BAB IV

PEMBAHASAN

4.1 Tahap Pemodelan Data

Pada tahap ini terdapat beberapa proses dalam pemodelan data diantaranya sebagai berikut.

4.1.1 Merancang Design Model Analisis

Pada tahap ini dilakukan proses merancang model analisis yang akan digunakan pada tools Rapid Miner terdapat pada Gambar 4.1.
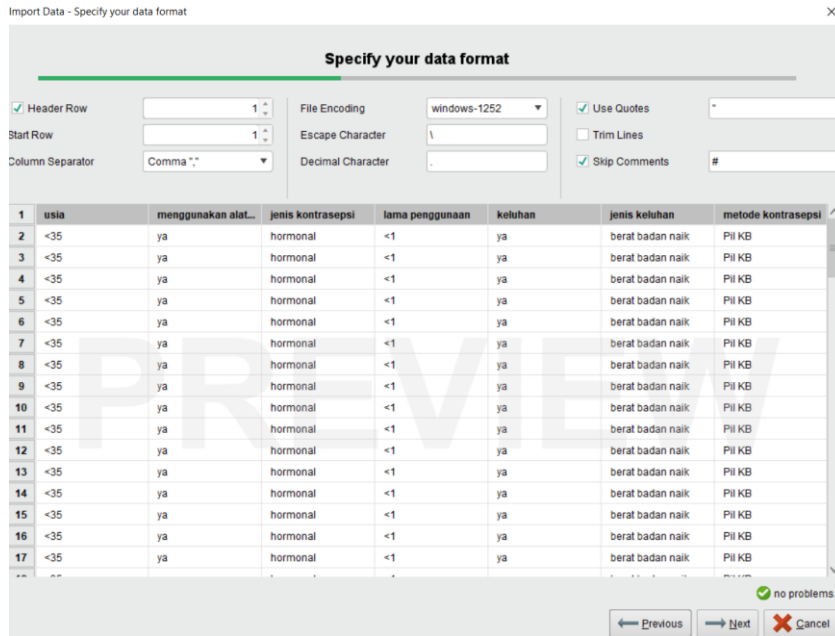

Gambar 4.1 Rancang Model Analisis

4.1.1.1 Data Mentah

Data mentah yang telah dipersiapkan kemudian di import menggunakan tools Rapid miner dengan menggunakan operator Read CSV kemudian dilakukan pemberian label pada data atrribut yang akan dijadikan label kelas terdapat pada Gambar 4.2.
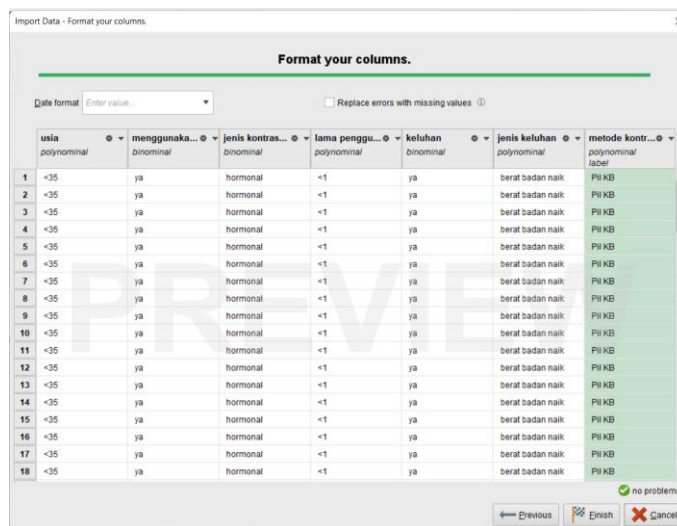

Gambar 4.2 Operator Read CSV

Berikut merupakan data mentah yang telah di import kedalam tools rapid miner dapat dilihat pada Gambar 4.3.

Gambar 4.3 Data mentah yang telah di import kedalam Tools Rapid Miner

Berikut merupakan data mentah yang telah diberikan label dapat dilihat pada Gambar 4.4.

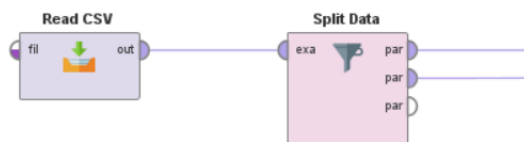Gambar 4.4 Data mentah yang telah diberikan label pada kolom hijau

Berikut merupakan data tabel data attribute dapat dilihat pada tabel 4.1.

Tabel 4.1 Type Data Attribut

N0	Attribute	Tipe
1	Usia	Polynominal
2	Gunakan Alat Kontrasepsi	Binominal
3	Jenis kontrasepsi	Binominal
4	Lama penggunaan	Polynominal
5	Keluhan	binominal
6	Metode kontrasepsi	polynominal

4.1.1.2 Data Training

Tahapan selanjutnya adalah melakukan *split data*, operator ini digunakan untuk membagi jumlah data training dan data testing sebesar 70:30. Dapat dilihat di Gambar 4.5

Gambar 4. 5 Operator Split Data

Maka akan didapatkan hasil sebagai berikut, dapat dilihat di Gambar 4.6 dan 4.7:

ExampleSet (317 examples, 1 special attribute, 6 regular attributes)

Gambar 4.6 Data Training

ExampleSet (136 examples, 13 special attributes, 6 regular attributes)

Gambar 4.7 Data Testing

| Data Training : 70% x 453 (*record* dataset) |
| Data Testing : 30% x 453 (*record* dataset) |

Menentukan Nilai Entrophy Dan Gain (Rumus)

Nilai Entrophy Total

Perhitungan entropy untuk semua data terhadap komposisi kelas, dapat dilihat di tabel 4.2 sebagai berikut :

