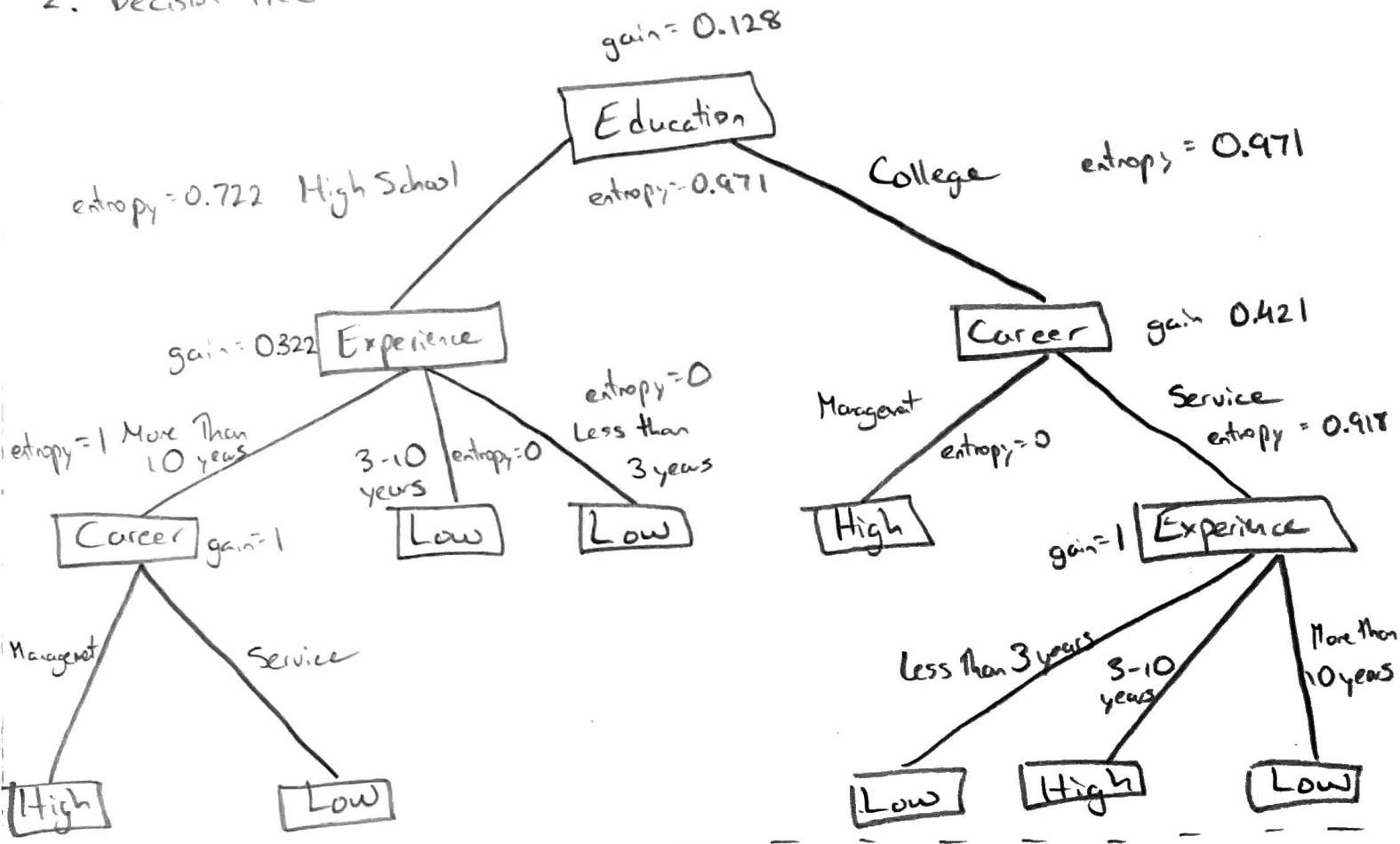
2. Decision Tree :



Prune the tree

Instance	Education	Career	Experience	Salary
1	High School	Managent	More than 10	High
2	College	Managent	Less than 3	Low
3	College	Service	3 to 10	Low

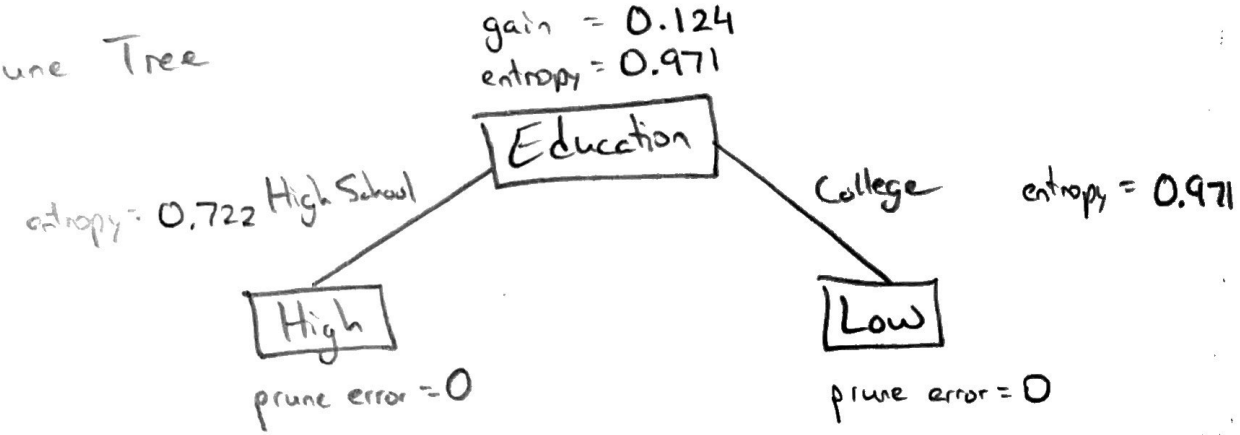
Following the tree

Education Experience Career Salary
High School → More than 10 Years → Managent → High ✓

