猫狗识别
——人工智能算法浅谈

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目录

- 人工智能的例子
- 机器人“大脑”探秘
- 猫狗识别案例
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  - 制作模型
  - 检验模型
  - 优化模型

学习走台阶

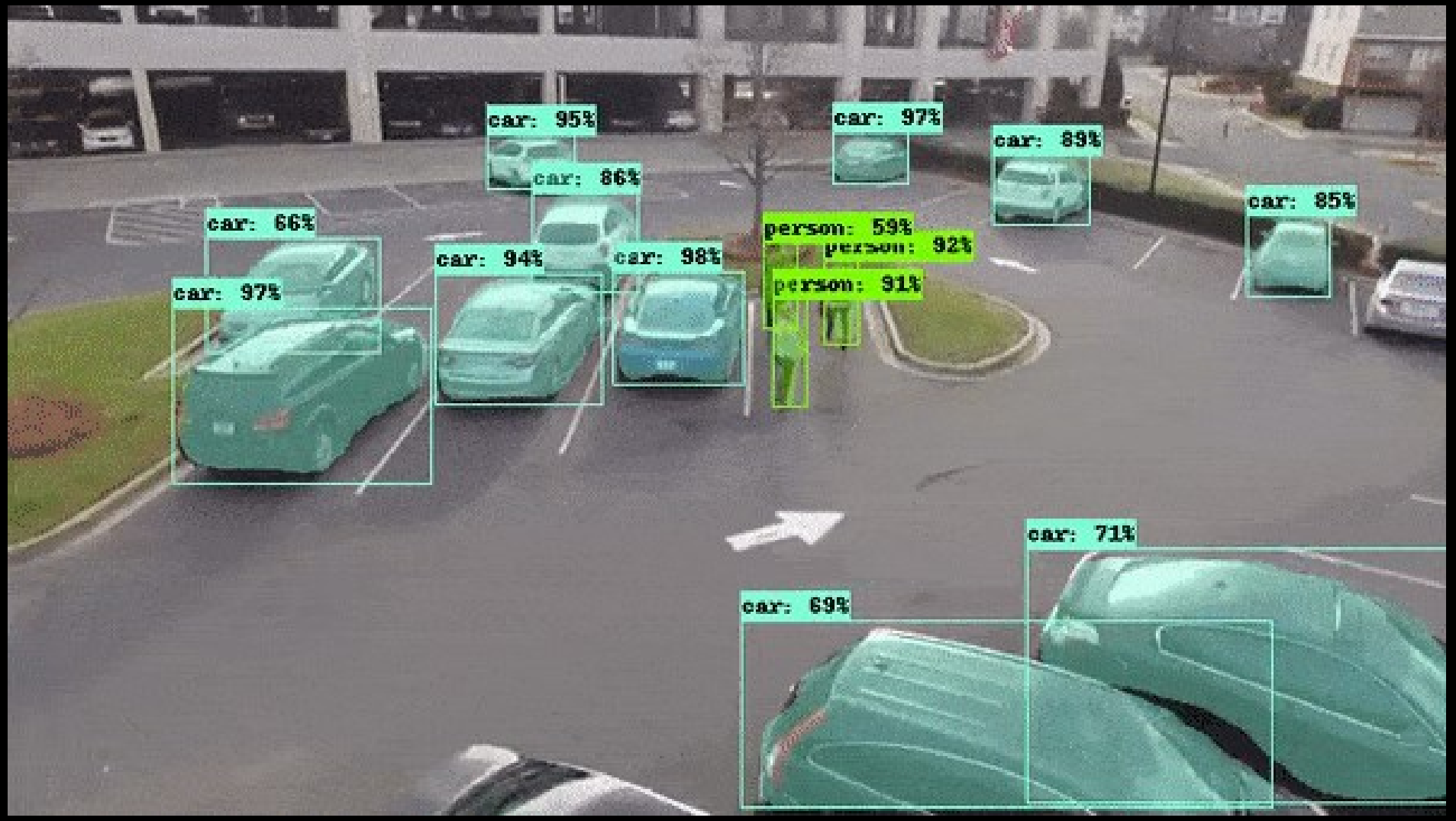
从这部短片中我们观察到了什么？

大家想知道机器人的“大脑”长啥样吗？

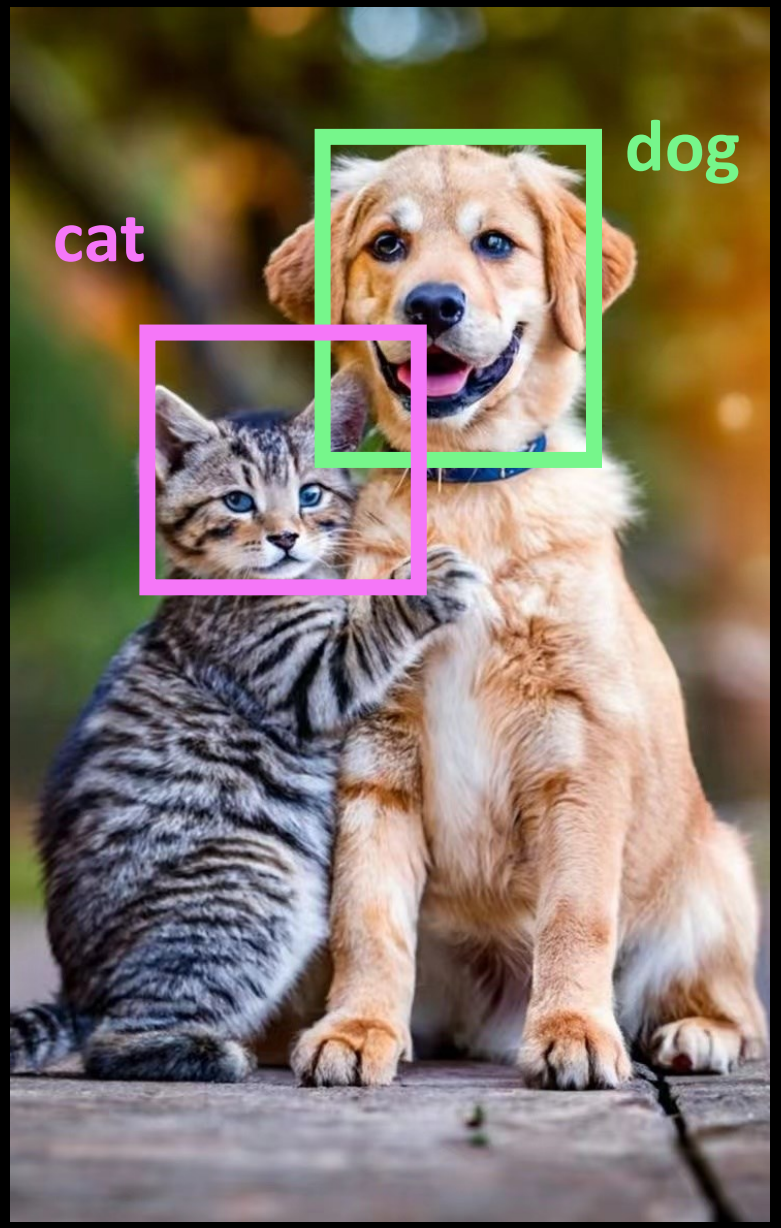
动画片中模型实现的任务是什么?