Tabel 4.2 Entrophy Total

Attribut	Kriteria	Jumlah Data	Implant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya	Entrophy Nilai
	Label	453	10	31	12	11	1	1	14	92	12	162	107	0.716

$E\ (semua(Total))$

$$= -\left(\left(\left(\frac{10}{453}\right)x\log 11\left(\frac{10}{453}\right)\right) + \left(\left(\frac{31}{453}\right)x\log 11\left(\frac{31}{453}\right)\right) + \left(\left(\frac{12}{453}\right)x\log 11\left(\frac{12}{453}\right)\right) + \left(\left(\frac{11}{453}\right)x\log 11\left(\frac{11}{453}\right)\right)\right.$$

$$+ \left(\left(\frac{1}{453}\right)x\log 11\left(\frac{1}{453}\right)\right) + \left(\left(\frac{1}{453}\right)x\log 11\left(\frac{1}{453}\right)\right) + \left(\left(\frac{14}{453}\right)x\log 11\left(\frac{14}{453}\right)\right) + \left(\left(\frac{92}{453}\right)x\log 11\left(\frac{92}{453}\right)\right)$$

$$+ \left(\left(\frac{12}{453}\right)x\log 11\left(\frac{12}{453}\right)\right) + \left(\left(\frac{162}{453}\right)x\log 11\left(\frac{162}{453}\right)\right) + \left(\left(\frac{107}{453}\right)x\log 11\left(\frac{107}{453}\right)\right) = 0.716$$

Nilai Entrophy Dan Gain Atrribut

Atribut Age (kontinyu).

Perhitungan atribut age untuk semua data terhadap komposisi kelas, dapat dilihat di tabel 4.3 sebagai berikut :

Tabel 4.3 Attribut Age

Attribut	Kriteria	Jumlah Data	Impant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya
Age	1	334	10	16	1	9	1	1	3	47	7	145	94
	2	119	0	15	11	2	0	0	11	45	5	17	13
Total													

$E\ (semua(1))$

$$= -\left(\left(\frac{10}{334}\right) x \log 11 \left(\frac{10}{334}\right)\right) + \left(\left(\frac{16}{334}\right) x \log 11 \left(\frac{16}{334}\right)\right) + \left(\left(\frac{1}{334}\right) x \log 11 \left(\frac{1}{334}\right)\right) + \left(\left(\frac{9}{334}\right) x \log 11 \left(\frac{9}{334}\right)\right)$$

$$+ \left(\left(\frac{1}{334}\right) x \log 11 \left(\frac{1}{334}\right)\right) + \left(\left(\frac{1}{334}\right) x \log 11 \left(\frac{1}{334}\right)\right)\left(\left(\frac{3}{334}\right) x \log 11 \left(\frac{3}{334}\right)\right) + \left(\left(\frac{47}{334}\right) x \log 11 \left(\frac{47}{334}\right)\right)$$

$$+ \left(\left(\frac{7}{334}\right) x \log 11 \left(\frac{7}{334}\right)\right)\left(\left(\frac{145}{334}\right) x \log 11 \left(\frac{145}{334}\right)\right) + \left(\left(\frac{94}{334}\right) x \log 11 \left(\frac{94}{334}\right)\right) = 0.633$$

$E\ (semua(2))$

$$= -\left(\left(\frac{0}{119}\right) x \log 11 \left(\frac{0}{119}\right)\right) + \left(\left(\frac{15}{119}\right) x \log 11 \left(\frac{15}{119}\right)\right) + \left(\left(\frac{11}{119}\right) x \log 11 \left(\frac{11}{119}\right)\right) + \left(\left(\frac{2}{119}\right) x \log 11 \left(\frac{2}{119}\right)\right)$$

$$+ \left(\left(\frac{0}{119}\right) x \log 11 \left(\frac{0}{119}\right)\right) + \left(\left(\frac{0}{119}\right) x \log 11 \left(\frac{0}{119}\right)\right)\left(\left(\frac{11}{119}\right) x \log 11 \left(\frac{11}{119}\right)\right) + \left(\left(\frac{45}{119}\right) x \log 11 \left(\frac{45}{119}\right)\right)$$

$$+ \left(\left(\frac{5}{119}\right) x \log 11 \left(\frac{5}{119}\right)\right)\left(\left(\frac{17}{119}\right) x \log 11 \left(\frac{17}{119}\right)\right) + \left(\left(\frac{13}{119}\right) x \log 11 \left(\frac{13}{119}\right)\right) = 0.747$$

$$Gain\ (semua(Age)) = -\left(\left(\frac{334}{453}\right)x0.633\right) + \left(\left(\frac{119}{453}\right)x0.747\right) = 0.053$$

$$Split\ Info\ (Age) = -\left(\left(\frac{334}{453}\right)x\log 2\left(\frac{334}{453}\right)\right) + \left(\left(\frac{119}{453}\right)x\log 2\left(\frac{119}{453}\right)\right) = 0.831$$

$$Gain\ Rasio\ (Age) = \frac{0.053}{0.831} = 0.064$$

Atribut Menggunakan Kontrasepsi (kontinyu).

