Decision Trees

W7-D5

Learning objectives

- Build a decision tree
- Visualize a decision tree
- Use decision tree vocabulary

What is a decision tree?

Framework of questions that are answered sequentially to group an item

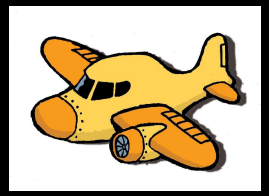
How are decision trees used?

- Classification
  - Titanic survival
  - Default risk
- Regression
  - Predict Housing prices

Example: pick an item

Boat

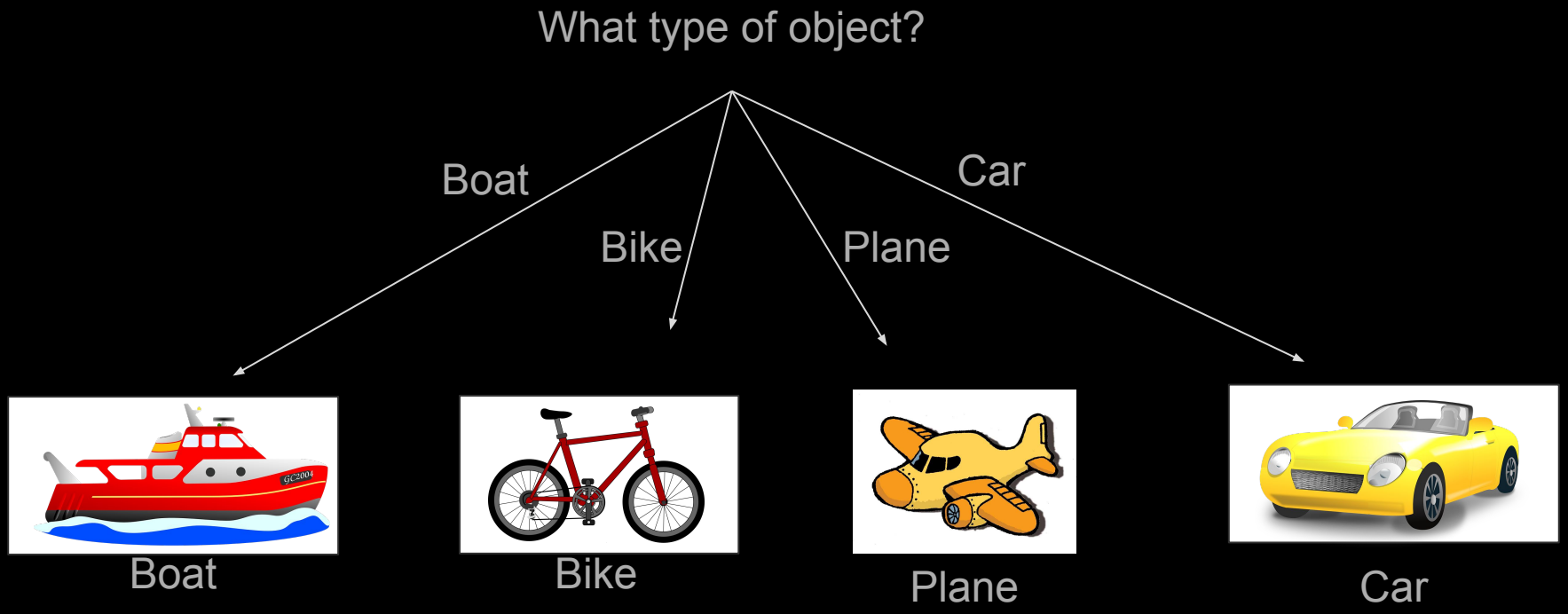
Bike



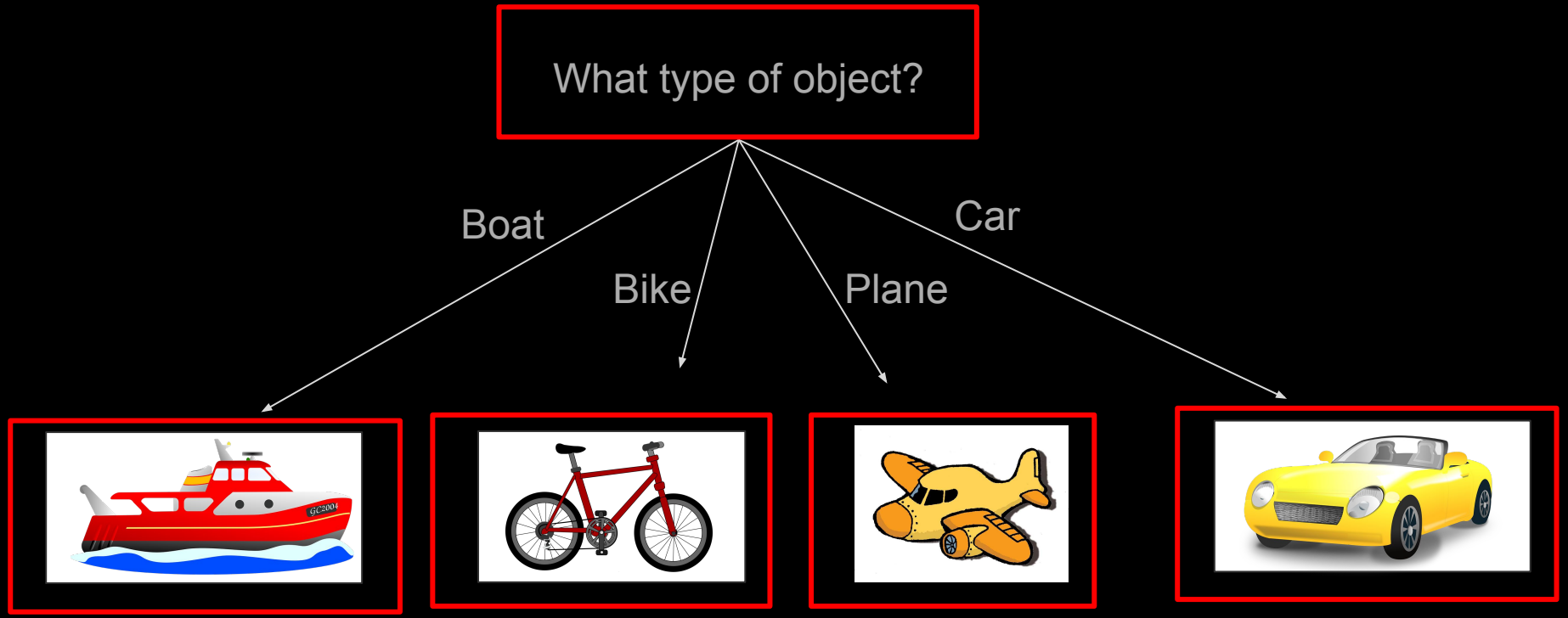
Plane

Car

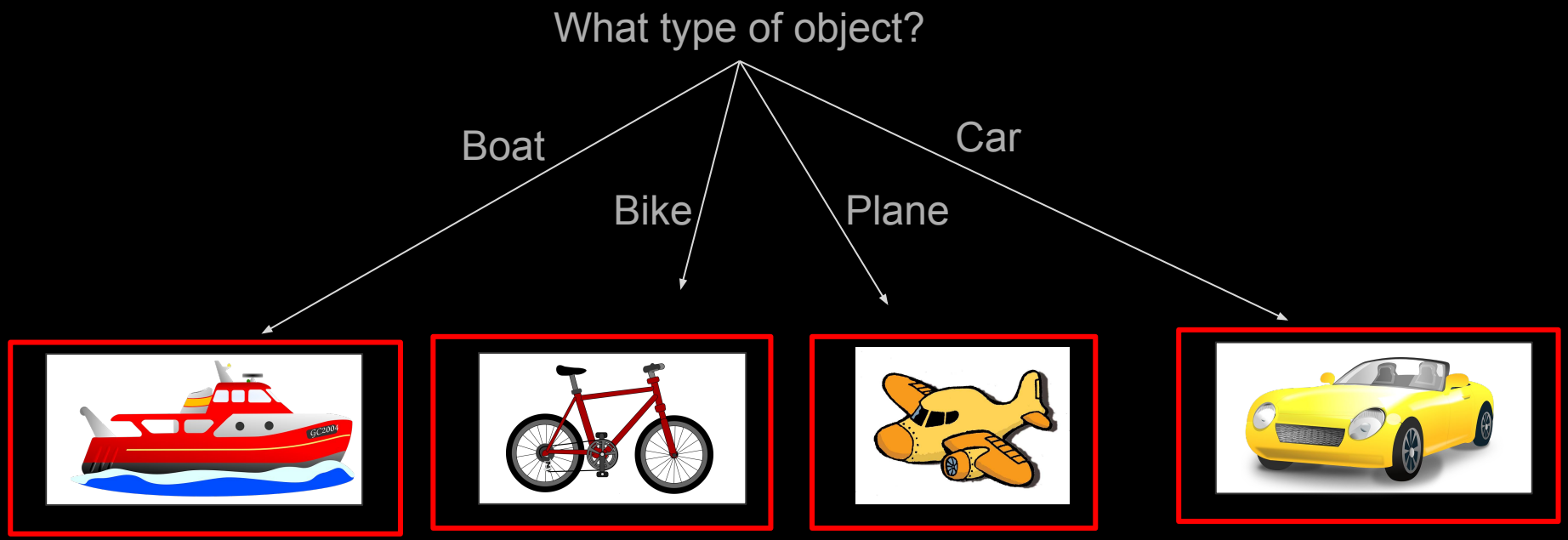
