

Lampiran C

Perhitungan *decision tree* berdasarkan data Tabel 3.2.1 Information gain dari keseluruhan data :

Entropy (Total)

$$\begin{aligned} Entropy &= \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) + \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) + \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) + \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) + \\ &= \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) + \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) + \left(-\frac{20}{140} \cdot \log_2 \frac{20}{140}\right) = 2.807344922 \end{aligned}$$

a. Perhitungan Informasi Gain dengan Entropy (min\_data\_x) berdasarkan Lampiran B =

$$\begin{aligned} MAX &= \\ &= \left(-\frac{20}{40} \cdot \log_2 \frac{20}{40}\right) + \left(-\frac{0}{40} \cdot \log_2 \frac{0}{40}\right) + \left(-\frac{0}{40} \cdot \log_2 \frac{0}{40}\right) + \left(-\frac{15}{40} \cdot \log_2 \frac{15}{40}\right) + \\ &= \left(-\frac{0}{40} \cdot \log_2 \frac{0}{40}\right) + \left(-\frac{5}{40} \cdot \log_2 \frac{5}{40}\right) + \left(-\frac{0}{40} \cdot \log_2 \frac{0}{40}\right) = 1.405639062 \end{aligned}$$

$$\begin{aligned} MIN &= \\ &= \left(-\frac{0}{100} \cdot \log_2 \frac{0}{100}\right) + \left(-\frac{20}{100} \cdot \log_2 \frac{20}{100}\right) + \left(-\frac{20}{100} \cdot \log_2 \frac{20}{100}\right) + \left(-\frac{5}{100} \cdot \log_2 \frac{5}{100}\right) + \\ &= \left(-\frac{20}{100} \cdot \log_2 \frac{20}{100}\right) + \left(-\frac{15}{100} \cdot \log_2 \frac{15}{100}\right) + \left(-\frac{20}{100} \cdot \log_2 \frac{20}{100}\right) = 2.48418372 \end{aligned}$$

$$\begin{aligned} InformasiGain &= 2.807344922 - \left(\left(\frac{40}{140}\right) \times 1.405639062\right) - \left(\left(\frac{40}{140}\right) \times 2.48418372\right) \\ &= 0.6313168186 \end{aligned}$$

b. Perhitungan Informasi Gain dengan Entropy (max\_data\_x) berdasarkan Lampiran B =

$$\begin{aligned} MAX &= \\ &= \left(-\frac{20}{120} \cdot \log_2 \frac{20}{120}\right) + \left(-\frac{20}{120} \cdot \log_2 \frac{20}{120}\right) + \left(-\frac{19}{120} \cdot \log_2 \frac{19}{120}\right) + \left(-\frac{13}{120} \cdot \log_2 \frac{13}{120}\right) + \\ &= \left(-\frac{20}{120} \cdot \log_2 \frac{20}{120}\right) + \left(-\frac{8}{120} \cdot \log_2 \frac{8}{120}\right) + \left(-\frac{20}{120} \cdot \log_2 \frac{20}{120}\right) = 2.752135707 \end{aligned}$$

$$\begin{aligned} MIN &= \\ &= \left(-\frac{0}{20} \cdot \log_2 \frac{0}{20}\right) + \left(-\frac{0}{20} \cdot \log_2 \frac{0}{20}\right) + \left(-\frac{1}{20} \cdot \log_2 \frac{1}{20}\right) + \left(-\frac{7}{20} \cdot \log_2 \frac{7}{20}\right) + \end{aligned}$$

$$= \left(-\frac{0}{20} \cdot \log_2 \frac{0}{20}\right) + \left(-\frac{12}{20} \cdot \log_2 \frac{12}{20}\right) + \left(-\frac{0}{20} \cdot \log_2 \frac{0}{20}\right) = 1.188376372$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{40}{140}\right) \times 1.405639062\right) - \left(\left(\frac{40}{140}\right) \times 2.48418372\right) \\ &= 0.27813 \end{aligned}$$

c. Perhitungan Informasi Gain dengan Entropy (rerata\_x) berdasarkan Lampiran B =

$$\begin{aligned} \text{MAX} &= \\ &= \left(-\frac{20}{93} \cdot \log_2 \frac{20}{93}\right) + \left(-\frac{20}{93} \cdot \log_2 \frac{20}{93}\right) + \left(-\frac{0}{93} \cdot \log_2 \frac{0}{93}\right) + \left(-\frac{15}{93} \cdot \log_2 \frac{15}{93}\right) + \end{aligned}$$

$$= \left(-\frac{19}{93} \cdot \log_2 \frac{19}{93}\right) + \left(-\frac{4}{93} \cdot \log_2 \frac{4}{93}\right) + \left(-\frac{15}{93} \cdot \log_2 \frac{15}{93}\right) = 2.466100054$$

