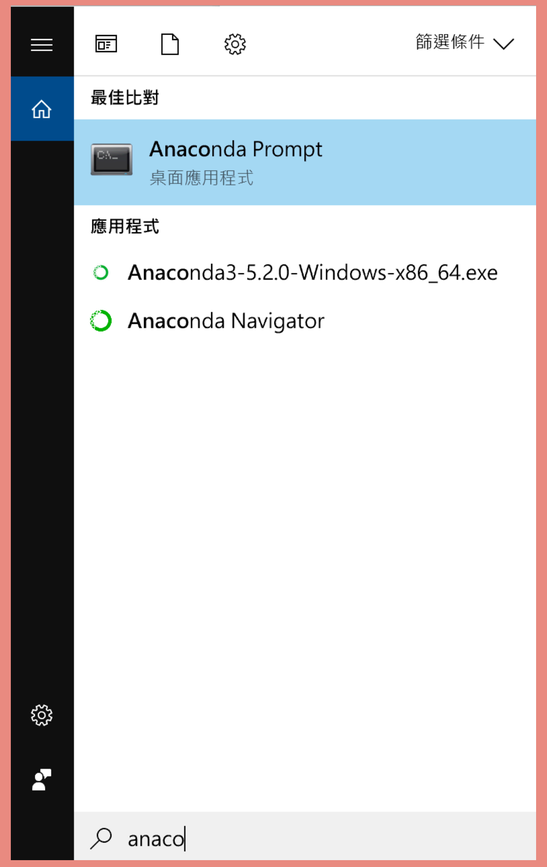
DECISION TREE

IKM Lab

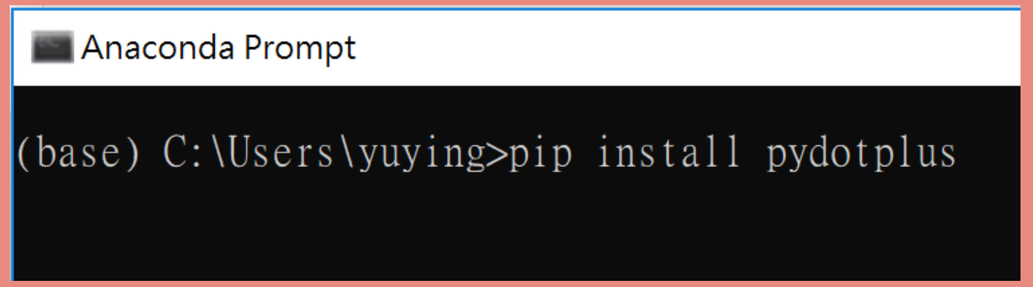
OUTLINE

- Package installation
- What is Decision Tree ?
- How can we use it ?
- How can we know which attribute is important ?
- My decision tree 😍

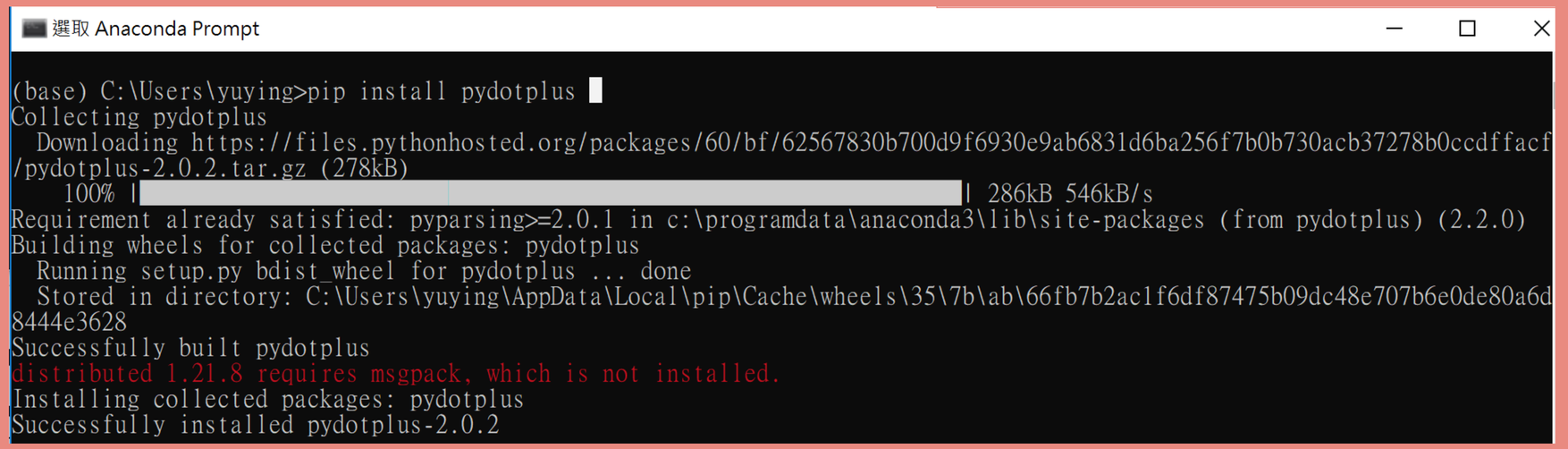
- Search for “Anaconda Prompt”