Berikut merupakan tabel 4.4 attribut menggunakan kontrasepsi

Tabel 4.4 Attribut Menggunakan Kontrasepsi

Attribut	Kriteria	Jumlah Data											
			Impant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya
Menggunakan Kontrasepsi	Ya	453	10	31	12	11	1	1	14	92	12	162	107
	Tidak	0	0	0	0	0	0	0	0	0	0	0	0
Total													

$E\ (semua(Ya))$

$$= -\left(\left(\frac{10}{453}\right)x\log 11\left(\frac{10}{453}\right)\right) + \left(\left(\frac{31}{453}\right)x\log 11\left(\frac{31}{453}\right)\right) + \left(\left(\frac{12}{453}\right)x\log 11\left(\frac{12}{453}\right)\right) + \left(\left(\frac{11}{453}\right)x\log 11\left(\frac{11}{453}\right)\right)$$

$$+ \left(\left(\frac{1}{453}\right)x\log 11\left(\frac{1}{453}\right)\right) + \left(\left(\frac{1}{453}\right)x\log 11\left(\frac{1}{453}\right)\right)\left(\left(\frac{14}{453}\right)x\log 11\left(\frac{14}{453}\right)\right) + \left(\left(\frac{92}{453}\right)x\log 11\left(\frac{92}{453}\right)\right)$$

$$+ \left(\left(\frac{12}{453}\right)x\log 11\left(\frac{12}{453}\right)\right)\left(\left(\frac{162}{453}\right)x\log 11\left(\frac{162}{453}\right)\right) + \left(\left(\frac{107}{453}\right)x\log 11\left(\frac{107}{453}\right)\right) = 0.716$$

$E\ (semua(Tidak)) = 0$

$Gain\ (semua(Menggunakan\ Kontrasepsi)) = -\left(\left(\frac{453}{453}\right)x0.716\right) + \left(\left(\frac{0}{453}\right)x0.0\right) = 0.0$

$Split\ Info\ (Menggunakan\ Kontrasepsi) = -\left(\left(\frac{453}{453}\right)x\log 2\left(\frac{453}{453}\right)\right) + \left(\left(\frac{0}{453}\right)x\log 2\left(\frac{0}{453}\right)\right) = 0.0$

$Gain\ Rasio\ (Menggunakan\ Kontrasepsi) = \dfrac{0.0}{0.0} = 0.0$

Atribut Jenis Kontrasepsi (kontinyu).

Atribut jenis kontrasepsi dapat dilihat di tabel 4.5 sebagai berikut :

Tabel 4.5 Attribut Jenis Kontrasepsi

Attribut	Kriteria	Jumlah Data	Impant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya
Jenis Kontrasepsi	1	421	10	31	12	11	1	1	14	92	12	162	75
	2	32	0	0	0	0	0	0	0	0	0	0	32
total													

$E\ (semua(1))$

$$= -\left(\left(\frac{10}{421}\right)x\log 11\left(\frac{10}{421}\right)\right) + \left(\left(\frac{31}{421}\right)x\log 11\left(\frac{31}{421}\right)\right) + \left(\left(\frac{12}{421}\right)x\log 11\left(\frac{12}{421}\right)\right) + \left(\left(\frac{11}{421}\right)x\log 11\left(\frac{11}{421}\right)\right)$$

$$+ \left(\left(\frac{1}{421}\right)x\log 11\left(\frac{1}{421}\right)\right) + \left(\left(\frac{1}{421}\right)x\log 11\left(\frac{1}{421}\right)\right)\left(\left(\frac{14}{421}\right)x\log 11\left(\frac{14}{421}\right)\right) + \left(\left(\frac{92}{421}\right)x\log 11\left(\frac{92}{421}\right)\right)$$

$$+ \left(\left(\frac{12}{421}\right)x\log 11\left(\frac{12}{421}\right)\right)\left(\left(\frac{162}{421}\right)x\log 11\left(\frac{162}{421}\right)\right) + \left(\left(\frac{75}{421}\right)x\log 11\left(\frac{75}{421}\right)\right) = 0.721$$

$E\ (semua(2))$

$$= -\left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right) + \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right) + \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right) + \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right)$$

$$+ \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right) + \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right)\left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right) + \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right)$$

$$+ \left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right)\left(\left(\frac{0}{32}\right)x\log 11\left(\frac{0}{32}\right)\right) + \left(\left(\frac{32}{32}\right)x\log 11\left(\frac{32}{32}\right)\right) = 0.0$$

$$Gain\ (semua(Jenis\ Kontrasepsi)) = -\left(\left(\frac{421}{453}\right)x0.721\right) + \left(\left(\frac{0}{453}\right)x0.0\right) = 0.046$$

$$Split\ Info\ (Jenis\ Kontrasepsi) = -\left(\left(\frac{421}{453}\right)x\log 2\left(\frac{421}{453}\right)\right) + \left(\left(\frac{0}{453}\right)x\log 2\left(\frac{0}{453}\right)\right) = 0.368$$

$$Gain\ Rasio\ (Jenis\ Kontrasepsi) = \frac{0.046}{0.368} = 0.126$$

Atribut Lama Penggunaan (kontinyu).

Atribut lama pengguna dapat dilihat di tabel 4.6 sebagai berikut :

Tabel 4.6 Attribut Lama Penggunaan

Attribut	Kriteria	Jumlah Data	Impant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya
Lama Penggunaan	1	189	3	16	0	9	0	1	3	36	7	65	49
	2	264	7	15	12	2	1	0	11	56	5	97	58
total													

$E\ (semua(1))$

$$= -\left(\left(\frac{3}{189}\right)x\log 11\left(\frac{3}{189}\right)\right) + \left(\left(\frac{16}{189}\right)x\log 11\left(\frac{16}{189}\right)\right) + \left(\left(\frac{0}{189}\right)x\log 11\left(\frac{0}{189}\right)\right) + \left(\left(\frac{9}{189}\right)x\log 11\left(\frac{9}{189}\right)\right)$$

$$+ \left(\left(\frac{0}{189}\right)x\log 11\left(\frac{0}{189}\right)\right) + \left(\left(\frac{1}{189}\right)x\log 11\left(\frac{1}{189}\right)\right)\left(\left(\frac{3}{189}\right)x\log 11\left(\frac{3}{189}\right)\right) + \left(\left(\frac{36}{189}\right)x\log 11\left(\frac{36}{189}\right)\right)$$

$$+ \left(\left(\frac{7}{189}\right)x\log 11\left(\frac{7}{189}\right)\right)\left(\left(\frac{65}{189}\right)x\log 11\left(\frac{65}{189}\right)\right) + \left(\left(\frac{49}{189}\right)x\log 11\left(\frac{49}{189}\right)\right) = 0.696$$