MIN =

$$= \left(-\frac{0}{47} \cdot \log_2 \frac{0}{47}\right) + \left(-\frac{0}{47} \cdot \log_2 \frac{0}{47}\right) + \left(-\frac{20}{47} \cdot \log_2 \frac{20}{47}\right) + \left(-\frac{5}{47} \cdot \log_2 \frac{5}{47}\right) +$$

$$= \left(-\frac{1}{47} \cdot \log_2 \frac{1}{47}\right) + \left(-\frac{16}{47} \cdot \log_2 \frac{16}{47}\right) + \left(-\frac{5}{47} \cdot \log_2 \frac{5}{47}\right) = 1.859741132$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{93}{140}\right) \times 2.466100054\right) - \left(\left(\frac{47}{140}\right) \times 1.859741132\right) \\ &= 0.544818 \end{aligned}$$

d. Perhitungan Informasi Gain dengan Entropy (std\_x) berdasarkan Lampiran B =

$$\begin{aligned} \text{MAX} &= \\ &= \left(-\frac{0}{54} \cdot \log_2 \frac{0}{54}\right) + \left(-\frac{20}{54} \cdot \log_2 \frac{20}{54}\right) + \left(-\frac{1}{54} \cdot \log_2 \frac{1}{54}\right) + \left(-\frac{1}{54} \cdot \log_2 \frac{1}{54}\right) + \end{aligned}$$

$$= \left(-\frac{20}{54} \cdot \log_2 \frac{20}{54}\right) + \left(-\frac{0}{54} \cdot \log_2 \frac{0}{54}\right) + \left(-\frac{12}{54} \cdot \log_2 \frac{12}{54}\right) = 1.75680095$$

MIN =

$$= \left(-\frac{20}{86} \cdot \log_2 \frac{20}{86}\right) + \left(-\frac{0}{86} \cdot \log_2 \frac{0}{86}\right) + \left(-\frac{19}{86} \cdot \log_2 \frac{19}{86}\right) + \left(-\frac{19}{86} \cdot \log_2 \frac{19}{86}\right) +$$

$$= \left(-\frac{0}{86} \cdot \log_2 \frac{0}{86}\right) + \left(-\frac{20}{86} \cdot \log_2 \frac{20}{86}\right) + \left(-\frac{8}{86} \cdot \log_2 \frac{8}{86}\right) = 2.260004646$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left(\left(\frac{54}{140}\right) \times 1.75680095\right) - \left(\left(\frac{86}{140}\right) \times 2.260004646\right) \\
&= 0.741443
\end{aligned}$$

e. Perhitungan Informasi Gain dengan Entropy (var\_x) berdasarkan Lampiran B =

$$\begin{aligned}
\text{MAX} &= \\
&= \left(-\frac{0}{33} \cdot \log_2 \frac{0}{33}\right) + \left(-\frac{17}{33} \cdot \log_2 \frac{17}{33}\right) + \left(-\frac{0}{33} \cdot \log_2 \frac{0}{33}\right) + \left(-\frac{0}{33} \cdot \log_2 \frac{0}{33}\right) + \\
&= \left(-\frac{15}{33} \cdot \log_2 \frac{15}{33}\right) + \left(-\frac{0}{33} \cdot \log_2 \frac{0}{33}\right) + \left(-\frac{1}{33} \cdot \log_2 \frac{1}{33}\right) = 1.162872083 \\
\text{MIN} &= \\
&= \left(-\frac{20}{107} \cdot \log_2 \frac{20}{107}\right) + \left(-\frac{3}{107} \cdot \log_2 \frac{3}{107}\right) + \left(-\frac{20}{107} \cdot \log_2 \frac{20}{107}\right) + \left(-\frac{20}{107} \cdot \log_2 \frac{20}{107}\right) + \\
&= \left(-\frac{5}{107} \cdot \log_2 \frac{5}{107}\right) + \left(-\frac{20}{107} \cdot \log_2 \frac{20}{107}\right) + \left(-\frac{19}{107} \cdot \log_2 \frac{19}{107}\right) = 2.2602874479
\end{aligned}$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left(\left(\frac{33}{140}\right) \times 1.62872083\right) - \left(\left(\frac{107}{140}\right) \times 2.602874479\right) \\
&= 0.54391
\end{aligned}$$