这虽然是个简单的识别，
但积累到一定规模后会有惊
人的成效

计算机视觉

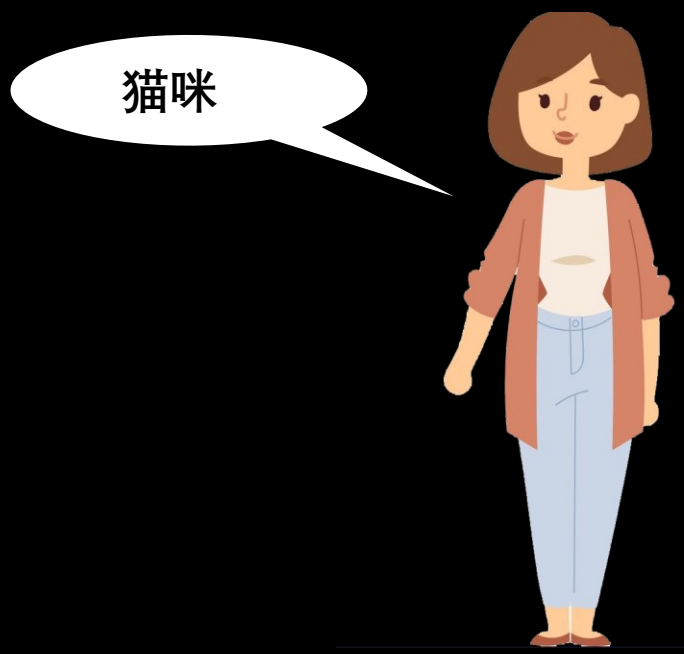

car: 95%
car: 97%
car: 89%
car: 86%
car: 85%
car: 66%
person: 59%
person: 92%
car: 94%
car: 98%
person: 91%
car: 97%
car: 71%
car: 69%

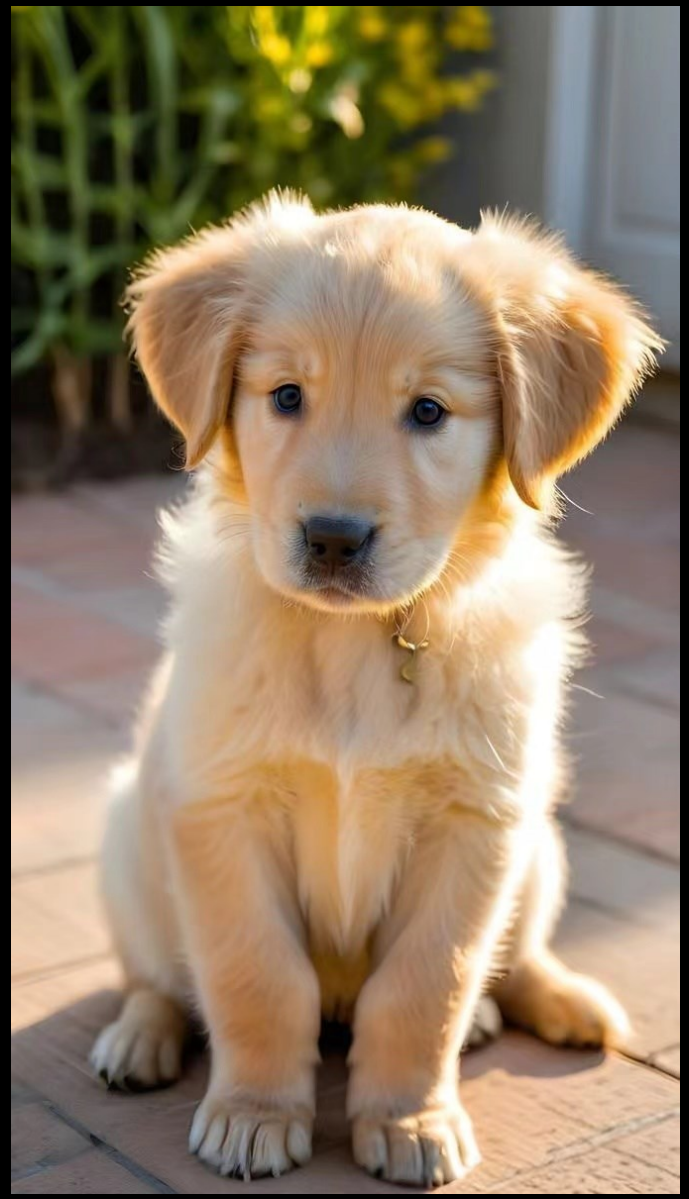
别被人工智能吓倒了
我们可以先从简单的猫狗识别项目入手



How ?

