Entropy and Entropy Gain

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Entropy – Two-Class Example

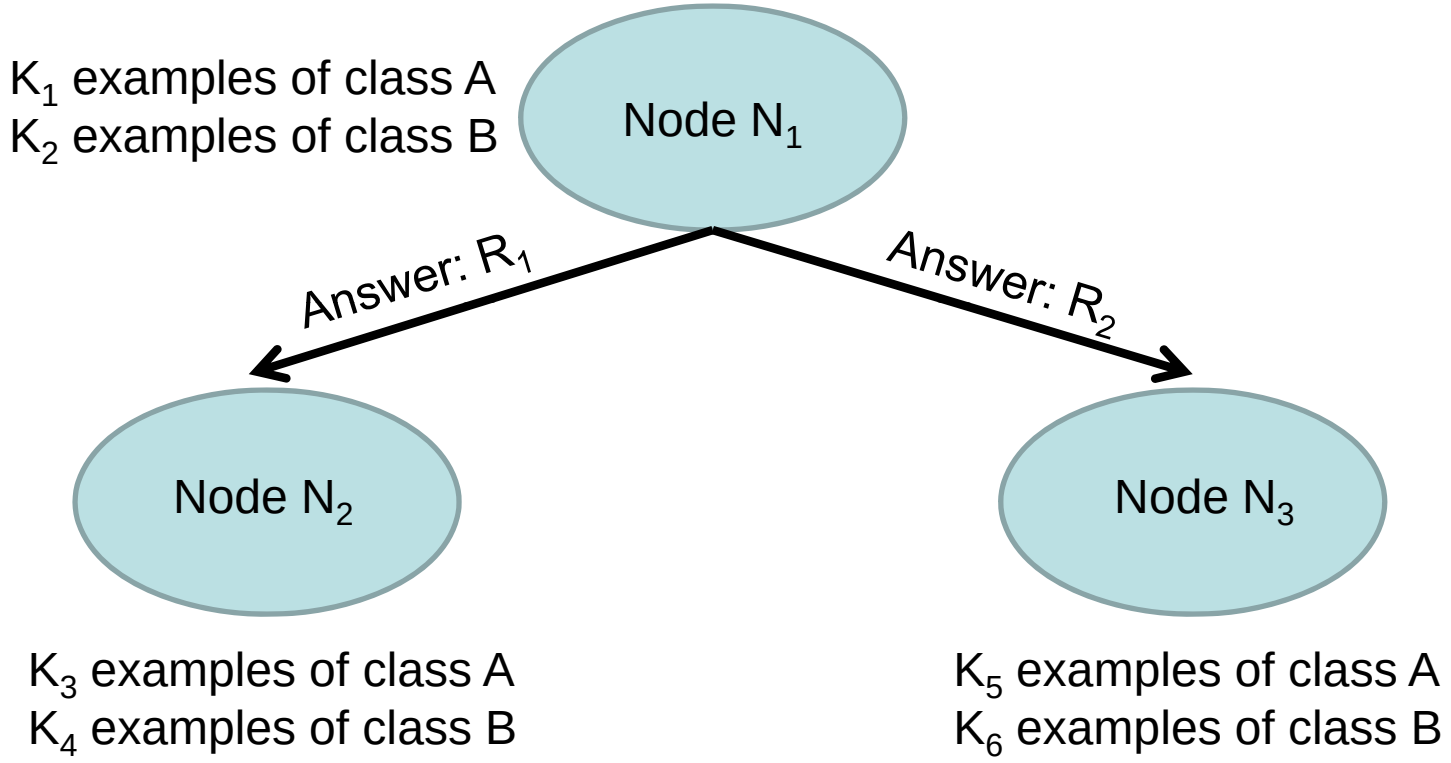
- Suppose that we have a set X of training examples.
  - K_1 examples have class label A.
  - K_2 examples have class label B.
- Let $K = K_1 + K_2$.
- Then the entropy of the set X is:

$$H(K_1/K, K_2/K) = -(K_1/K) \log(K_1/K) -(K_2/K)\log(K_2/K)$$

Information Gain – Example with Two Classes, Two Answers

- Suppose that we have a set X of training examples.
  - K_1 examples have class label A.
  - K_2 examples have class label B.
- Let $K = K_1 + K_2$.
- Suppose that we have a question Q_1 with only two possible answers: R_1 and R_2.
- K_3 examples of class A and K_4 examples of class B give answer R_1.
- K_5 examples of class A and K_6 examples of class B give answer R_2.
- Obviously, $K_3 + K_5 = K_1$, $K_4 + K_6 = K_2$

Information Gain – Example with Two Classes, Two Answers



- Information gain of question Q at node N_1 =

Entropy at N_1 – weighted average of entropies at N_2 and N_3

Information Gain – Example with Two Classes, Two Answers

- Information gain of question Q at node N_1 =