f. Perhitungan Informasi Gain dengan Entropy (min\_data\_y) berdasarkan Lampiran B =

$$\begin{aligned}
\text{MAX} &= \\
&= \left(-\frac{16}{81} \cdot \log_2 \frac{16}{81}\right) + \left(-\frac{9}{81} \cdot \log_2 \frac{9}{81}\right) + \left(-\frac{10}{81} \cdot \log_2 \frac{10}{81}\right) + \left(-\frac{16}{81} \cdot \log_2 \frac{16}{81}\right) + \\
&= \left(-\frac{4}{81} \cdot \log_2 \frac{4}{81}\right) + \left(-\frac{13}{81} \cdot \log_2 \frac{13}{81}\right) + \left(-\frac{13}{81} \cdot \log_2 \frac{13}{81}\right) = 2.7107133723 \\
\text{MIN} &= \\
&= \left(-\frac{4}{59} \cdot \log_2 \frac{4}{59}\right) + \left(-\frac{11}{59} \cdot \log_2 \frac{11}{59}\right) + \left(-\frac{10}{59} \cdot \log_2 \frac{10}{59}\right) + \left(-\frac{4}{59} \cdot \log_2 \frac{4}{59}\right) + \\
&= \left(-\frac{16}{59} \cdot \log_2 \frac{16}{59}\right) + \left(-\frac{7}{59} \cdot \log_2 \frac{7}{59}\right) + \left(-\frac{7}{59} \cdot \log_2 \frac{7}{59}\right) = 2.652541394
\end{aligned}$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left(\left(\frac{81}{140}\right) \times 2.710713723\right) - \left(\left(\frac{59}{140}\right) \times 2.652541394\right) \\
&= 0.121157
\end{aligned}$$

g. Perhitungan Informasi Gain dengan Entropy (max\_data\_y) berdasarkan Lampiran B =

$$\begin{aligned}
 \text{MAX} &= \\
 &= \left(-\frac{0}{63} \cdot \log_2 \frac{0}{63}\right) + \left(-\frac{9}{63} \cdot \log_2 \frac{9}{63}\right) + \left(-\frac{10}{63} \cdot \log_2 \frac{10}{63}\right) + \left(-\frac{4}{63} \cdot \log_2 \frac{4}{63}\right) + \\
 &= \left(-\frac{17}{63} \cdot \log_2 \frac{17}{63}\right) + \left(-\frac{5}{63} \cdot \log_2 \frac{5}{63}\right) + \left(-\frac{18}{63} \cdot \log_2 \frac{18}{63}\right) = 2.39150588 \\
 \text{MIN} &= \\
 &= \left(-\frac{20}{77} \cdot \log_2 \frac{20}{77}\right) + \left(-\frac{11}{77} \cdot \log_2 \frac{11}{77}\right) + \left(-\frac{10}{77} \cdot \log_2 \frac{10}{77}\right) + \left(-\frac{16}{77} \cdot \log_2 \frac{16}{77}\right) + \\
 &= \left(-\frac{3}{77} \cdot \log_2 \frac{3}{77}\right) + \left(-\frac{15}{77} \cdot \log_2 \frac{15}{77}\right) + \left(-\frac{2}{77} \cdot \log_2 \frac{2}{77}\right) = 2.5386068338
 \end{aligned}$$

$$\begin{aligned}
 \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{63}{140}\right) \times 2.39150588\right) - \left(\left(\frac{77}{140}\right) \times 2.5386068338\right) \\
 &= 0.334944
 \end{aligned}$$

h. Perhitungan Informasi Gain dengan Entropy (rerata\_y) berdasarkan Lampiran B =