$E\ (semua(2))$

$$= -\left(\left(\frac{7}{264}\right)x\log 11\left(\frac{7}{264}\right)\right) + \left(\left(\frac{15}{264}\right)x\log 11\left(\frac{15}{264}\right)\right) + \left(\left(\frac{12}{264}\right)x\log 11\left(\frac{12}{264}\right)\right) + \left(\left(\frac{2}{264}\right)x\log 11\left(\frac{2}{264}\right)\right)$$

$$+ \left(\left(\frac{1}{264}\right)x\log 11\left(\frac{1}{264}\right)\right) + \left(\left(\frac{0}{264}\right)x\log 11\left(\frac{0}{264}\right)\right)\left(\left(\frac{11}{264}\right)x\log 11\left(\frac{11}{264}\right)\right) + \left(\left(\frac{56}{264}\right)x\log 11\left(\frac{56}{264}\right)\right)$$

$$+ \left(\left(\frac{5}{264}\right)x\log 11\left(\frac{5}{264}\right)\right)\left(\left(\frac{97}{264}\right)x\log 11\left(\frac{97}{264}\right)\right) + \left(\left(\frac{58}{264}\right)x\log 11\left(\frac{58}{264}\right)\right) = 0.707$$

$$Gain\ (semua(Lama\ Penggunaan)) = -\left(\left(\frac{189}{453}\right)x0.696\right) + \left(\left(\frac{264}{453}\right)x0.707\right) = 0.014$$

$$Split\ Info\ (Lama\ Penggunaan) = -\left(\left(\frac{189}{453}\right)x\log 2\left(\frac{189}{453}\right)\right) + \left(\left(\frac{264}{453}\right)x\log 2\left(\frac{264}{453}\right)\right) = 0.980$$

$$Gain\ Rasio\ (Lama\ Penggunaan) = \frac{0.014}{0.980} = 0.014$$

Atribut Keluhan (kontinyu).

Atribut keluhan dapat dilihat di tabel 4.7 sebagai berikut :

Tabel 4.7. Attribut Keluhan

Attribut	Kriteria	Jumlah Data											
			Impant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya
Keluhan	Ya	453	10	31	12	11	1	1	14	92	12	162	107
	Tidak	0	0	0	0	0	0	0	0	0	0	0	0
total													

$E\ (semua(Ya))$

$$= -\left(\left(\left(\frac{10}{453}\right) x \log 11 \left(\frac{10}{453}\right)\right) + \left(\left(\frac{31}{453}\right) x \log 11 \left(\frac{31}{453}\right)\right) + \left(\left(\frac{12}{453}\right) x \log 11 \left(\frac{12}{453}\right)\right) + \left(\left(\frac{11}{453}\right) x \log 11 \left(\frac{11}{453}\right)\right)\right.$$

$$+ \left(\left(\frac{1}{453}\right) x \log 11 \left(\frac{1}{453}\right)\right) + \left(\left(\frac{1}{453}\right) x \log 11 \left(\frac{1}{453}\right)\right)\left(\left(\frac{14}{453}\right) x \log 11 \left(\frac{14}{453}\right)\right) + \left(\left(\frac{92}{453}\right) x \log 11 \left(\frac{92}{453}\right)\right)$$

$$+ \left(\left(\frac{12}{453}\right) x \log 11 \left(\frac{12}{453}\right)\right)\left(\left(\frac{162}{453}\right) x \log 11 \left(\frac{162}{453}\right)\right) + \left(\left(\frac{107}{453}\right) x \log 11 \left(\frac{107}{453}\right)\right) = 0.716$$

$E\ (semua(Tidak)) = 0$

$Gain\ (semua(Keluhan)) = -\left(\left(\frac{453}{453}\right) x 0.716\right) + \left(\left(\frac{0}{453}\right) x 0.0\right) = 0.0$

$$Split\ Info\ (Keluhan) = -\left(\left(\frac{453}{453}\right) x \log 2 \left(\frac{453}{453}\right)\right) + \left(\left(\frac{0}{453}\right) x \log 2 \left(\frac{0}{453}\right)\right) = 0.0$$

$$Gain\ Rasio\ (Keluhan) = \frac{0.0}{0.0} = \ 0.0$$

Atribut Jenis Keluhan (kontinyu)

Atribut jenis keluhan dapat dilihat di tabel 4.8 sebagai berikut :

Tabel 4.8. Attribut Jenis Keluhan

Attribut	Kriteria	Jumlah Data											
			Impant	IUD	Kalender	KONDOM	MAL	MOP	MOW	Pil KB	Senggama Terputus	Suntik	lainnya
Jenis Keluhan	1	97	0	0	0	0	0	0	0	67	0	27	3
	2	8	0	0	0	0	0	0	0	1	0	7	0
	3	5	0	0	0	0	0	0	0	0	0	5	0
	4	9	0	0	0	0	0	0	0	0	0	0	9
	5	19	8	0	0	0	0	0	0	0	0	11	0
	6	17	0	0	0	0	0	0	0	5	0	9	3

	7	114	0	0	0	0	0	0	0	12	0	102	0
	8	82	2	31	1	11	1	1	10	0	7	1	17
	9	102	0	0	11	0	0	0	4	7	5	0	75
total													

$E\ (semua(1))$

$$= -\left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right) + \left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right) + \left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right) + \left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right)$$

$$+ \left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right) + \left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right)\left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right) + \left(\left(\frac{67}{97}\right)x\log 11\left(\frac{67}{97}\right)\right)$$

$$+ \left(\left(\frac{0}{97}\right)x\log 11\left(\frac{0}{97}\right)\right)\left(\left(\frac{27}{97}\right)x\log 11\left(\frac{27}{97}\right)\right) + \left(\left(\frac{3}{97}\right)x\log 11\left(\frac{3}{97}\right)\right) = 0.300$$

