Secara umum, langkah-langkah dalam algoritma ID3 adalah:

ID3(Examples, Target_Attribute, Attributes)

Examples are the training attributes. Target_Attribute is the attribute whose value is to be predicted by the tree. Attributes is a list of other attributes that may tested by the learned decision tree. Returns a decision tree that correctly classifies the given Examples.

1. Create a root node for the tree.
2. If all Examples are positive, Return the single-node tree Root, with label = +
3. If all Examples are negative, Return the single-node tree Root, with label = -
4. If Attributes is empty, Return the single node tree Root, with label = most common value of Target_Attribute in Examples
5. Else Begin
    a. Calculate the information gain for each attribute, according to the average entropy formula

$$Gain(S, A) = Entropy(S) - \sum_{v \in Values(A)} \frac{|S_v|}{|S|} Entropy(S_v)$$

$$Entropy(S) = \sum_{i=1}^{c} - p_i \log_2 p_i$$

    b. Select the Attribute, A, from Attributes that best classifies Examples (attribute with the highest information gain/lowest average entropy) and make this attribute tested at the root. Root ← A
    c. For each possible value, v_i, of A,
        - Add a new tree branch below Root, corresponding to the test A= v_i
        - Let $Examples_{vi}$ be the subset of Examples that have value v_i for A
        - If $Examples_{vi}$ is empty
          Then below this new branch add aleaf node with label = most common value of Target_Attibutes in Examples
          Else below this new branch add the subtree
          ID3($Examples_{vi}$, Target_Attribute, (Attributes - {A}))
6. End
7. Return Root

Contoh:
Bentuklah pengetahuan dalam bentuk decision tree dengan menggunakan algoritma ID3 terhadap kasus berikut ini:

Identifikasi makanan yang baik untuk dimakan

No	Conclusion	Skin	Colour	Size	Flash
1.	Safe	Hairy	Brown	Large	Hard
2.	Safe	Hairy	Green	Large	Hard
3.	Dangerous	Smooth	Red	Large	Soft
4.	Safe	Hairy	Green	Large	Soft
5.	Safe	Hairy	Red	Small	Hard
6.	Safe	Smooth	Red	Small	Hard
7.	Safe	Smooth	Brown	Small	Hard
8.	Dangerous	Hairy	Green	Small	Soft
9.	Dangerous	Smooth	Green	Small	Hard
10.	Safe	Hairy	Red	Large	Hard
11.	Safe	Smooth	Brown	Large	Soft
12.	Dangerous	Smooth	Green	Small	Soft
13.	Safe	Hairy	Red	Small	Soft
14.	Dangerous	Smooth	Red	Large	Hard
15.	Safe	Smooth	Red	Small	Hard
16.	Dangerous	Hairy	Green	Small	Hard

Target_Attribute: Safe(+) dan Dangerous(-)
Atribut2:

- Skin, dengan dua nilai yang mungkin: hairy dan smooth
- Colour, dengan tiga nilai yang mungkin: brown, green, red
- Size, dengan dua nilai yang mungkin: large dan small
- Flash, dengan dua nilai yang mungkin: soft dan hard

Langkah 1: Menentukan node dengan atribut mana yang akan dijadikan sebagai akar. Atribut dengan Gain tertinggi yang akan dipilih

S = [10+,6-]
Entropy(S) = Entropy([10+, 6−]) $= -(10/16)\log_2(10/16) - (6/16)\log_2(6/16)$
$= 0.9544$

Gain (S, skin)=?
Values(Skin) = hairy and smooth
Hairy = 8
Smooth = 8
S_{hairy} = [6+, 2-]
S_{smooth} = [4+, 4-]

$$Gain(S, Skin) = Entropy(S) - \sum_{v \in \{hairy, smooth\}} \frac{|S_v|}{|S|} Entropy(S_v)$$

= Entropy(S) – (8/16) entropy(S_{hairy}) – (8/16) entropy(S_{smooth})

$$=0.9544-\frac{8}{16}(entropy[6+,2-])-\frac{8}{16}(entropy[4+,4-])$$

$$=0.9544-\frac{8}{16}\left\{-\frac{6}{8}\ {}^{2}\log\frac{6}{8}-\frac{2}{8}\ {}^{2}\log\frac{2}{8}\right\}-\frac{8}{16}\left\{-\frac{4}{8}\ {}^{2}\log\frac{4}{8}-\frac{4}{8}\ {}^{2}\log\frac{4}{8}\right\}$$