$$\begin{aligned}
 \text{MAX} &= \\
 &= \left(-\frac{0}{86} \cdot \log_2 \frac{0}{86}\right) + \left(-\frac{17}{86} \cdot \log_2 \frac{17}{86}\right) + \left(-\frac{20}{86} \cdot \log_2 \frac{20}{86}\right) + \left(-\frac{10}{86} \cdot \log_2 \frac{10}{86}\right) + \\
 &= \left(-\frac{16}{86} \cdot \log_2 \frac{16}{86}\right) + \left(-\frac{9}{86} \cdot \log_2 \frac{9}{86}\right) + \left(-\frac{14}{86} \cdot \log_2 \frac{14}{86}\right) = 2.5311833 \\
 \text{MIN} &= \\
 &= \left(-\frac{20}{54} \cdot \log_2 \frac{20}{54}\right) + \left(-\frac{3}{54} \cdot \log_2 \frac{3}{54}\right) + \left(-\frac{0}{54} \cdot \log_2 \frac{0}{54}\right) + \left(-\frac{10}{54} \cdot \log_2 \frac{10}{54}\right) + \\
 &= \left(-\frac{4}{54} \cdot \log_2 \frac{4}{54}\right) + \left(-\frac{11}{54} \cdot \log_2 \frac{11}{54}\right) + \left(-\frac{6}{54} \cdot \log_2 \frac{6}{54}\right) = 2.310882814
 \end{aligned}$$

$$\begin{aligned}
 \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{86}{140}\right) \times 2.5311833\right) - \left(\left(\frac{54}{140}\right) \times 2.310882814\right) \\
 &= 0.61145
 \end{aligned}$$

i. Perhitungan Informasi Gain dengan Entropy (std\_y) berdasarkan Lampiran B =

$$\text{MAX} =$$

$$= \left(-\frac{1}{48} \cdot \log_2 \frac{1}{48}\right) + \left(-\frac{14}{48} \cdot \log_2 \frac{14}{48}\right) + \left(-\frac{9}{48} \cdot \log_2 \frac{9}{48}\right) + \left(-\frac{5}{48} \cdot \log_2 \frac{5}{48}\right) +$$

$$= \left(-\frac{13}{48} \cdot \log_2 \frac{13}{48}\right) + \left(-\frac{5}{48} \cdot \log_2 \frac{5}{48}\right) + \left(-\frac{1}{48} \cdot \log_2 \frac{1}{48}\right) = 2.394185601$$

MIN

$$= \left(-\frac{19}{92} \cdot \log_2 \frac{19}{92}\right) + \left(-\frac{6}{92} \cdot \log_2 \frac{6}{92}\right) + \left(-\frac{11}{92} \cdot \log_2 \frac{11}{92}\right) + \left(-\frac{15}{92} \cdot \log_2 \frac{15}{92}\right) +$$

$$= \left(-\frac{7}{92} \cdot \log_2 \frac{7}{92}\right) + \left(-\frac{15}{92} \cdot \log_2 \frac{15}{92}\right) + \left(-\frac{19}{92} \cdot \log_2 \frac{19}{92}\right) = 2.69918184$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{48}{140}\right) \times 2.394186\right) - \left(\left(\frac{92}{140}\right) \times 2.699184\right) \\ &= 0.212743 \end{aligned}$$

j. Perhitungan Informasi Gain dengan Entropy (var\_y) berdasarkan Lampiran B =

MAX

$$= \left(-\frac{0}{9} \cdot \log_2 \frac{0}{9}\right) + \left(-\frac{4}{9} \cdot \log_2 \frac{4}{9}\right) + \left(-\frac{4}{9} \cdot \log_2 \frac{4}{9}\right) + \left(-\frac{0}{9} \cdot \log_2 \frac{0}{9}\right) +$$

$$= \left(-\frac{0}{9} \cdot \log_2 \frac{0}{9}\right) + \left(-\frac{1}{9} \cdot \log_2 \frac{1}{9}\right) + \left(-\frac{0}{9} \cdot \log_2 \frac{0}{9}\right) = 1.392147224$$

MIN

$$= \left(-\frac{20}{131} \cdot \log_2 \frac{20}{131}\right) + \left(-\frac{16}{131} \cdot \log_2 \frac{16}{131}\right) + \left(-\frac{16}{131} \cdot \log_2 \frac{16}{131}\right) + \left(-\frac{20}{131} \cdot \log_2 \frac{20}{131}\right) +$$

$$= \left(-\frac{20}{131} \cdot \log_2 \frac{20}{131}\right) + \left(-\frac{19}{131} \cdot \log_2 \frac{19}{131}\right) + \left(-\frac{20}{131} \cdot \log_2 \frac{20}{131}\right) = 2.800866739$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{9}{140}\right) \times 1.392147224\right) - \left(\left(\frac{131}{140}\right) \times 2.800866739\right) \\ &= 0.097049 \end{aligned}$$

k. Perhitungan Informasi Gain dengan Entropy (min\_data\_z) berdasarkan Lampiran B =