婴儿如何认识猫和狗

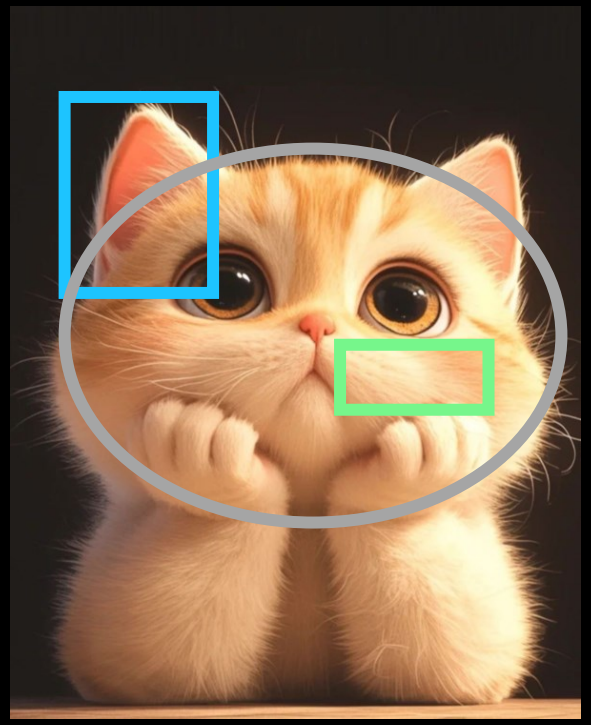


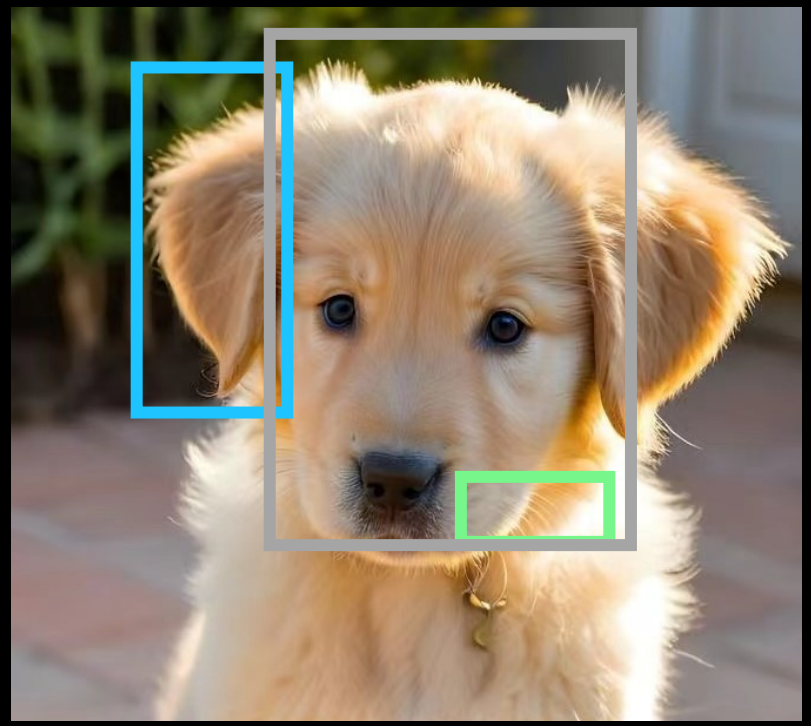



狗狗

这是什么？

特征提取





耳朵形状（尖耳，圆耳）

脸型（圆脸，方脸）

胡须（有，无）

一幅表格

Ear Shape	Face Shape	Whiskers	Cat
Pointy	Round	Present	1
Floppy	Not Round	Present	1
Floppy	Round	Absent	0
Pointy	Not Round	Present	0
Pointy	Round	Present	1
Pointy	Round	Absent	1
Floppy	Not Round	Absent	0
Pointy	Round	Absent	1

特征

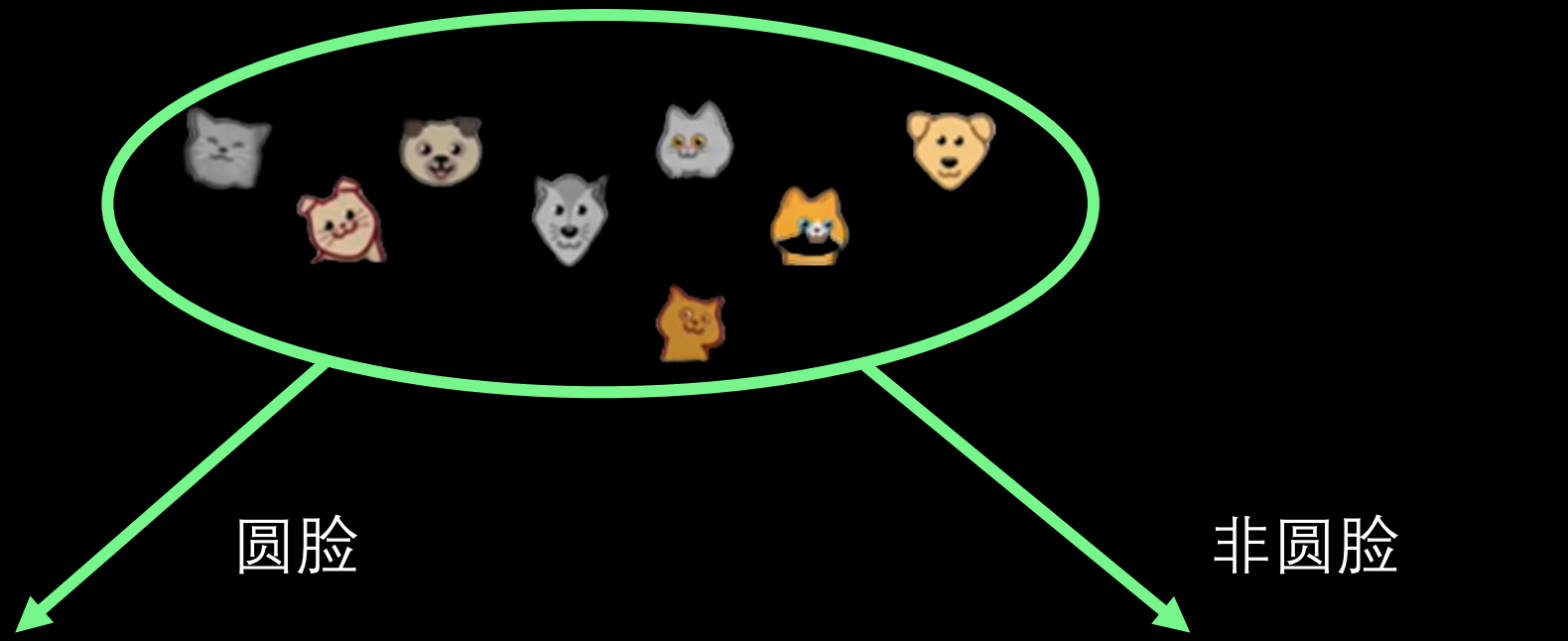
Ear Shape	Face Shape	Whiskers
Pointy	Round	Present
Floppy	Not Round	Present
Floppy	Round	Absent
Pointy	Not Round	Present
Pointy	Round	Present
Pointy	Round	Absent
Floppy	Not Round	Absent
Pointy	Round	Absent

