 5. jml\_tunggakan | (1 = Pernah Ada Tunggakan, 2 = Tidak Pernah Ada Tunggakan) |
| 6. usia | (1 = kurang dari sama dengan 21 tahun, 2 = 22 sampai 25 tahun, 3 = diatas usia 25 tahun) |
| 7. beasiswa | (1 = Menerima beasiswa, 2 = Tidak Pernah Menerima Beasiswa) |
| 8. marital | (1 = sudah menikah, 2 = belum menikah) |
| 9. jml\_aktivitas\_kemahasiswaan | (1 = aktif mengikuti , 2 = tidak memiliki aktivitas kemahasiswaan) |
| 10. jml\_prestasi | (1 = mempunyai piagam penghargaan, 2 = tidak punya piagam) |
| 11. ips | (Nilai Index Prestasi semester >>> 1 = IPS kurang dari 2, 2 = IPS >2 dan kurang dari 3,  3 = IPS lebih dari 3) |
| 12. label | (1 = Lulus kurang dari sama dengan 8 Semester, 2 = Lulus lebih dari 8 Semester) |

1. Login : Admin (Perumpamaan Login Prodi)
2. Halaman Dashboard (Data Grafis umum : Jumlah MHS A11 per tahun Angkatan dan Status kelulusan – tgl\_yud terisi = sudah lulus) > Tahun masuk 2012 - 2021
3. Menu Data Mahasiswa A11 Full Lengkap (dalam bentuk List) pakai nim samara tidak masalah (nim counter), Filter pencarian berdasarkan NIM, Tahun Masuk. > Tahun masuk 2012 - 2021
4. Menu Tampilan Statistik Data dengan rincian sbb :
   1. Jumlah Mahasiswa berdasarkan tahun masuk dan status kelulusan (lulus tidak lulus)
   2. Jumlah mahasiswa berdasarkan tahun masuk dan sex (2)
   3. Jumlah mahasiswa berdasarkan tahun masuk dan kota asal (3)
   4. Jumlah mahasiswa berdasarkan tahun masuk dan jumlah ajuan cuti (4)
   5. Jumlah mahasiswa berdasarkan tahun masuk dan jumlah tunggakan (5)
   6. Jumlah mahasiswa berdasarkan tahun masuk dan usia (6)
   7. Jumlah mahasiswa berdasarkan tahun masuk dan beasiswa (7)
   8. Jumlah mahasiswa berdasarkan tahun masuk dan marital (8)
   9. Jumlah mahasiswa berdasarkan tahun masuk dan jml aktifitas kemahasiswaan (9)
   10. Jumlah mahasiswa berdasarkan tahun masuk dan jml prestasi (10)
   11. Jumlah mahasiswa berdasarkan tahun masuk dan ips 1 (11)
   12. Jumlah mahasiswa berdasarkan tahun masuk dan ips 2 (12)
   13. Jumlah mahasiswa berdasarkan tahun masuk dan ips 3 (13)
   14. Jumlah mahasiswa berdasarkan tahun masuk dan ips 4 (14)

Contoh format :

Angka bisa diklik muncul detail nyambung point 2.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Thn Masuk** | **Status Lulus** | | **Jenis kelamin** | | **Kota Asal** | | **Jumlah Cuti** | | **dst…** |
| **Lulus** | **Belum** | **L** | **P** | **Dalam Kota** | **Luar Kota** | **Pernah Cuti** | **Belum Pernah** |
| 1 | 2012 |  |  |  |  |  |  |  |  |  |
| 2 | 2013 |  |  |  |  |  |  |  |  |  |
| 3 | 2014 |  |  |  |  |  |  |  |  |  |
| 4 | 2015 |  |  |  |  |  |  |  |  |  |
| 5 | 2016 |  |  |  |  |  |  |  |  |  |
|  | **dst…** |  |  |  |  |  |  |  |  |  |

1. Menu Prediksi Mahasiswa Tahun masuk 2019

Angka bisa di klik muncul detail data

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Prediksi** | **Jenis kelamin** | | **Kota Asal** | | **Jumlah Cuti** | | **dst…** |
| **L** | **P** | **Dalam Kota** | **Luar Kota** | **Pernah Cuti** | **Belum Pernah** |
| <= 8 Sm |  |  |  |  |  |  |  |
| > 8 SM |  |  |  |  |  |  |  |