MAX

$$= \left(-\frac{19}{118} \cdot \log_2 \frac{19}{118}\right) + \left(-\frac{13}{118} \cdot \log_2 \frac{13}{118}\right) + \left(-\frac{17}{118} \cdot \log_2 \frac{17}{118}\right) + \left(-\frac{20}{118} \cdot \log_2 \frac{20}{118}\right) +$$

$$= \left(-\frac{16}{118} \cdot \log_2 \frac{16}{118}\right) + \left(-\frac{13}{118} \cdot \log_2 \frac{13}{118}\right) + \left(-\frac{20}{118} \cdot \log_2 \frac{20}{118}\right) = 2.786998579$$

MIN

$$= \left(-\frac{1}{22} \cdot \log_2 \frac{1}{22}\right) + \left(-\frac{7}{22} \cdot \log_2 \frac{7}{22}\right) + \left(-\frac{3}{22} \cdot \log_2 \frac{3}{22}\right) + \left(-\frac{0}{22} \cdot \log_2 \frac{0}{22}\right) +$$

$$= \left(-\frac{4}{22} \cdot \log_2 \frac{4}{22}\right) + \left(-\frac{7}{22} \cdot \log_2 \frac{7}{22}\right) + \left(-\frac{0}{22} \cdot \log_2 \frac{0}{22}\right) = 2.093165418$$

$$\text{InformasiGain} = 2.807344922 - \left(\left(\frac{118}{140}\right) \times 2.786998579\right) - \left(\left(\frac{22}{140}\right) \times 2.093165418\right)$$

$$= 0.129387$$

l. Perhitungan Informasi Gain dengan Entropy (max\_data\_z) berdasarkan Lampiran B =

MAX

$$= \left(-\frac{0}{62} \cdot \log_2 \frac{0}{62}\right) + \left(-\frac{7}{62} \cdot \log_2 \frac{7}{62}\right) + \left(-\frac{15}{62} \cdot \log_2 \frac{15}{62}\right) + \left(-\frac{1}{62} \cdot \log_2 \frac{1}{62}\right) +$$

$$= \left(-\frac{19}{62} \cdot \log_2 \frac{19}{62}\right) + \left(-\frac{6}{62} \cdot \log_2 \frac{6}{62}\right) + \left(-\frac{14}{62} \cdot \log_2 \frac{14}{62}\right) = 2.280354213$$

MIN

$$= \left(-\frac{20}{78} \cdot \log_2 \frac{20}{78}\right) + \left(-\frac{13}{78} \cdot \log_2 \frac{13}{78}\right) + \left(-\frac{5}{78} \cdot \log_2 \frac{5}{78}\right) + \left(-\frac{19}{78} \cdot \log_2 \frac{19}{78}\right) +$$

$$= \left(-\frac{1}{78} \cdot \log_2 \frac{1}{78}\right) + \left(-\frac{14}{78} \cdot \log_2 \frac{14}{78}\right) + \left(-\frac{6}{78} \cdot \log_2 \frac{6}{78}\right) = 2.494667791$$

$$\text{InformasiGain} = 2.807344922 - \left(\left(\frac{62}{140}\right) \times 2.280354213\right) - \left(\left(\frac{78}{140}\right) \times 2.494667791\right)$$

$$= 0.407597$$

m. Perhitungan Informasi Gain dengan Entropy (rerata\_z) berdasarkan Lampiran B =

MAX

$$= \left(-\frac{20}{97} \cdot \log_2 \frac{20}{97}\right) + \left(-\frac{2}{97} \cdot \log_2 \frac{2}{97}\right) + \left(-\frac{15}{97} \cdot \log_2 \frac{15}{97}\right) + \left(-\frac{20}{97} \cdot \log_2 \frac{20}{97}\right) +$$

$$= \left(-\frac{17}{97} \cdot \log_2 \frac{17}{97}\right) + \left(-\frac{3}{97} \cdot \log_2 \frac{3}{97}\right) + \left(-\frac{20}{97} \cdot \log_2 \frac{20}{97}\right) = 2.536399436$$