类别

Cat
1
1
0
0
1
1
0
1

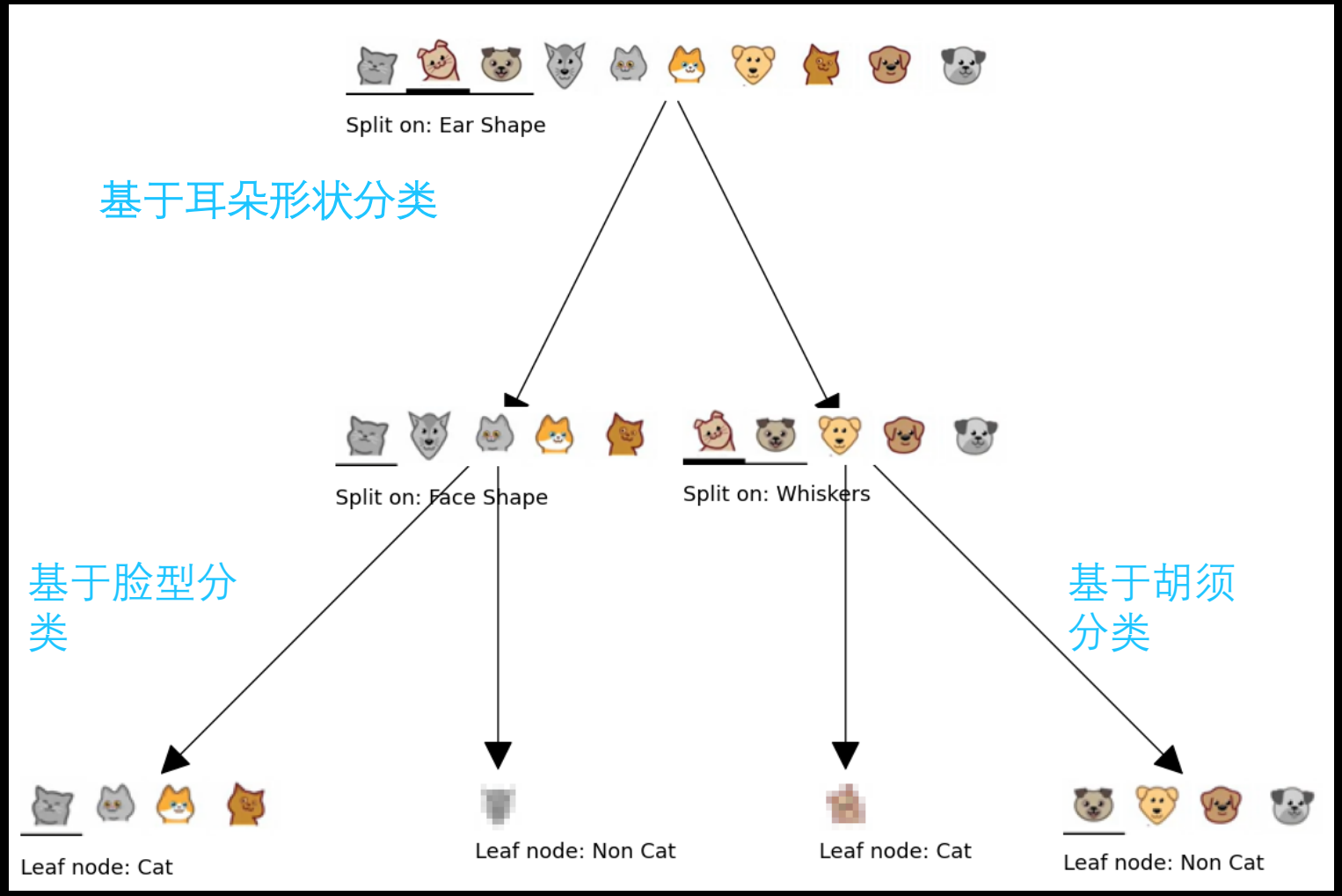
Whisker:胡须

如何把猫咪和狗狗区分开来?



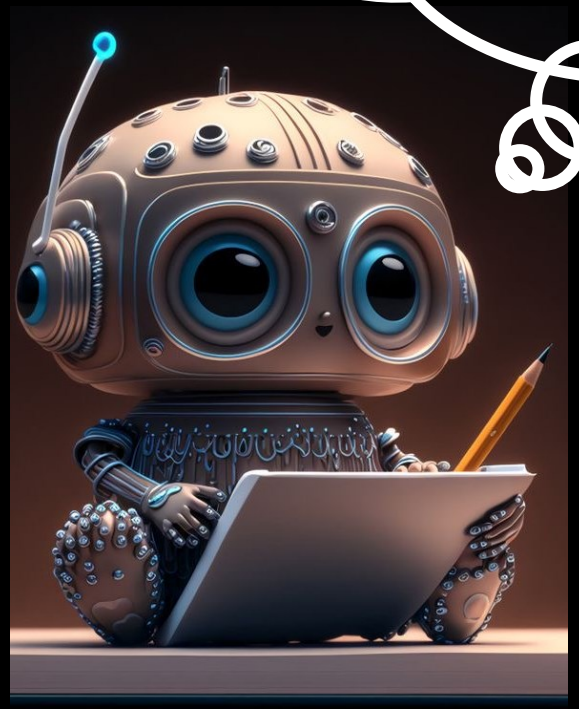
- 基于不同特征分类（有无胡子，耳朵形状）
- 直至分类后的集合中只有一个类别（猫，狗）