$E\ (semua(2))$

$$= -\left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right) + \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right) + \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right) + \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right) + \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right)$$

$$+ \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right)\left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right) + \left(\left(\frac{1}{8}\right)x\log 11\left(\frac{1}{8}\right)\right) + \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right)\left(\left(\frac{7}{8}\right)x\log 11\left(\frac{7}{8}\right)\right)$$

$$+ \left(\left(\frac{0}{8}\right)x\log 11\left(\frac{0}{8}\right)\right) = 0.157$$

$E\ (semua(3))$

$$= -\left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) + \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) + \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) + \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) + \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right)$$

$$+ \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right)\left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) + \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) + \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right)\left(\left(\frac{5}{5}\right)x\log 11\left(\frac{5}{5}\right)\right)$$

$$+ \left(\left(\frac{0}{5}\right)x\log 11\left(\frac{0}{5}\right)\right) = 0.000$$

$E\ (semua(4))$

$$= -\left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right) + \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right) + \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right) + \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right) + \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right)$$

$$+ \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right)\left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right) + \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right) + \left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right)\left(\left(\frac{0}{9}\right)x\log 11\left(\frac{0}{9}\right)\right)$$

$$+ \left(\left(\frac{9}{9}\right)x\log 11\left(\frac{9}{9}\right)\right) = 0.000$$

$E\ (semua(5))$

$$= -\left(\left(\frac{8}{19}\right)x\log 11\left(\frac{8}{19}\right)\right) + \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right) + \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right) + \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right)$$

$$+ \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right) + \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right)\left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right) + \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right)$$

$$+ \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right)\left(\left(\frac{11}{19}\right)x\log 11\left(\frac{11}{19}\right)\right) + \left(\left(\frac{0}{19}\right)x\log 11\left(\frac{0}{19}\right)\right) = 0.284$$

$E\ (semua(6))$

$$= -\left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right) + \left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right) + \left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right) + \left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right)$$

$$+ \left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right) + \left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right)\left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right) + \left(\left(\frac{5}{17}\right)x\log 11\left(\frac{5}{17}\right)\right)$$

$$+ \left(\left(\frac{0}{17}\right)x\log 11\left(\frac{0}{17}\right)\right)\left(\left(\frac{9}{17}\right)x\log 11\left(\frac{9}{17}\right)\right) + \left(\left(\frac{3}{17}\right)x\log 11\left(\frac{3}{17}\right)\right) = 0.418$$

$E\ (semua(7))$

$$= -\left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right) + \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right) + \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right) + \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right)$$

$$+ \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right) + \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right)\left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right) + \left(\left(\frac{12}{114}\right)x \log 11\left(\frac{12}{114}\right)\right)$$

$$+ \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right)\left(\left(\frac{102}{114}\right)x \log 11\left(\frac{102}{114}\right)\right) + \left(\left(\frac{0}{114}\right)x \log 11\left(\frac{0}{114}\right)\right) = 0.140$$

$E\ (semua(8))$

$$= -\left(\left(\frac{2}{82}\right)x \log 11\left(\frac{2}{82}\right)\right) + \left(\left(\frac{31}{82}\right)x \log 11\left(\frac{31}{82}\right)\right) + \left(\left(\frac{1}{82}\right)x \log 11\left(\frac{1}{82}\right)\right) + \left(\left(\frac{11}{82}\right)x \log 11\left(\frac{11}{82}\right)\right)$$

$$+ \left(\left(\frac{1}{82}\right)x \log 11\left(\frac{1}{82}\right)\right) + \left(\left(\frac{1}{82}\right)x \log 11\left(\frac{1}{82}\right)\right)\left(\left(\frac{10}{82}\right)x \log 11\left(\frac{10}{82}\right)\right) + \left(\left(\frac{0}{82}\right)x \log 11\left(\frac{0}{82}\right)\right)$$

$$+ \left(\left(\frac{7}{82}\right)x \log 11\left(\frac{7}{82}\right)\right)\left(\left(\frac{1}{82}\right)x \log 11\left(\frac{1}{82}\right)\right) + \left(\left(\frac{17}{82}\right)x \log 11\left(\frac{17}{82}\right)\right) = 0.724$$

$E\ (semua(9))$

$$= -\left(\left(\frac{0}{102}\right)x\log 11\left(\frac{0}{102}\right)\right) + \left(\left(\frac{0}{102}\right)x\log 11\left(\frac{0}{102}\right)\right) + \left(\left(\frac{11}{102}\right)x\log 11\left(\frac{11}{102}\right)\right) + \left(\left(\frac{0}{102}\right)x\log 11\left(\frac{0}{102}\right)\right)$$

$$+ \left(\left(\frac{0}{102}\right)x\log 11\left(\frac{0}{102}\right)\right) + \left(\left(\frac{0}{102}\right)x\log 11\left(\frac{0}{102}\right)\right)\left(\left(\frac{4}{102}\right)x\log 11\left(\frac{4}{102}\right)\right) + \left(\left(\frac{7}{102}\right)x\log 11\left(\frac{7}{102}\right)\right)$$

$$+ \left(\left(\frac{5}{102}\right)x\log 11\left(\frac{5}{102}\right)\right)\left(\left(\frac{0}{102}\right)x\log 11\left(\frac{0}{102}\right)\right) + \left(\left(\frac{75}{102}\right)x\log 11\left(\frac{75}{102}\right)\right) = 0.386$$