= 0.9544 – (8/16) (0.311278+0.5)-(8/16) (0.5+0.5)
= 0.9544 – 0.40564-0.5
= 0.04876

Gain(S, Color) = ?
Values(Color) = brown (3), green (6), dan red (7)

S_{brown} = [3+, 0-]
S_{green} = [2+, 4-]
S_{red} = [5+, 2-]

$$Gain(S,Color)=Entropy(S)-\sum_{v\in\{brown,green,red\}}\frac{|S_v|}{|S|}Entropy(S_v)$$

= Entropy(S) – (3/16)entropy(S_{brown}) – (6/16)entropy(S_{green}) – (7/16)entropy(S_{red})

$$=0.9544-\frac{3}{16}(entropy[3+,0-])-\frac{6}{16}(entropy[2+,4-])-\frac{7}{16}(entropy[5+,2-])$$

$$=0.9544-\frac{3}{16}\left\{-\frac{3}{3}\ {}^{2}\log\frac{3}{3}-\frac{0}{3}\ {}^{2}\log\frac{0}{3}\right\}-\frac{6}{16}\left\{-\frac{2}{6}\ {}^{2}\log\frac{2}{6}-\frac{4}{6}\ {}^{2}\log\frac{4}{6}\right\}-\frac{7}{16}\left\{-\frac{5}{7}\ {}^{2}\log\frac{5}{7}-\frac{2}{7}\ {}^{2}\log\frac{2}{7}\right\}$$

= 0.9544 – 0 – 0.34436 – 0.37762
= 0.23242

Gain(S, Size) = ?
Values(Size) = large (7), small (9)

S_{large} = [5+, 2-]
S_{small} = [5+, 4-]

$$Gain(S,Size)=Entropy(S)-\sum_{v\in\{large,small\}}\frac{|S_v|}{|S|}Entropy(S_v)$$

= Entropy(S) – (7/16) entropy(S_{large}) – (9/16) entropy(S_{small})

$$=0.9544-\frac{7}{16}(entropy[5+,2-])-\frac{9}{16}(entropy[5+,4-])$$

= 0.9544 – 0.37762 – 0.55748 = 0.0193

Gain(S, Flash) = ?
Values(Flash) = hard(10), soft(6)

S_{hard} = [7+, 3-]
S_{small} = [3+, 3-]

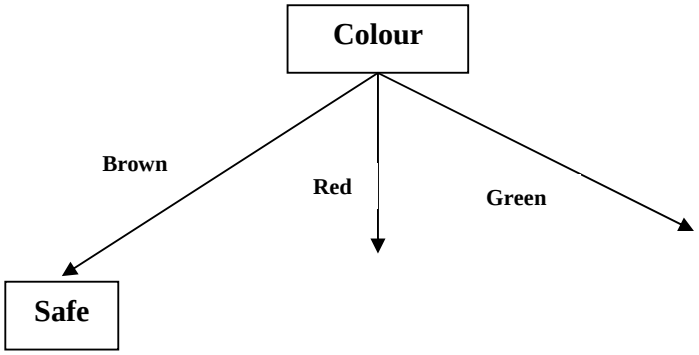
$$Gain(S, Flash) = Entropy(S) - \sum_{v \in \{hard, soft\}} \frac{|S_v|}{|S|} Entropy(S_v)$$

= Entropy(S) – (10/16) entropy(S_{hard}) – (6/16) entropy(S_{soft})

$$= 0.9544 - \frac{10}{16}(entropy[7+,3-]) - \frac{6}{16}(entropy[3+,3-])$$

= 0.9544 – 0.55081 – 0.375
= 0.02859

Gain tertinggi (A) = Color
Root = A = Color



Langkah 2: Memilih atribut untuk membentuk cabang

Untuk cabang Colour = Red

S_{red} = [5+, 2-]

Entropy(S_{red}) = 0.86312

Gain(S_{red}, Skin)= ?

$(S_{red})_{hairy}$ = [3+, 0-]
$(S_{red})_{smooth}$ = [2+, 2-]

$$Gain(S_{red}, Skin) = Entropy(S_{red}) - \sum_{v \in \{hairy, smooth\}} \frac{|S_v|}{|S|} Entropy(S_v) = 0.29169$$

Gain(S_{red}, Size) = ?