MIN

=

$$\begin{aligned}
&= \left(-\frac{0}{43} \cdot \log_2 \frac{0}{43}\right) + \left(-\frac{18}{43} \cdot \log_2 \frac{18}{43}\right) + \left(-\frac{5}{43} \cdot \log_2 \frac{5}{43}\right) + \left(-\frac{0}{43} \cdot \log_2 \frac{0}{43}\right) + \\
&= \left(-\frac{3}{43} \cdot \log_2 \frac{3}{43}\right) + \left(-\frac{17}{43} \cdot \log_2 \frac{17}{43}\right) + \left(-\frac{0}{43} \cdot \log_2 \frac{0}{43}\right) = 1.684170655
\end{aligned}$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left(\left(\frac{97}{140}\right) \times 2.536399436\right) - \left(\left(\frac{43}{140}\right) \times 1.684170655\right) \\
&= 0.5332711
\end{aligned}$$

n. Perhitungan Informasi Gain dengan Entropy (std\_z) berdasarkan Lampiran B =

$$\begin{aligned}
\text{MAX} &= \\
&= \left(-\frac{1}{22} \cdot \log_2 \frac{1}{22}\right) + \left(-\frac{3}{22} \cdot \log_2 \frac{3}{22}\right) + \left(-\frac{10}{22} \cdot \log_2 \frac{10}{22}\right) + \left(-\frac{0}{22} \cdot \log_2 \frac{0}{22}\right) + \\
&= \left(-\frac{4}{22} \cdot \log_2 \frac{4}{22}\right) + \left(-\frac{4}{22} \cdot \log_2 \frac{4}{22}\right) + \left(-\frac{0}{22} \cdot \log_2 \frac{0}{22}\right) = 2.006060325
\end{aligned}$$

$$\begin{aligned}
\text{MIN} &= \\
&= \left(-\frac{19}{118} \cdot \log_2 \frac{19}{118}\right) + \left(-\frac{17}{118} \cdot \log_2 \frac{17}{118}\right) + \left(-\frac{10}{118} \cdot \log_2 \frac{10}{118}\right) + \left(-\frac{20}{118} \cdot \log_2 \frac{20}{118}\right) + \\
&= \left(-\frac{16}{118} \cdot \log_2 \frac{16}{118}\right) + \left(-\frac{16}{118} \cdot \log_2 \frac{16}{118}\right) + \left(-\frac{20}{118} \cdot \log_2 \frac{20}{118}\right) = 2.778457492
\end{aligned}$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left(\left(\frac{22}{140}\right) \times 2.006060325\right) - \left(\left(\frac{118}{140}\right) \times 2.778457492\right) \\
&= 0.150274
\end{aligned}$$

o. Perhitungan Informasi Gain dengan Entropy (var\_z) berdasarkan Lampiran B =

$$\begin{aligned}
\text{MAX} &= \\
&= \left(-\frac{0}{8} \cdot \log_2 \frac{0}{8}\right) + \left(-\frac{0}{8} \cdot \log_2 \frac{0}{8}\right) + \left(-\frac{5}{8} \cdot \log_2 \frac{5}{8}\right) + \left(-\frac{0}{8} \cdot \log_2 \frac{0}{8}\right) + \\
&= \left(-\frac{1}{8} \cdot \log_2 \frac{1}{8}\right) + \left(-\frac{2}{8} \cdot \log_2 \frac{2}{8}\right) + \left(-\frac{0}{8} \cdot \log_2 \frac{0}{8}\right) = 1.298794941
\end{aligned}$$

$$\begin{aligned}
\text{MIN} &= \\
&= \left(-\frac{20}{132} \cdot \log_2 \frac{20}{132}\right) + \left(-\frac{20}{132} \cdot \log_2 \frac{20}{132}\right) + \left(-\frac{15}{132} \cdot \log_2 \frac{15}{132}\right) + \left(-\frac{20}{132} \cdot \log_2 \frac{20}{132}\right) +
\end{aligned}$$

$$= \left(-\frac{19}{132} \cdot \log_2 \frac{19}{132}\right) + \left(-\frac{18}{132} \cdot \log_2 \frac{18}{132}\right) + \left(-\frac{20}{132} \cdot \log_2 \frac{20}{132}\right) = 2.801008867$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{8}{140}\right) \times 1.298794941\right) - \left(\left(\frac{132}{140}\right) \times 2.801008867\right) \\ &= 0.092187 \end{aligned}$$