$Gain\ (semua(Jenis\ Keluhan))$

$$= -\left(\left(\frac{97}{453}\right)x0.300\right) + \left(\left(\frac{8}{453}\right)x0.157\right) + \left(\left(\frac{5}{453}\right)x0.000\right) + \left(\left(\frac{9}{453}\right)x0.000\right) + \left(\left(\frac{19}{453}\right)x0.284\right) + \left(\left(\frac{17}{453}\right)x0.418\right)$$

$$+ \left(\left(\frac{114}{453}\right)x0.140\right) + \left(\left(\frac{82}{453}\right)x0.724\right) + \left(\left(\frac{102}{453}\right)x0.386\right) = 0.368$$

Split Info (Jenis Keluhan)

$$= -\left(\left(\frac{97}{453}\right) x \log 9 \left(\frac{97}{453}\right)\right) + \left(\left(\frac{8}{453}\right) x \log 9 \left(\frac{8}{453}\right)\right) + \left(\left(\frac{5}{453}\right) x \log 9 \left(\frac{5}{453}\right)\right) + \left(\left(\frac{9}{453}\right) x \log 9 \left(\frac{9}{453}\right)\right)$$

$$+ \left(\left(\frac{19}{453}\right) x \log 9 \left(\frac{19}{453}\right)\right) + \left(\left(\frac{17}{453}\right) x \log 9 \left(\frac{17}{453}\right)\right) + \left(\left(\frac{114}{453}\right) x \log 9 \left(\frac{114}{453}\right)\right) + \left(\left(\frac{82}{453}\right) x \log 9 \left(\frac{82}{453}\right)\right)$$

$$+ \left(\left(\frac{102}{453}\right) x \log 9 \left(\frac{102}{453}\right)\right) = 0.809$$

$$Gain\ Rasio\ (Jenis\ Keluhan) = \frac{0.368}{0.809} = 0.455$$

Hasil Entrophy Attribut Dan Gain dari Entrophy Total

Hasil entrophy attribute dan gain dari entrophy total dapat dilihat di tabel 4.9 sebagai berikut :

Tabel 4.9. Hasil Entrophy Attribut Dan Gain dari Entrophy Total

No	Atribut	Value	Deskripsi	Entrophy	Gain	Split Info	Gain rasio
1	Age	1	<20 Tahun	0.633	0.053	0.831	0.064
		2	20-35 Tahun >35 Tahun	0.747			
2	Menggunakan Kontrasepsi	Ya	Ya	0.716	0.000	0.000	0.000
		Tidak	Tidak	0.000			
3	Jenis Kontrasepsi	1	Hormonal	0.721	0.046	0.368	0.126
		2	Non Hormonal	0.000			
4	Lama Penggunaan	1	Tidak Menggunakan	0.696	0.014	0.980	0.014
		2	Jangka Pendel	0.707			
5	Keluhan	Ya	Ya	0.716	0.000	0.000	0.000
		Tidak	Tidak	0.000			
6	Jenis Keluhan	1	Berat Badan Naik	0.300	0.368	0.809	0.455
		2	Berat Badan turun	0.157			
		3	Hipertensi	0.000			
		4	Lemas	0.000			
		5	Mual	0.284			
		6	Pendarahan	0.418			
		7	Sakit kepala	0.140			
		8	Tidak haid	0.724			
		9	Lainnya	0.386			

1.1.2. Menentukan Model Algoritma

Berdasarkan dataset yang telah diolah, tahapan berikutnya adalah melakukan proses perhitungan. Dapat dilihat di Gambar 4.8

Gambar 4.8. Model Algoritma Decision Tree

Berikut ini Gambar 4.9 hasil Pohon Keputusan dari *Operator Decision Tree* dengan *Node Root* sebagai Jenis Kontrasepsi.

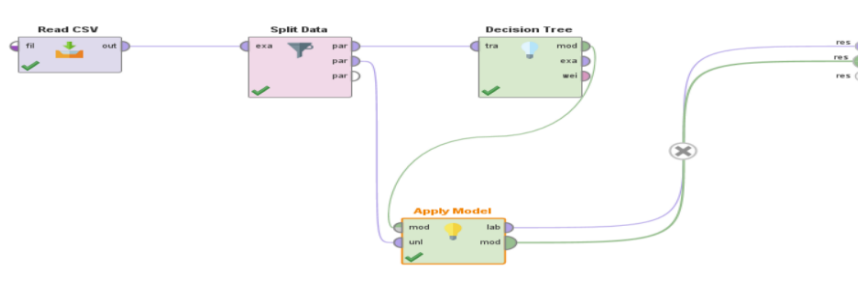
Gambar 4.9. Pohon Keputusan dari Operator Decision Tree