这一模型被称为
“决策树”（Decision Tree）

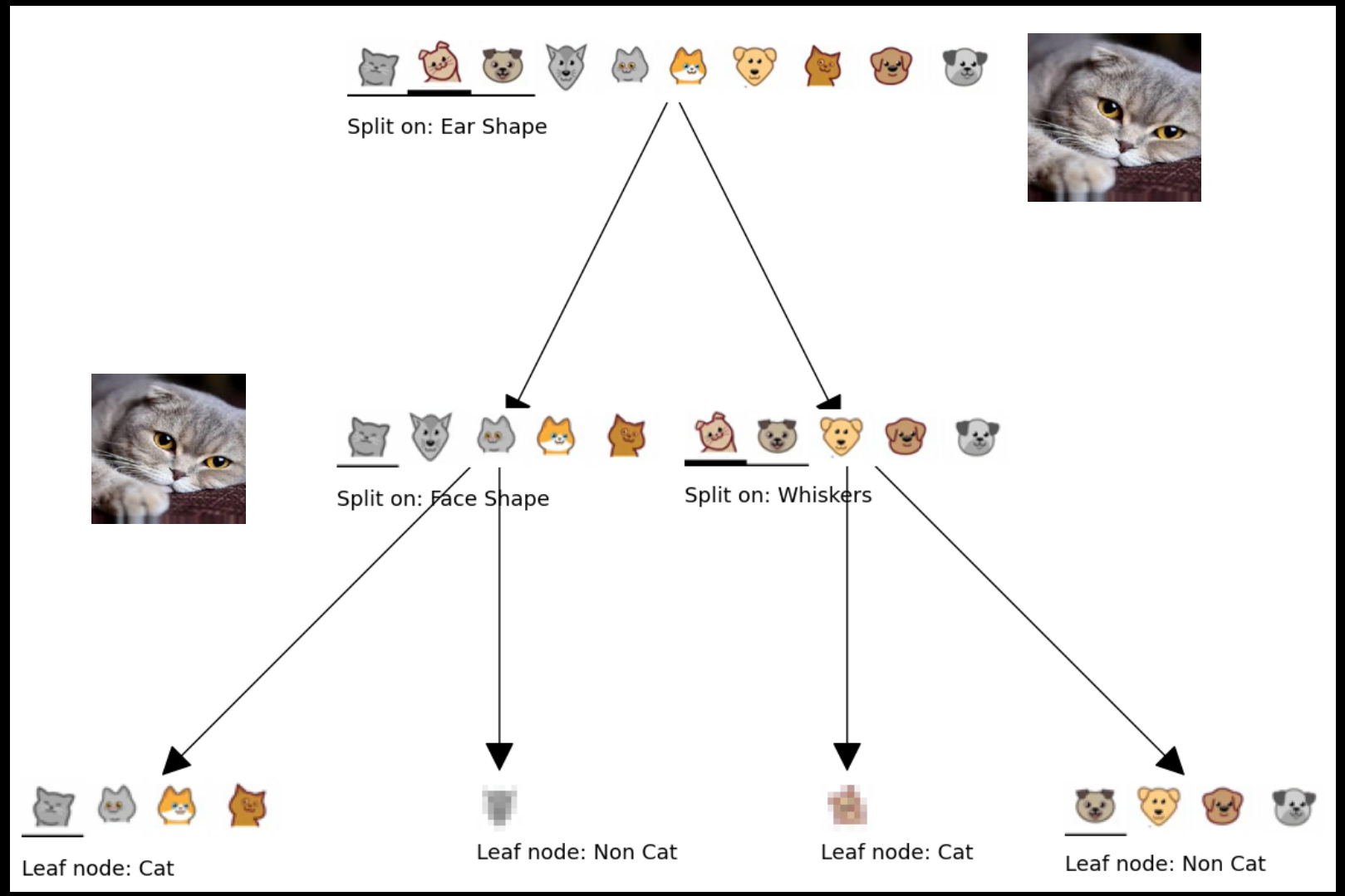


如何检验模型呢？

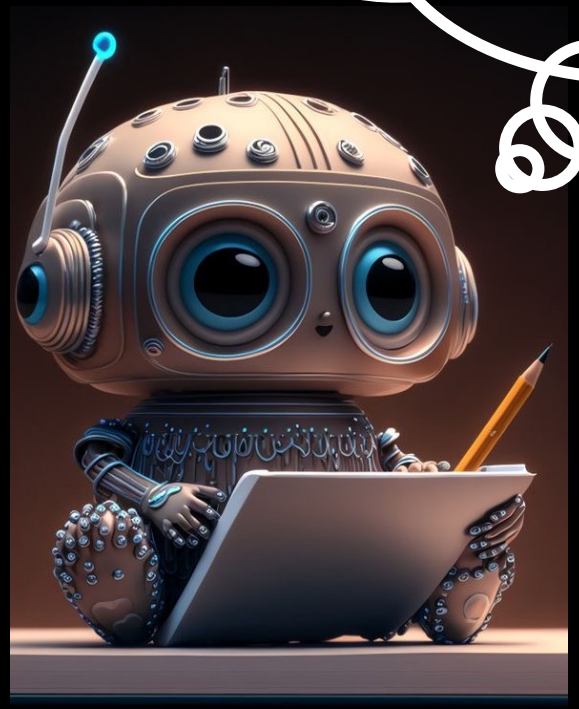
“有一只动物，它尖耳朵，圆脸，有胡须。它是猫吗？”



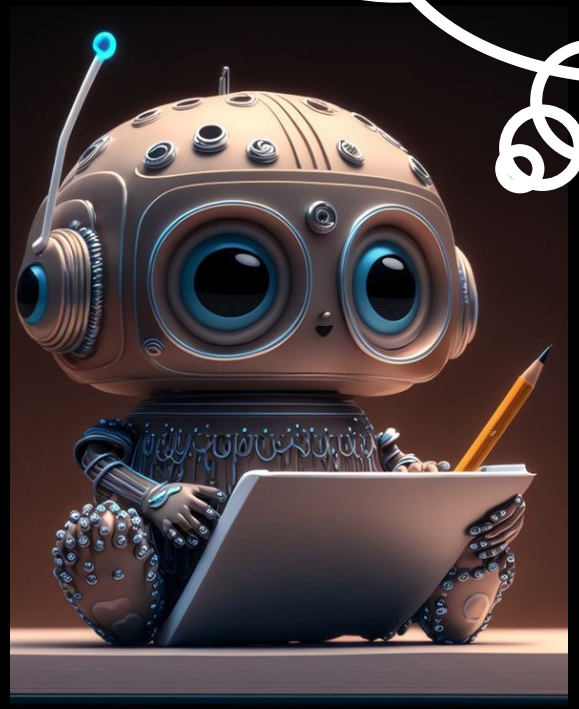
“有一只动物，它尖耳朵，圆脸，有胡须。它是猫吗？”



“有一只动物，它尖耳朵，圆脸，没有胡须。它是猫吗？”



呃，大概是猫吧。



Python 代码：

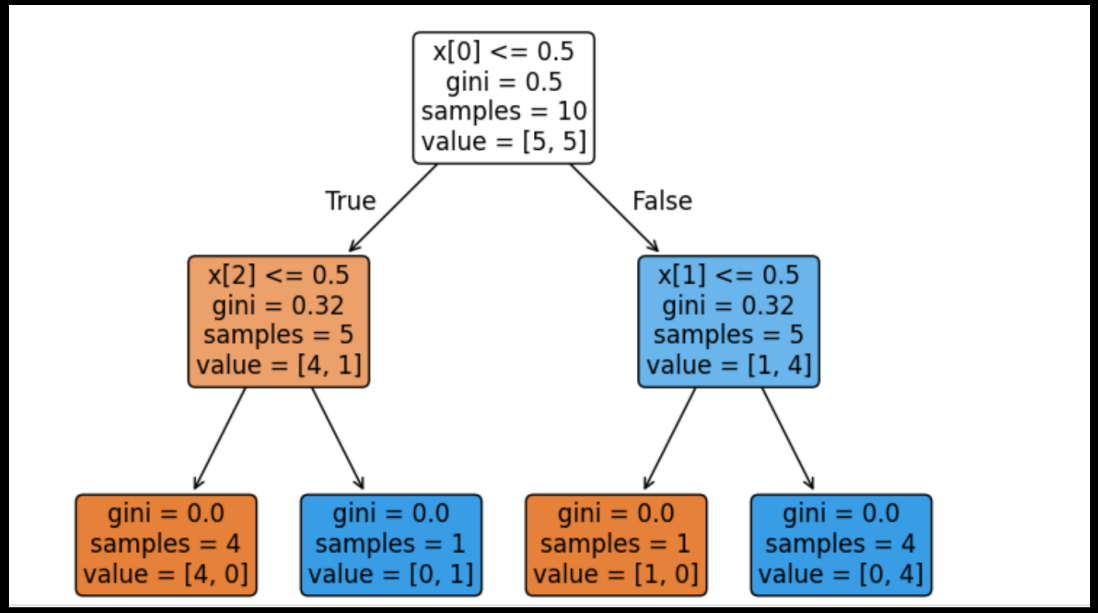
```
[9]: from sklearn.tree import DecisionTreeClassifier

[10]: dtc=DecisionTreeClassifier()
      dtc.fit(feature,target)

[10]: DecisionTreeClassifier
      DecisionTreeClassifier()
```