- Pip install pydotplus

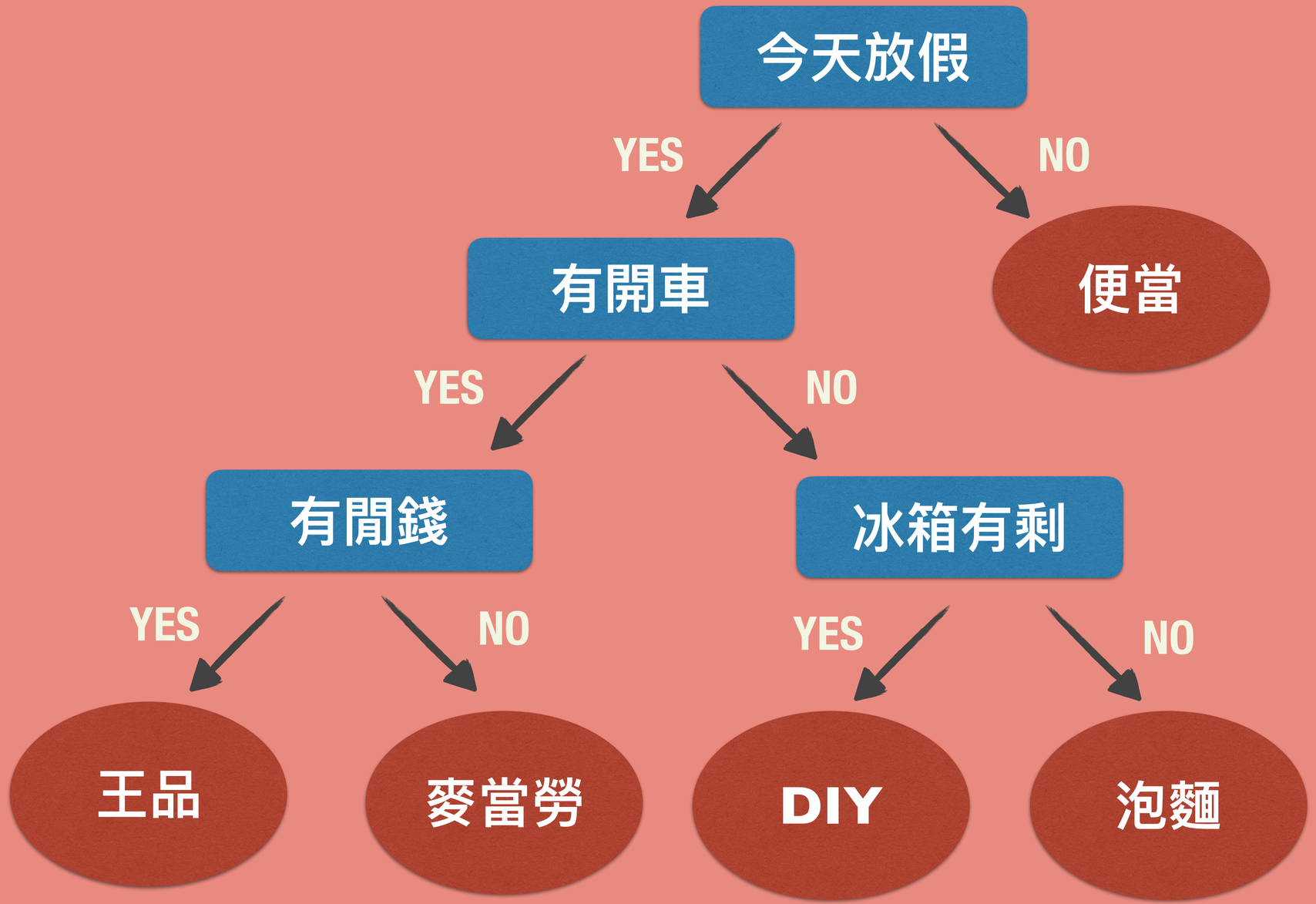


- Just wait a moment :)



WHAT IS DECISION TREE?