Tree

```
jenis kontrasepsi = hormonal
|   jenis keluhan = berat badan naik: Pil KB {Pil KB=69, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IU
|   jenis keluhan = berat badan turun: Suntik {Pil KB=0, Suntik=8, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IU
|   jenis keluhan = hipertensi: Pil KB {Pil KB=2, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MA
|   jenis keluhan = lainnya
|   |   lama penggunaan = <1: Suntik {Pil KB=10, Suntik=20, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MA
|   |   lama penggunaan = >1: Suntik {Pil KB=0, Suntik=23, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL
|   jenis keluhan = lemas: Suntik {Pil KB=0, Suntik=7, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0,
|   jenis keluhan = mual
|   |   usia = <35: Pil KB {Pil KB=10, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalend
|   |   usia = >35: suntik {Pil KB=0, Suntik=0, Impant=0, suntik=4, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalende
|   jenis keluhan = pendarahan
|   |   usia = <35: Impant {Pil KB=0, Suntik=0, Impant=6, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalende
|   |   usia = >35: Suntik {Pil KB=0, Suntik=1, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalende
|   jenis keluhan = sakit kepala
|   |   usia = <35
|   |   |   lama penggunaan = <1: Suntik {Pil KB=5, Suntik=23, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0,
|   |   |   lama penggunaan = >1: Suntik {Pil KB=0, Suntik=35, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0,
|   |   usia = >35: suntik {Pil KB=0, Suntik=0, Impant=0, suntik=16, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalend
|   jenis keluhan = tidak haid
|   |   usia = <35: Suntik {Pil KB=0, Suntik=38, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalend
|   |   usia = >35: impant {Pil KB=0, Suntik=0, Impant=0, suntik=0, impant=18, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=0, Kalend
jenis kontrasepsi = non hormonal
|   usia = <35: Kondom {Pil KB=0, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=10, senggama terputus=2, MOW=2, IUD=0, MAL=0, Kalender=0
|   usia = >35
|   |   jenis keluhan = berat badan naik: IUD {Pil KB=0, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IU
|   |   jenis keluhan = lainnya: Kalender {Pil KB=0, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0,
|   |   jenis keluhan = lemas: MAL {Pil KB=0, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=0, MAL=1,
|   |   jenis keluhan = pendarahan: IUD {Pil KB=0, Suntik=0, Impant=0, suntik=0, impant=0, Kondom=0, senggama terputus=0, MOW=0, IUD=2, M
```

Gambar 4.10. Deskripsi dari pohon keputusan

4.1.3. *Model Predict*

Tahapan selanjutnya adalah menggunakan *Model Predict* untuk melihat prediksi Data Testing berdasarkan Algoritma yang digunakan. Desain model proses utama ini menggunakan satu dataset yang sama untuk algoritma C4.5 untuk memastikan konsistensi dataset yang sama yang diproses di setiap algoritma. Gambar 4.11 merupakan rincian dengan model proses training dan testing untuk proses klasifikasi algoritma Decision Tree C4.5.

Gambar 4.11. Model Prediksi untuk uji coba Algoritma

4.2 Hasil

4.2.1 Hasil Menggunakan Algoritma C4.5

Algoritma C4.5 menghasilkan *Simple Distribution* yang potongannya terlihat pada Gambar 4.12 berupa hasil nilai akurasi.

accuracy: 91.18%

	true Pil KB	true Suntik	true Imp...	true suntik	true imp...	true Kon...	true sen...	true MOW	true IUD	true MAL	true Kale...	clas
pred. Pil ...	32	0	0	0	0	0	0	0	0	0	0	100
pred. Su...	9	67	0	0	0	0	0	0	0	0	0	88.
pred. Im...	0	0	3	0	0	0	0	0	0	0	0	100
pred. su...	0	0	0	8	0	0	0	0	0	0	0	100
pred. im...	0	0	0	0	7	0	0	0	0	0	0	100
pred. Ko...	0	0	0	0	0	4	1	1	0	0	0	66.(
pred. se...	0	0	0	0	0	0	0	0	0	0	0	0.0(
pred. MO...	0	0	0	0	0	0	0	0	0	0	0	0.0(
pred. IUD	0	0	0	0	0	0	0	0	2	1	0	66.(
pred. MAL	0	0	0	0	0	0	0	0	0	0	0	0.0(
pred. Kal...	0	0	0	0	0	0	0	0	0	0	1	100
class rec...	78.05%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%	100.00%	0.00%	100.00%	

Gambar 4.12. Operator Performa untuk melihat nilai akurasi

Algoritma C4.5 menghasilkan *Simple Distribution* yang potongannya terlihat pada

Gambar 4.13 berupa hasil nilai recall.

Gambar 4.13. Recall dari Algoritma C4.5

Algoritma C4.5 menghasilkan *Simple Distribution* yang potongannya terlihat pada
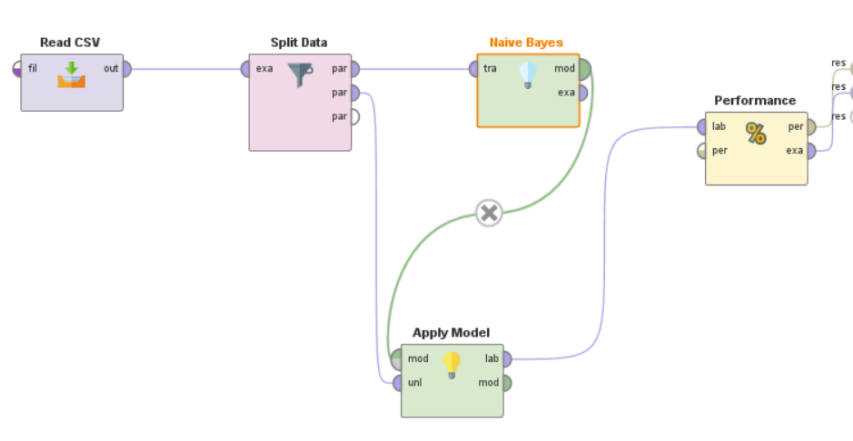
Gambar 4.14 berupa hasil nilai precision.

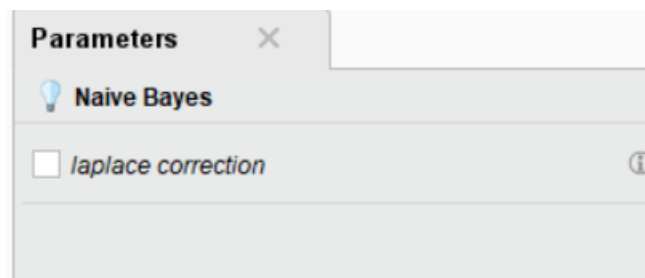
Gambar 4.14. Precision dari Algoritma C4.5

4.2.2 Hasil Menggunakan Algoritma Naïve Byes

Pada tahapan ini menggunakan model Algoritma Naïve Byes dengan model design seperti Gambar 4.15 dibawah ini.