$(S_{red})_{large}$ = [1+, 2-]
$(S_{red})_{small}$ = [4+, 0-]

Gain(S_{red}, Size) = 0.46956

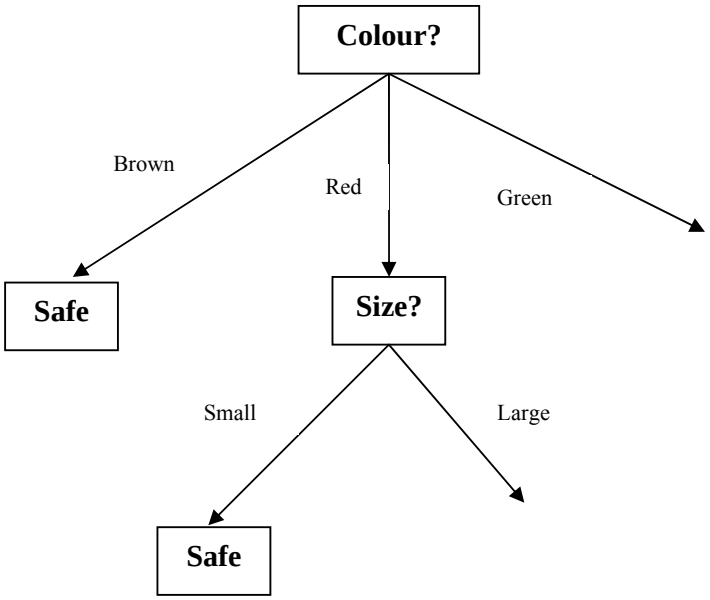
Gain(S_{red}, Flash) = ?

$(S_{red})_{hard}$ = [4+, 1-]
$(S_{red})_{soft}$ = [1+, 1-]

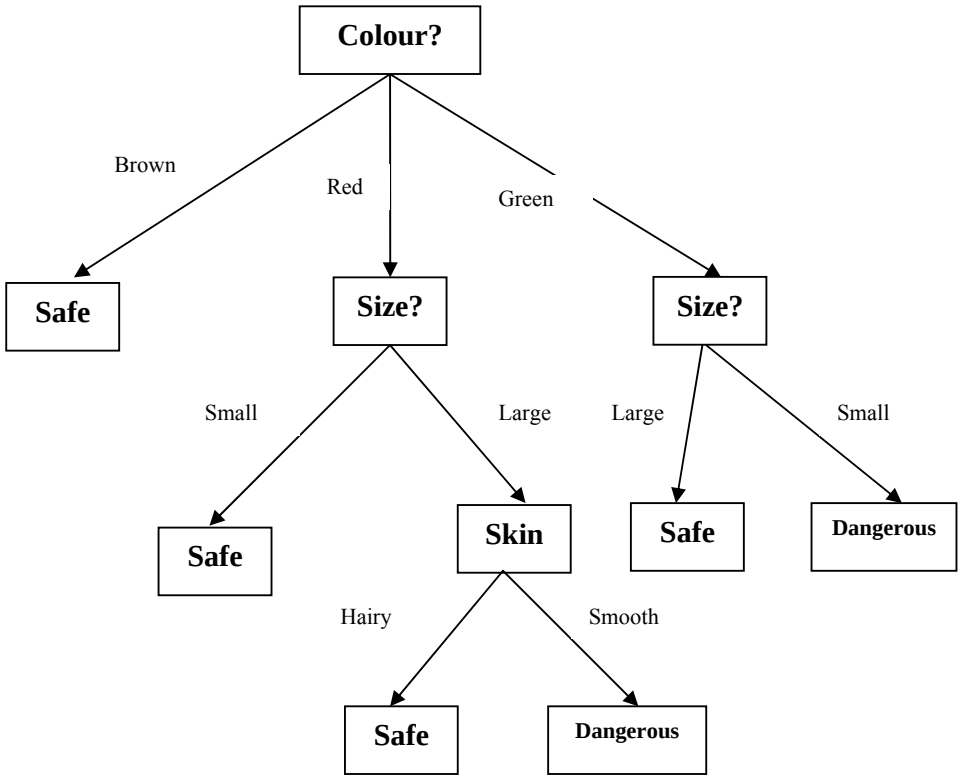
Gain(S_{red}, Flash) = 0.06229

Atribut yang dipilih adalah Size

Bentuk Tree:



Dst….


Colour?
Brown
Red
Green
Safe
Size?
Size?
Small
Large
Large
Small
Safe
Skin
Safe
Dangerous
Hairy
Smooth
Safe
Dangerous