Education Career Experience Salary
College → Managent → Less Than 3 Years → Low ✗
(should default to High)
2 errors
2 errors should be pruned

Education Career Experience
College → Service → 3 to 10 years → Low ✗
(should default to High)
1 error
1 error should be pruned

Prune Tree


gain = 0.124
entropy = 0.971
Education
entropy = 0.722
High School
College
entropy = 0.971
High
Low
prune error = 0
prune error = 0

3 Naive Bayes

Low 6 -> 0.6 -> $\frac{3}{5}$
High 4 -> 0.4 -> $\frac{2}{5}$

High School 5 -> 0.5 -> $\frac{5}{10}$
College 5 -> 0.5 -> $\frac{5}{10}$
Managerial 5 -> 0.5 -> $\frac{5}{10}$
Service 5 -> 0.5 -> $\frac{5}{10}$
Less Than 3 -> 0.3 -> $\frac{3}{10}$
3 to 10 -> 0.3 -> $\frac{3}{10}$
More Than 10 -> 0.4 -> $\frac{2}{5}$

Instance	Education	Career	Experience
1	High School	Service	Less Than 3
2	College	Retail	Less Than 3
3	Graduate	Service	3 to 10

Instance 1 $P(\text{High School} \mid \text{Low}) = \frac{4+1}{6+2} = \frac{5}{8} = 0.625$ (Laplace Smoothing)

$P(\text{Service} \mid \text{Low}) = \frac{4+1}{6+2} = \frac{5}{8} = 0.625$ (Laplace smoothing)

$P(\text{Less Than 3} \mid \text{Low}) = \frac{2+1}{6+3} = \frac{3}{9} = 0.333$ (Laplace smoothing)

$P(\text{Low} \mid \text{Instance 1}) = (0.625)(0.625)(0.333)(0.6) = 0.078125$ (0.6 ↑ low)

$P(\text{High School} \mid \text{High}) = \frac{1+1}{4+2} = \frac{2}{6} = 0.333$ (Laplace smoothing)

$P(\text{Service} \mid \text{High}) = \frac{1+1}{4+2} = \frac{2}{6} = 0.333$ (Laplace smoothing)

$P(\text{Less Than 3} \mid \text{Low}) = \frac{1+1}{4+3} = \frac{2}{7} = 0.2857$ (Laplace smoothing)

$P(\text{High} \mid \text{Instance 1}) = (0.333)(0.333)(0.2857)(0.4) = 0.01267239$ (0.4 ↑ high)

Instance 1 would be classified as a Low salary
Instance 2 would be classified as a High salary
Instance 3 would be classified as a Low salary

Instance 2 $P(\text{College} \mid \text{Low}) = \frac{0+1}{6+2} = \frac{1}{8} = 0.125$ (Laplace smoothing)

$P(\text{Retail} \mid \text{Low}) = \frac{2+1}{6+2} = \frac{3}{8} = 0.375$ (Laplace smoothing)

$P(\text{Less Than 3} \mid \text{Low}) = \frac{2+1}{6+3} = \frac{3}{9} = 0.333$ (Laplace smoothing)

$P(\text{Low} \mid \text{Instance 2}) = (0.125)(0.375)(0.333)(0.6) = \boxed{0.0093656 2}$

(0.6 ↑ low)

$P(\text{College} \mid \text{High}) = \frac{0+1}{6+2} = \frac{1}{8} = 0.125$ (Laplace smoothing)

$P(\text{Retail} \mid \text{High}) = \frac{3+1}{4+2} = \frac{4}{6} = 0.666$ (Laplace smoothing)

$P(\text{Less Than 3} \mid \text{High}) = \frac{1+1}{4+3} = \frac{2}{7} = 0.2857$ (Laplace smoothing)

$P(\text{High} \mid \text{Instance 2}) = (0.125)(0.666)(0.2857)(0.4) = \boxed{0.00951381}$

(0.4 ↑ high)

Instance 3 $P(\text{Graduate} \mid \text{Low}) = \frac{0+1}{6+2} = \frac{1}{8} = 0.125$ (Laplace smoothing)

$P(\text{Service} \mid \text{Low}) = \frac{4+1}{6+2} = \frac{5}{8} = 0.625$ (Laplace smoothing)

$P(3 \text{ to } 10 \mid \text{Low}) = \frac{2+1}{6+3} = \frac{3}{9} = 0.333$ (Laplace smoothing)

$P(\text{Low} \mid \text{Instance 3}) = (0.125)(0.625)(0.333)(0.6) = \boxed{0.01560938}$

(0.6 ↑ low)

$P(\text{Graduate} \mid \text{High}) = \frac{0+1}{6+2} = \frac{1}{8} = 0.125$ (Laplace smoothing)

$P(\text{Service} \mid \text{High}) = \frac{3+1}{4+2} = \frac{4}{6} = 0.666$ (Laplace smoothing)

$P(3 \text{ to } 10 \mid \text{High}) = \frac{1+1}{4+3} = \frac{2}{7} = 0.2857$ (Laplace smoothing)

$P(\text{High} \mid \text{Instance 3}) = (0.125)(0.666)(0.2857)(0.4) = \boxed{0.00951381}$

(0.4 ↑ high)