Gambar 4.15. Model Algoritma Naïve Byes

Pada tahapan ini menggunakan parameter Algoritma Naïve Byes dengan model design seperti Gambar 4.16 dibawah ini.

Gambar 4.16. Parameter Naïve byes

Pada tahapan ini menggunakan model label attribute seperti Gambar 4.17 dibawah

ini.

```
Distribution model for label attribute metode kontrasepsi


Class Pil KB (0.303)
6 distributions

Class Suntik (0.489)
6 distributions

Class Impant (0.019)
6 distributions

Class suntik (0.063)
6 distributions

Class impant (0.057)
6 distributions

Class Kondom (0.032)
6 distributions

Class senggama terputus (0.006)
6 distributions

Class MOW (0.006)
6 distributions

Class IUD (0.013)
6 distributions

Class MAL (0.003)
6 distributions

Class Kalender (0.009)
6 distributions
```

Gambar 4.17. Model Naïve Byes

Algoritma Naïve Bayes menghasilkan *Simple Distribution* yang potongannya terlihat

pada Gambar 4.18 berupa hasil nilai akurasi.

accuracy: 91.91%

	true Pil KB	true Suntik	true Imp...	true suntik	true imp...	true Kon...	true sen...	true MOW	true IUD	true MAL	true Kale...	clas
pred. Pil ...	32	0	0	0	0	0	0	0	0	0	0	100
pred. Su...	9	67	0	0	0	0	0	0	0	0	0	88.1
pred. Im...	0	0	3	0	0	0	0	0	0	0	0	100
pred. su...	0	0	0	8	0	0	0	0	0	0	0	100
pred. im...	0	0	0	0	7	0	0	0	0	0	0	100
pred. Ko...	0	0	0	0	0	4	1	1	0	0	0	66.6
pred. se...	0	0	0	0	0	0	0	0	0	0	0	0.00
pred. MO...	0	0	0	0	0	0	0	0	0	0	0	0.00
pred. IUD	0	0	0	0	0	0	0	0	2	0	0	100
pred. MAL	0	0	0	0	0	0	0	0	0	1	0	100
pred. Kal...	0	0	0	0	0	0	0	0	0	0	1	100
class rec...	78.05%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%	100.00%	

Gambar 4.18. akurasi dari Algoritma Naïve Byes

Algoritma Naïve Bayes menghasilkan *Simple Distribution* yang potongannya terlihat

pada Gambar 4.19 berupa hasil nilai precision.

	true Pil KB	true Suntik	true Imp...	true suntik	true imp...	true Kon...	true sen...	true MOW	true IUD	true MAL	true Kale...	clas
pred. Pil ...	32	0	0	0	0	0	0	0	0	0	0	100
pred. Su...	9	67	0	0	0	0	0	0	0	0	0	88.·
pred. Im...	0	0	3	0	0	0	0	0	0	0	0	100
pred. su...	0	0	0	8	0	0	0	0	0	0	0	100
pred. im...	0	0	0	0	7	0	0	0	0	0	0	100
pred. Ko...	0	0	0	0	0	4	1	1	0	0	0	66.(
pred. se...	0	0	0	0	0	0	0	0	0	0	0	0.0(
pred. MO...	0	0	0	0	0	0	0	0	0	0	0	0.0(
pred. IUD	0	0	0	0	0	0	0	0	2	0	0	100
pred. MAL	0	0	0	0	0	0	0	0	0	1	0	100
pred. Kal...	0	0	0	0	0	0	0	0	0	0	1	100
class rec...	78.05%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%	100.00%	

weighted_mean_precision: 77.71%, weights: 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1

Gambar 4.19. Precision dari Naïve Byes

4.3 Tahap Evaluasi

4.3.1 Evaluasi Model Algoritma C4.5 dan Naïve Bayes

Pada tahap ini dilakukan Evaluasi dari Model Algoritma yang telah digunakan. Dari hasil uji data yang telah dilakukan menggunakan algoritma Decision Tree C4.5 dan Naïve Bayes maka didapatkan nilai sebagai berikut :

Tabel 4.10 Evaluasi C4.5

Akurasi	Recall	Precision
91,18%	70,73%	65,59%

Tabel 4.11 Evaluasi Naïve Bayes

Akurasi	Recall	Presision
91,91%	79,82%	77,71%

4.3.2 Perbandingan Hasil Penelitian

Berdasarkan hasil penelitian yang dilakukan maka dididapatkan suatu perbandingan sebagai berikut :

PENELITIAN	JUDUL	AKURASI
RUSDA WAJHILLAH 2017	PENERAPAN ALGORITMA C4.5 UNTUK PREDIKSI PENGGUNAAN JENIS KONTRASEPSI BERBASIS WEB	85.38%
NI WAYAN PARWATI SEPTIANI	PERANCANGAN SISTEM PAKAR UNTUK MENENTUKAN ALAT KONTRASEPSI MENGGUNAKAN ALGORITMA C4.5	92%

2014		
NUUR ROCHMAN NAAFIAN 2016	SISTEM PENDUKUNG KEPUTUSAN PEMILIHAN METODE KONTRASEPSI DI PUSKESMAS II COLOMADU DENGAN ALGORITMA NAÏVE BAYES	82.2%
ALI MUSTOPA 2020	PENGARUH MEDIA TERHADAP PENGAMBILAN KEPUTUSAN DALAM MENJALANKAN PROGRAM KELUARGA BERENCANA DENGAN ALGORITMA DECISION TREE	91.58%
PENELITIAN SAAT INI AYU BRAHDIKA PUTRI 2022	PERBANDINGAN KINERJA ALGORITMA C4.5 DAN NAÏVE BYES DALAM MENENTUKAN ALAT KONTRASEPSI YANG TEPAT	91,91%