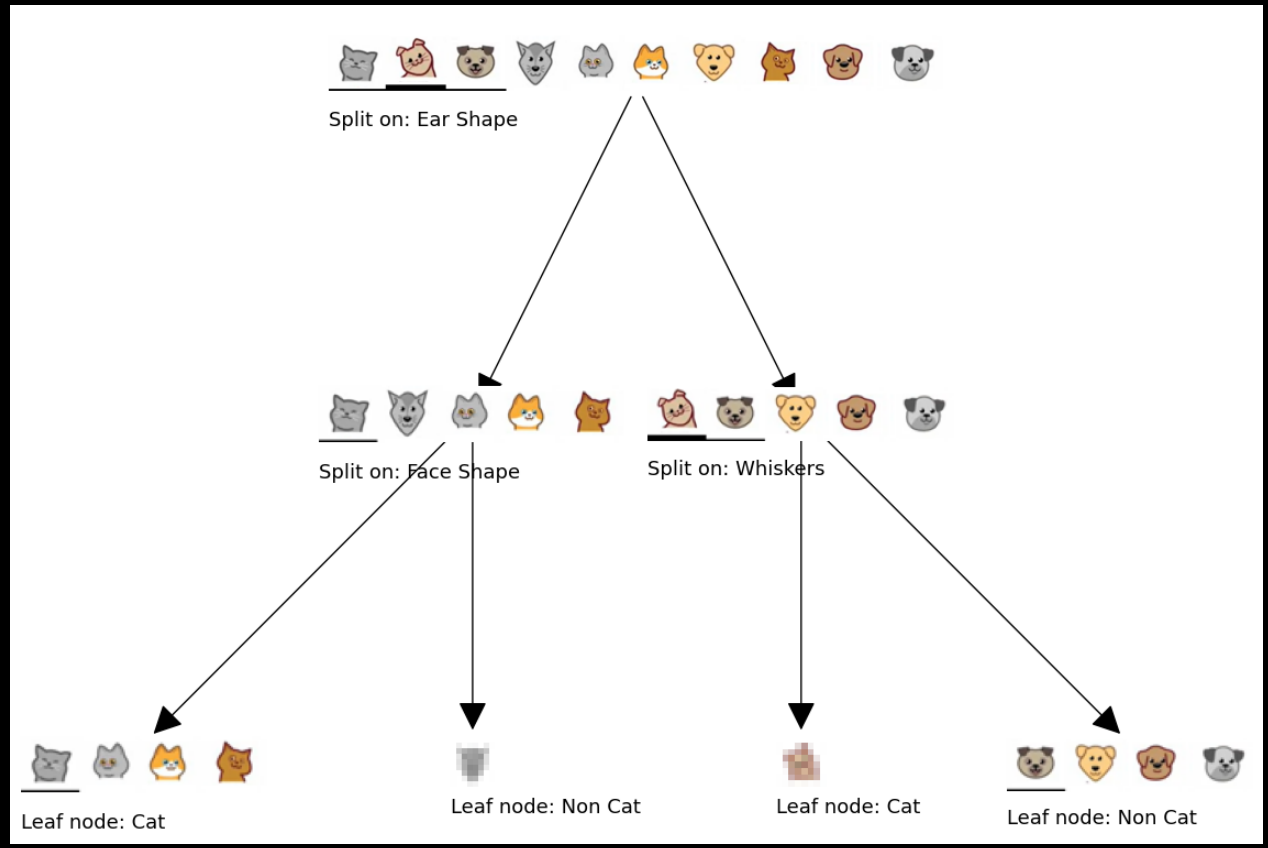
训练模型

```
:  import matplotlib.pyplot as plt
   from sklearn.tree import plot_tree, export_text
   import matplotlib.font_manager as fm

   font_path = 'path/to/your/Chinese/font.ttf'
   prop = fm.FontProperties(fname=font_path)

:  plt.figure(figsize=(8,6))

   plot_tree(dtc,fontsize=12,rounded=True,filled=True)
```

绘制决策树

模型的可视化


x[0] <= 0.5
gini = 0.5
samples = 10
value = [5, 5]
True
False
x[2] <= 0.5
gini = 0.32
samples = 5
value = [4, 1]
x[1] <= 0.5
gini = 0.32
samples = 5
value = [1, 4]
gini = 0.0
samples = 4
value = [4, 0]
gini = 0.0
samples = 1
value = [0, 1]
gini = 0.0
samples = 1
value = [1, 0]
gini = 0.0
samples = 4
value = [0, 4]


Split on: Ear Shape
Split on: Face Shape
Split on: Whiskers
Leaf node: Cat
Leaf node: Non Cat
Leaf node: Cat
Leaf node: Non Cat

问题：

- 猫狗分类的决策树是否唯一？
- 如何获得最优的决策树?
- 决策树算法在猫狗识别问题中有哪些缺陷?