p. Perhitungan Informasi Gain dengan Entropy (std\_mag) berdasarkan Lampiran B =

$$\begin{aligned} \text{MAX} &= \\ &= \left(-\frac{0}{52} \cdot \log_2 \frac{0}{52}\right) + \left(-\frac{20}{52} \cdot \log_2 \frac{20}{52}\right) + \left(-\frac{7}{52} \cdot \log_2 \frac{7}{52}\right) + \left(-\frac{0}{52} \cdot \log_2 \frac{0}{52}\right) + \\ &= \left(-\frac{19}{52} \cdot \log_2 \frac{19}{52}\right) + \left(-\frac{1}{52} \cdot \log_2 \frac{1}{52}\right) + \left(-\frac{5}{52} \cdot \log_2 \frac{5}{52}\right) = 1.884856842 \end{aligned}$$

$$\begin{aligned} \text{MIN} &= \\ &= \left(-\frac{20}{88} \cdot \log_2 \frac{20}{88}\right) + \left(-\frac{0}{88} \cdot \log_2 \frac{0}{88}\right) + \left(-\frac{13}{88} \cdot \log_2 \frac{13}{88}\right) + \left(-\frac{20}{88} \cdot \log_2 \frac{20}{88}\right) + \\ &= \left(-\frac{1}{88} \cdot \log_2 \frac{1}{88}\right) + \left(-\frac{19}{88} \cdot \log_2 \frac{19}{88}\right) + \left(-\frac{15}{88} \cdot \log_2 \frac{15}{88}\right) = 2.365149552 \end{aligned}$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{52}{140}\right) \times 1.884856842\right) - \left(\left(\frac{88}{140}\right) \times 2.365149552\right) \\ &= 0.6206 \end{aligned}$$

q. Perhitungan Informasi Gain dengan Entropy (std\_sum\_vec\_mag) berdasarkan Lampiran B

$$\begin{aligned} &= \\ \text{MAX} &= \\ &= \left(-\frac{0}{63} \cdot \log_2 \frac{0}{63}\right) + \left(-\frac{20}{63} \cdot \log_2 \frac{20}{63}\right) + \left(-\frac{4}{63} \cdot \log_2 \frac{4}{63}\right) + \left(-\frac{2}{63} \cdot \log_2 \frac{2}{63}\right) + \\ &= \left(-\frac{18}{63} \cdot \log_2 \frac{18}{63}\right) + \left(-\frac{2}{63} \cdot \log_2 \frac{2}{63}\right) + \left(-\frac{17}{63} \cdot \log_2 \frac{17}{63}\right) = 2.120389761 \end{aligned}$$

$$\begin{aligned} \text{MIN} &= \\ &= \left(-\frac{20}{77} \cdot \log_2 \frac{20}{77}\right) + \left(-\frac{0}{77} \cdot \log_2 \frac{0}{77}\right) + \left(-\frac{16}{77} \cdot \log_2 \frac{16}{77}\right) + \left(-\frac{18}{77} \cdot \log_2 \frac{18}{77}\right) + \\ &= \left(-\frac{2}{77} \cdot \log_2 \frac{2}{77}\right) + \left(-\frac{18}{77} \cdot \log_2 \frac{18}{77}\right) + \left(-\frac{3}{77} \cdot \log_2 \frac{3}{77}\right) = 2.275737847 \end{aligned}$$



$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left( \left( \frac{63}{140} \right) \times 2.120389761 \right) - \left( \left( \frac{77}{140} \right) \times 2.275737847 \right) \\
&= 0.601524
\end{aligned}$$

r. Perhitungan Informasi Gain dengan Entropy (std\_sum\_vec\_hor) berdasarkan Lampiran B =

$$\begin{aligned}
\text{MAX} &= \\
&= \left( -\frac{0}{51} \times \log_2 \frac{0}{51} \right) + \left( -\frac{20}{51} \times \log_2 \frac{20}{51} \right) + \left( -\frac{1}{51} \times \log_2 \frac{1}{51} \right) + \left( -\frac{1}{51} \times \log_2 \frac{1}{15} \right) + \\
&= \left( -\frac{20}{51} \times \log_2 \frac{20}{51} \right) + \left( -\frac{0}{51} \times \log_2 \frac{0}{51} \right) + \left( -\frac{9}{51} \times \log_2 \frac{9}{51} \right) = 1.723279287
\end{aligned}$$