- 藍色方形：決策點
- 紅色橢圓：結果



HOW CAN WE USE DECISION TREE?

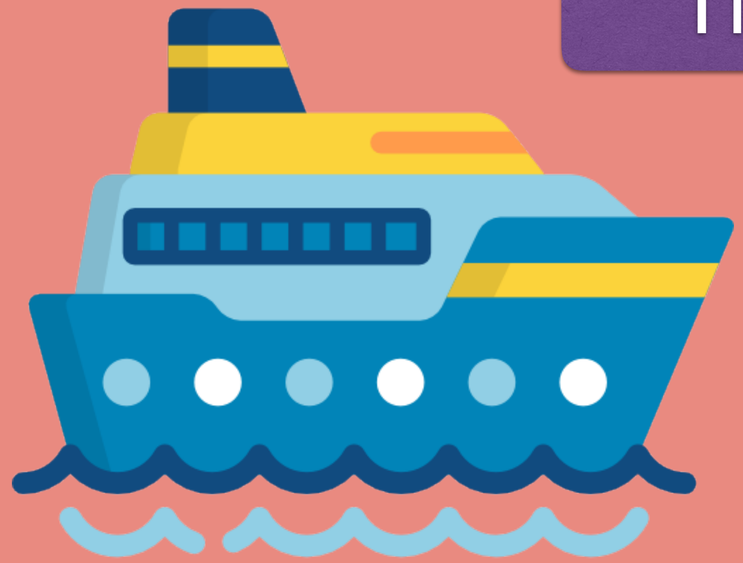
35-year-old
Ticket Class = 2nd
Parents. Wife

Passenger 1

7-month-old
Ticket Class = 3rd
Parents

Passenger 2

Titanic



62-year-old
Ticket Class = 1st
Husband. son

Passenger 3

TRAINING DATA

- PClass ：艙等（1~3）
- Sex：性別
- Age：年齡
- SibSp：兄弟姐妹、丈夫（妻子）人數
- Parch：父母、小孩人數
- Fare：票價
- Result：是否存活（1:存活，0:死亡）

result	Pclass	Sex	Age	SibSp	Parch	Fare
0	3	0	22	1	0	7.25
1	1	1	38	1	0	71.2833
1	3	1	26	0	0	7.925
1	1	1	35	1	0	53.1
0	3	0	35	0	0	8.05
0	1	0	54	0	0	51.8625
0	3	0	2	3	1	21.075
1	3	1	27	0	2	11.1333
1	2	1	14	1	0	30.0708
1	3	1	4	1	1	16.7
1	1	1	58	0	0	26.55
0	3	0	20	0	0	8.05

TESTING DATA

- 現在已知以下資訊：
  - PClass ：艙等（1~3）
  - Sex：性別
  - Age：年齡
  - SibSp：兄弟姐妹、丈夫（妻子）人數
  - Parch：父母、小孩人數
  - Fare：票價
- 希望猜出該乘客是否存活

result	Pclass	Sex	Age	SibSp	Parch	Fare
1	2	1	40	1	1	39
0	1	0	31	1	0	52
0	2	0	70	0	0	10.5
1	2	0	31	0	0	13
0	3	0	18	0	0	7.775
0	3	0	24.5	0	0	8.05
1	3	1	18	0	0	9.8417
0	3	1	43	1	6	46.9
1	1	0	36	0	1	512.3292
1	1	0	27	0	0	76.7292
0	3	0	20	0	0	9.225

FLOWCHART

Training Data → Build Decision Tree → Apply to Testing Data → Prediction

result	Pclass	Sex	Age	SibSp	Parch	Fare
0	3	0	22	1	0	7.25
1	1	1	38	1	0	71.2833
1	3	1	26	0	0	7.925
1	1	1	35	1	0	53.1
0	3	0	35	0	0	8.05
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1	1	1	58	0	0	26.55
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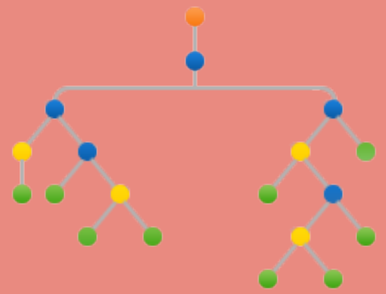

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1	1	0	36	0	1	512.3292
1	1	0	27	0	0	76.7292
0	3	0	20	0	0	9.225

HOW CAN WE KNOW WHICH ATTRIBUTE IS IMPORTANT?

