Example of Information gain

	Age	Competition	Type	Class (Profit)
1	mid old	yes	Software	Down
2	old	No	Software	Down
3	old	No	H/W	Down
4	mid	yes	S/W	Down
5	mid	yes	H/W	Up
6	mid	No	H/W	up
7	mid	NO	S/W	up
8	New	yes	S/W	up
9	New	No	H/W	up
10	New	No	S/W	up

$$Inf(D) = -\frac{5}{10}\log_2\left(\frac{5}{10}\right) - \frac{5}{10}\log\left(\frac{5}{10}\right)$$

$$= 1$$

$$Inf_{age}(D) = \frac{3}{10} \times \left(\frac{-3}{3}\log\left(\frac{3}{3}\right) - \frac{0}{3}\log\left(\frac{0}{3}\right)\right)$$

$$+ \frac{4}{10} \times \left(-\frac{2}{4}\log\left(\frac{2}{4}\right) - \frac{2}{4}\log\left(\frac{2}{4}\right)\right)$$

$$+ \frac{3}{10} \times \left(\frac{-0}{3}\log\left(\frac{0}{3}\right) - \frac{3}{3}\log\left(\frac{3}{3}\right)\right)$$

$$= 1 - 0.4 = 0.6$$

$$\text{gain}_{age}(D) = Inf(D) - Inf_{age}(D) =$$

Example of Information gain

	Age	competition	Type	Down
1	~~middle~~ old	yes	Software	Down
2	old	No	Software	Down
3	old	No	H/w	Down
4	mid	yes	S/w	Down
5	mid	yes	H/w	Up
6	mid	No	H/w	Up
7	mid	NO	S/w	Up
8	New yo	yes	S/w	Up
9	New	No	H/w	Up
10	New	NO	S/w	Up

$$\text{Inf}(D) = -\frac{5}{10}\log_2\left(\frac{5}{10}\right) - \frac{5}{10}\log\left(\frac{5}{10}\right)$$

$$= 1$$

$$\text{Inf}_{age}(D) = \frac{5}{10}\log_2\left(\frac{5}{10}\right) \quad \frac{3}{10} \times \left(\frac{-3}{3}\log\left(\frac{3}{3}\right) - \frac{0}{3}\log\left(\frac{0}{3}\right)\right)$$

$$+ \frac{4}{10} \times \left(-\frac{2}{4}\log\left(\frac{2}{4}\right) - \frac{2}{4}\log\left(\frac{2}{4}\right)\right)$$

$$+ \frac{3}{10} \times \left(\frac{-0}{3}\log\left(\frac{0}{3}\right) - \frac{3}{3}\log\left(\frac{3}{3}\right)\right)$$

$$= 1 - 0.4 = 0.6$$

$$\text{Gain}_{age}(D) = \text{Inf}(D) - \text{Inf}_{age}(D) =$$