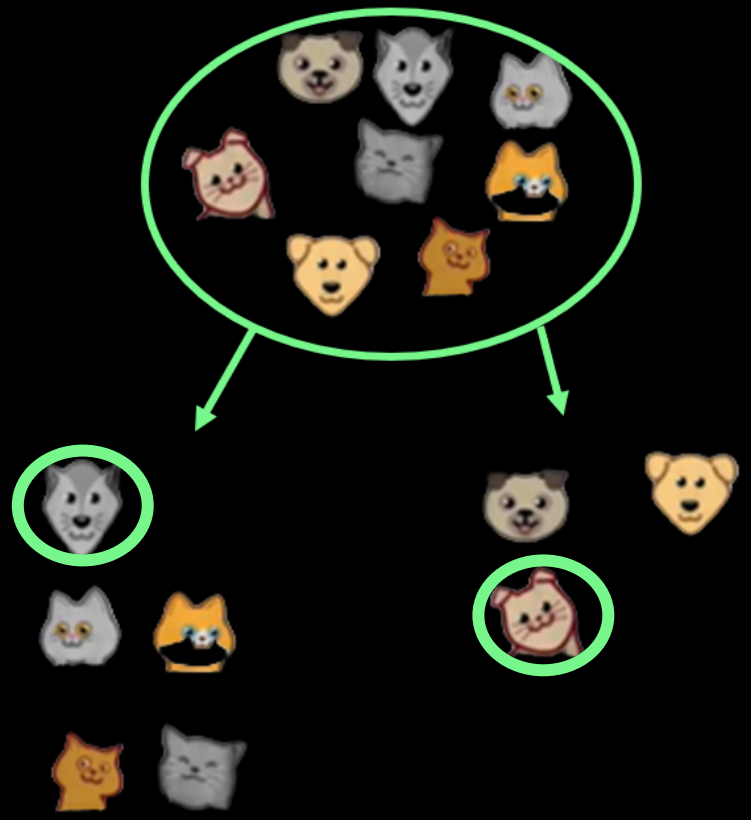
猫狗分类的决策树是否唯一？

不唯一

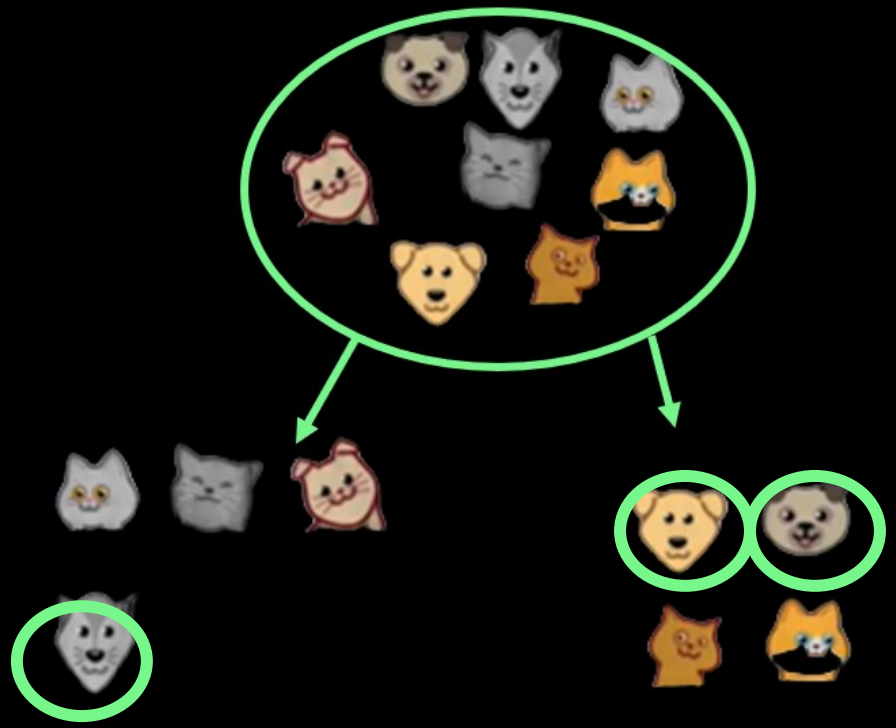
我们可以调整**分类次序**

分类次序的调整

基于耳朵形状分类



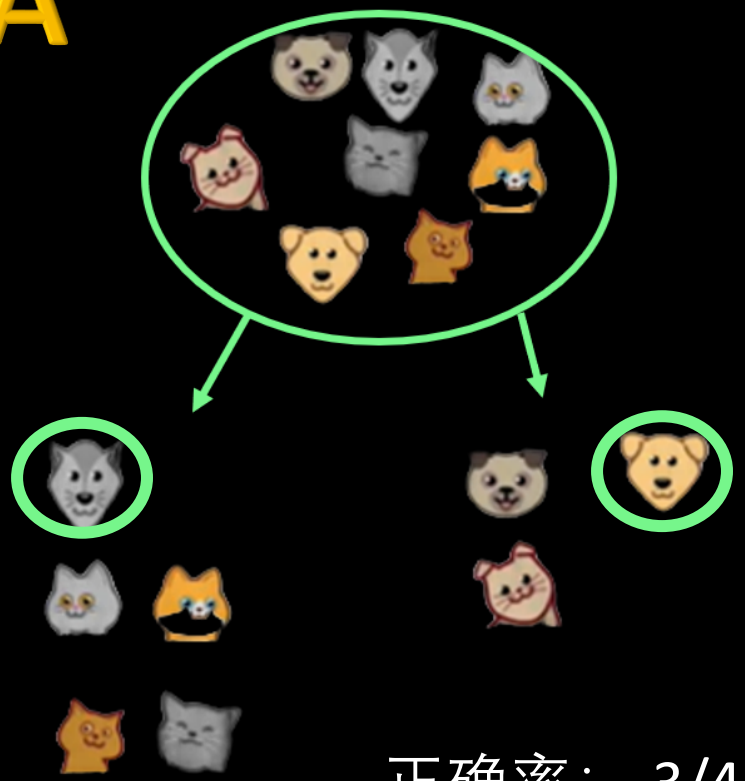
基于胡须分类



如何获得最优的决策树?

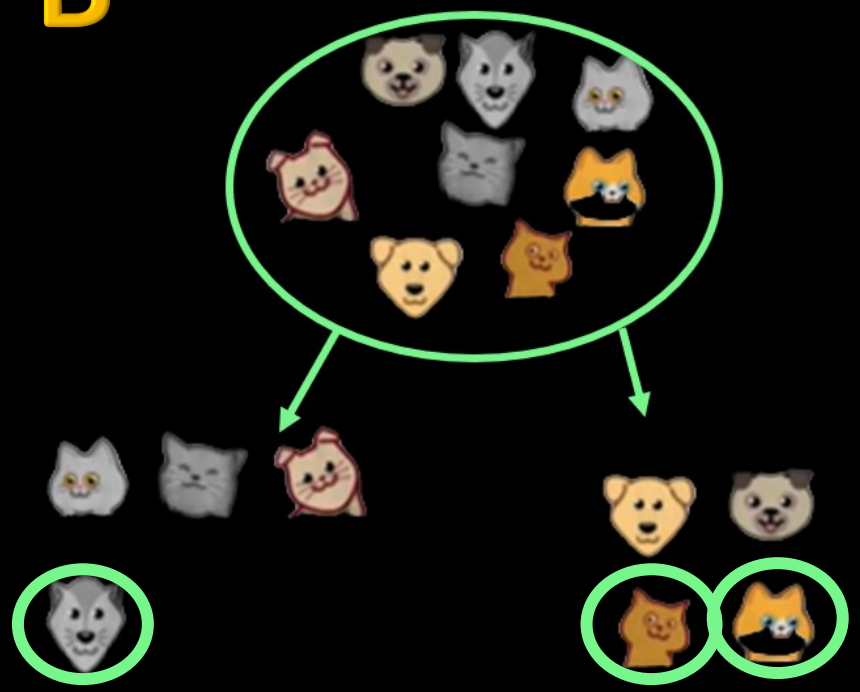
决策树A, B哪个更好?