資料集	人數
存活	100
死亡	200

Attribute 1

年齡 > 60

YES

	人數
存活	50
死亡	50

NO

	人數
存活	50
死亡	150

Attribute 2

艙等 = 1st

YES

	人數
存活	99
死亡	1

NO

	人數
存活	1
死亡	199

資料集	人數
存活	100
死亡	200

Attribute 1

年齡 > 60

YES

	人數
存活	50
死亡	50

NO

	人數
存活	50
死亡	150

Attribute 2

艙等 = 1st

YES

	人數
存活	99
死亡	1

NO

	人數
存活	1
死亡	199

GINI

$$1 - \sum_{i=1}^{J} {p_i}^2$$

- Gini impurity score is a measure of how the data would be incorrectly labeled.
- Gini = 0.0 -> best
    - when we use this attribute to classify the dataset, it can be clearly categorized.
- Gini = 0.5 -> worst
    - this attribute is not an important feature to make a decision.

GINI

Training Data	人數
存活	100
死亡	200

1-(100/300)^2
-(200/300)^2
=0.44

年齡 > 60

YES

	人數
存活	50
死亡	50

1-(50/100)^2
-(50/100)^2
=0.5

NO

	人數
存活	50
死亡	150

1-(50/200)^2
-(150/200)^2
=0.375

艙等 = 1st

YES

	人數
存活	99
死亡	1

1-(99/100)^2
-(1/100)^2
=0.02

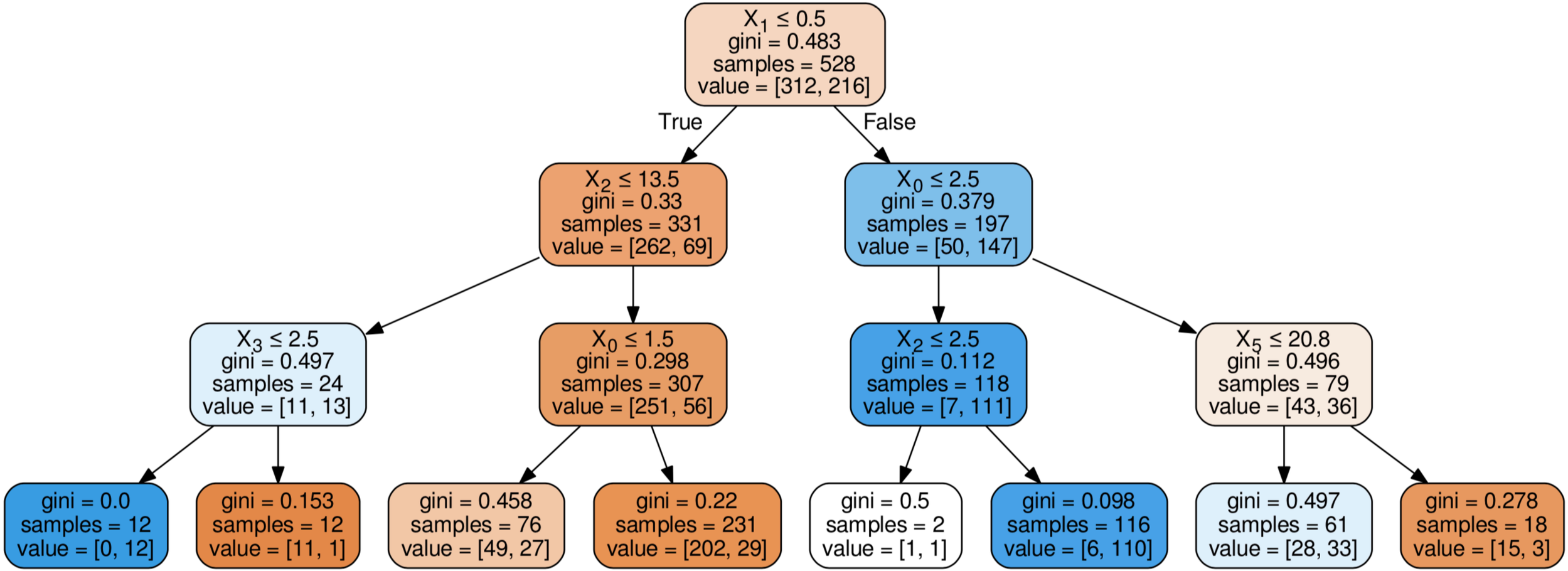
NO

	人數
存活	1
死亡	199

1-(1/200)^2
-(199/200)^2
=0.01

TREE.PDF

X0 : PClass
X1 : Sex
X2 : Age
X3 : SibSp
X4 : Parch
X5 : Fare



THANK YOU