$$\begin{aligned}
\text{MIN} &= \\
&= \left( -\frac{20}{89} \cdot \log_2 \frac{20}{89} \right) + \left( -\frac{0}{89} \cdot \log_2 \frac{0}{89} \right) + \left( -\frac{19}{89} \cdot \log_2 \frac{9}{89} \right) + \left( -\frac{19}{89} \cdot \log_2 \frac{19}{89} \right) + \\
&= \left( -\frac{0}{89} \cdot \log_2 \frac{0}{89} \right) + \left( -\frac{20}{89} \cdot \log_2 \frac{20}{89} \right) + \left( -\frac{11}{89} \cdot \log_2 \frac{11}{89} \right) = 2.292001778
\end{aligned}$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left( \left( \frac{51}{140} \right) \times 1.723279287 \right) - \left( \left( \frac{89}{140} \right) \times 2.292001778 \right) \\
&= 0.722531
\end{aligned}$$

s. Perhitungan Informasi Gain dengan Entropy (delta\_sum\_vec\_mag) berdasarkan Lampiran

B =

$$\begin{aligned}
\text{MAX} &= \\
&= \left( -\frac{0}{39} \cdot \log_2 \frac{0}{39} \right) + \left( -\frac{6}{39} \cdot \log_2 \frac{6}{39} \right) + \left( -\frac{3}{39} \cdot \log_2 \frac{3}{39} \right) + \left( -\frac{0}{39} \cdot \log_2 \frac{0}{39} \right) + \\
&= \left( -\frac{11}{39} \cdot \log_2 \frac{11}{39} \right) + \left( -\frac{3}{39} \cdot \log_2 \frac{3}{39} \right) + \left( -\frac{16}{39} \cdot \log_2 \frac{16}{39} \right) = 2.027112581
\end{aligned}$$

$$\begin{aligned}
\text{MIN} &= \\
&= \left( -\frac{20}{101} \cdot \log_2 \frac{20}{101} \right) + \left( -\frac{14}{101} \cdot \log_2 \frac{14}{101} \right) + \left( -\frac{17}{101} \cdot \log_2 \frac{17}{101} \right) + \left( -\frac{20}{101} \cdot \log_2 \frac{20}{101} \right) + \\
&= \left( -\frac{9}{101} \cdot \log_2 \frac{9}{101} \right) + \left( -\frac{17}{101} \cdot \log_2 \frac{17}{101} \right) + \left( -\frac{4}{101} \cdot \log_2 \frac{4}{101} \right) = 2.681150549
\end{aligned}$$

$$\begin{aligned}
\text{InformasiGain} &= 2.807344922 - \left( \left( \frac{39}{140} \right) \times 2.027112581 \right) - \left( \left( \frac{101}{140} \right) \times 2.681150549 \right) \\
&= 0.308401
\end{aligned}$$

t. Perhitungan Informasi Gain dengan Entropy (rms\_sum\_vec\_mag) berdasarkan Lampiran B

$$\begin{aligned} &= \\ \text{MAX} &= \\ &= \left(-\frac{0}{51} \cdot \log_2 \frac{0}{51}\right) + \left(-\frac{20}{51} \cdot \log_2 \frac{20}{51}\right) + \left(-\frac{0}{51} \cdot \log_2 \frac{0}{51}\right) + \left(-\frac{10}{51} \cdot \log_2 \frac{10}{51}\right) + \\ &= \left(-\frac{1}{51} \cdot \log_2 \frac{1}{51}\right) + \left(-\frac{5}{51} \cdot \log_2 \frac{5}{51}\right) + \left(-\frac{15}{51} \cdot \log_2 \frac{15}{51}\right) = 1.949467651 \end{aligned}$$

$$\begin{aligned} \text{MIN} &= \\ &= \left(-\frac{20}{89} \cdot \log_2 \frac{20}{89}\right) + \left(-\frac{0}{89} \cdot \log_2 \frac{0}{89}\right) + \left(-\frac{20}{89} \cdot \log_2 \frac{20}{89}\right) + \left(-\frac{10}{89} \cdot \log_2 \frac{10}{89}\right) + \\ &= \left(-\frac{19}{89} \cdot \log_2 \frac{19}{89}\right) + \left(-\frac{15}{89} \cdot \log_2 \frac{15}{89}\right) + \left(-\frac{5}{89} \cdot \log_2 \frac{5}{89}\right) = 2.464272454 \end{aligned}$$

$$\begin{aligned} \text{InformasiGain} &= 2.807344922 - \left(\left(\frac{51}{140}\right) \times 1.949467651\right) - \left(\left(\frac{89}{140}\right) \times 2.464272454\right) \\ &= 0.308401 \end{aligned}$$