A



正确率： 3/4

B



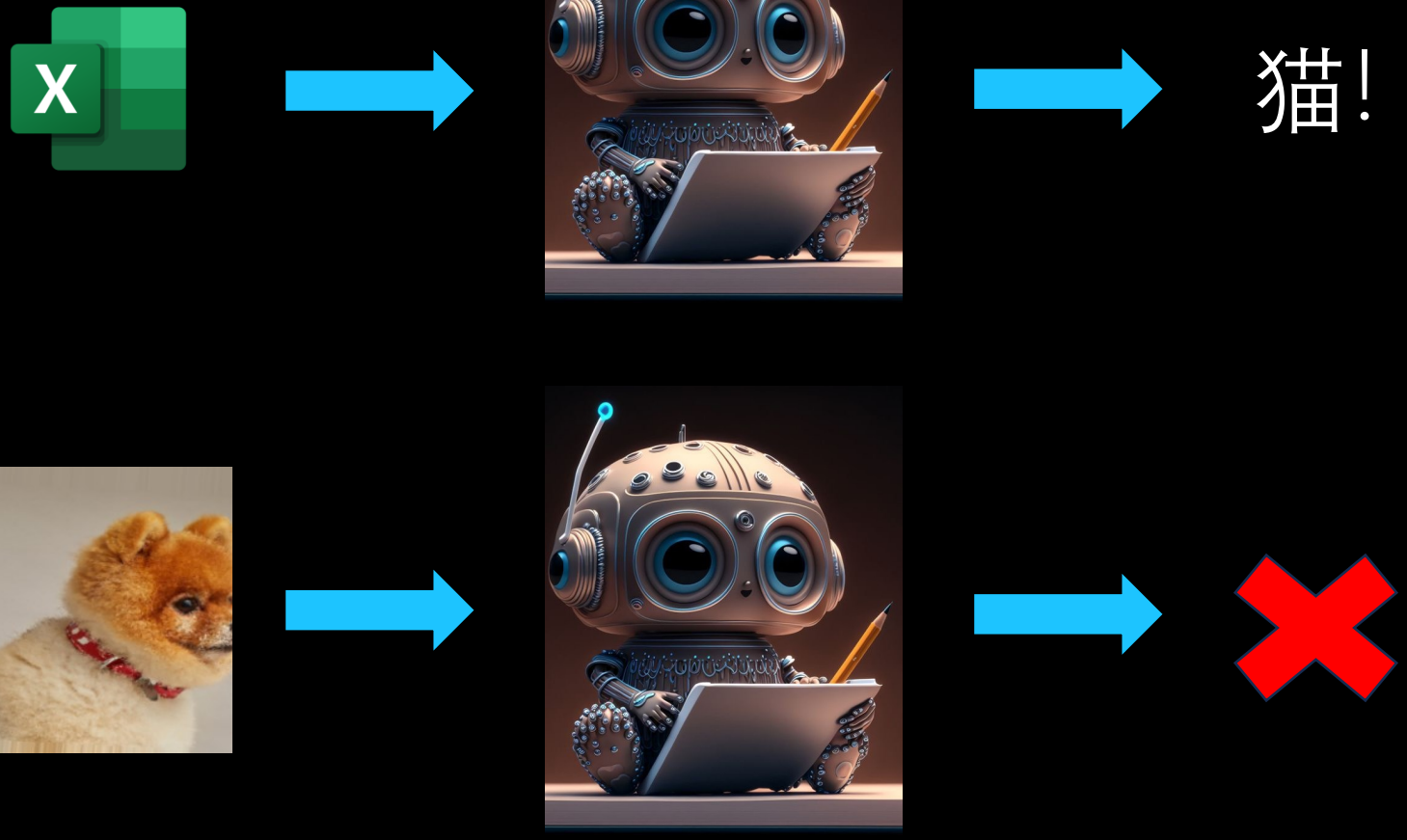
正确率：5/8

A 更好

答：A模型在分类当中正确率更高

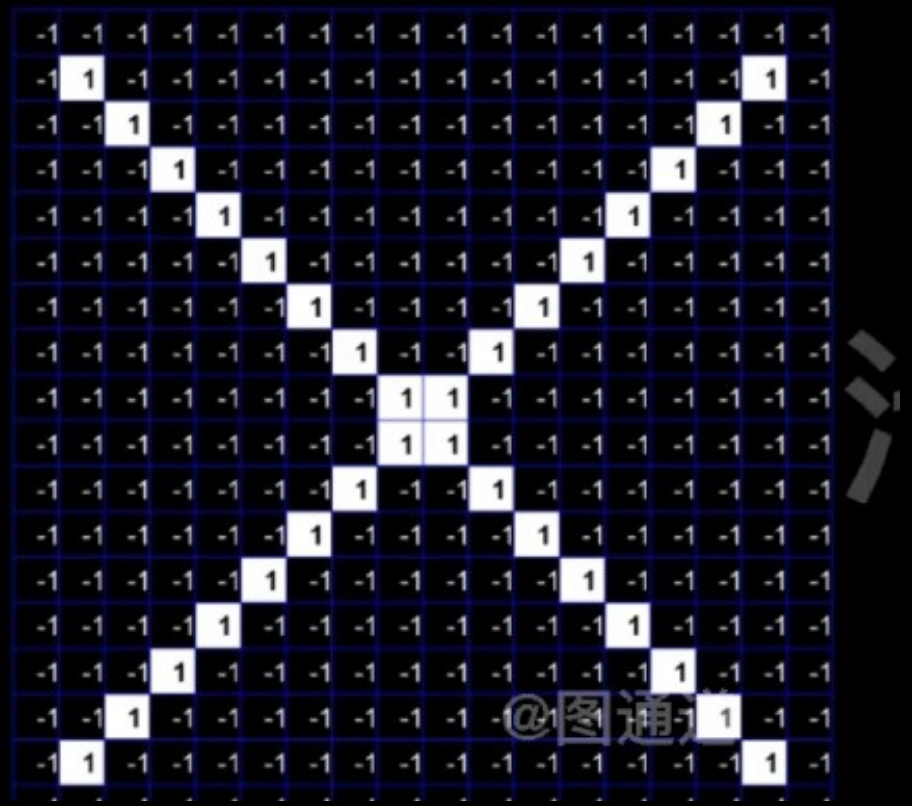
决策树算法在猫狗识别问题中有哪些缺陷?

- 只能输入表格，不能输入图片



解决方案：

- 将图像转化成一种特殊的“表格”：矩阵



谢谢观看