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1> Develop a Decision tree using Gini Index for for the following Date set.

~~Day~~ $Gini\ (overall) = 1 - \sum_{i=1}^{c} (P_i)^2$

① outlook attribute

$$OL = values = (Su, Ov, Ra) = (5, 4, 5)$$

$$Gini(Sunny) = 1 - \left[\frac{2}{5}^2 + \frac{3}{5}^2\right]$$

$$= 0.48$$

$$Gini\ (over-cast) = 1 - \left[\frac{4}{4}^2 + 0\right]$$
$$= 0$$

$$Gini(Rain) = 1 - \left[\frac{3}{5}^2 + \frac{2}{5}^2\right]$$

$$= 0.48$$

$$Gini\ Index\ (outlook) = \sum \frac{|S_v|}{|S|}\ Gini\ (S_r)$$

$$= \frac{5}{14} \times 0.48 + \frac{4}{14} \times 0 + \frac{5}{14} \times 0.48$$

$$= 0.3428\ \checkmark$$

2) Temperature Attribute

$$Gini\ (Hot) = 1 - \left[\frac{2}{4}^2 + \frac{2}{4}^2\right] = 0.5$$

$$Gini(Mild) = 1 - \left[\frac{4}{6}^2 + \frac{2}{6}^2\right] = 0.44$$

$$Gini\ (cool) = 1 - \left[\frac{3}{4}^2 + \frac{1}{4}^2\right] = 0.375$$

$$GI(Temp) = \frac{4}{14} \times 0.5 + \frac{6}{14} \times 0.44 + \frac{4}{14} \times 0.375$$

$$= 0.438$$