Example: decision tree



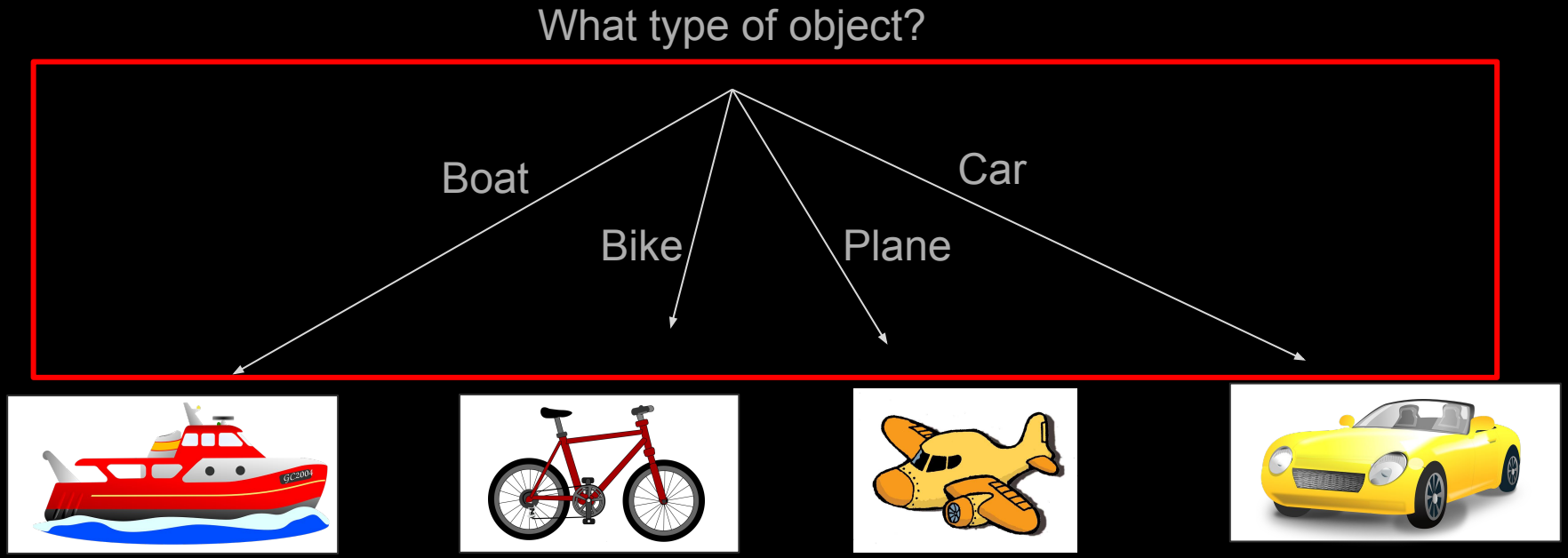
Nodes and levels



Leaf nodes



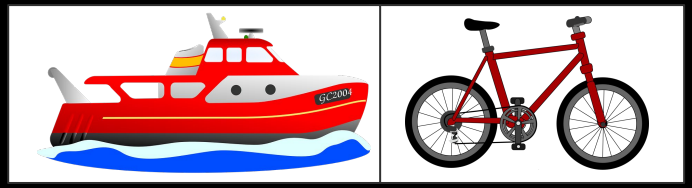
Split (multiway)



Practice - splits

What color?

Red



Yellow

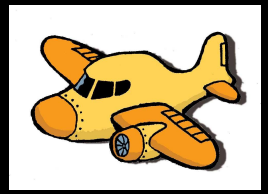
Has wheels?

Yes

No

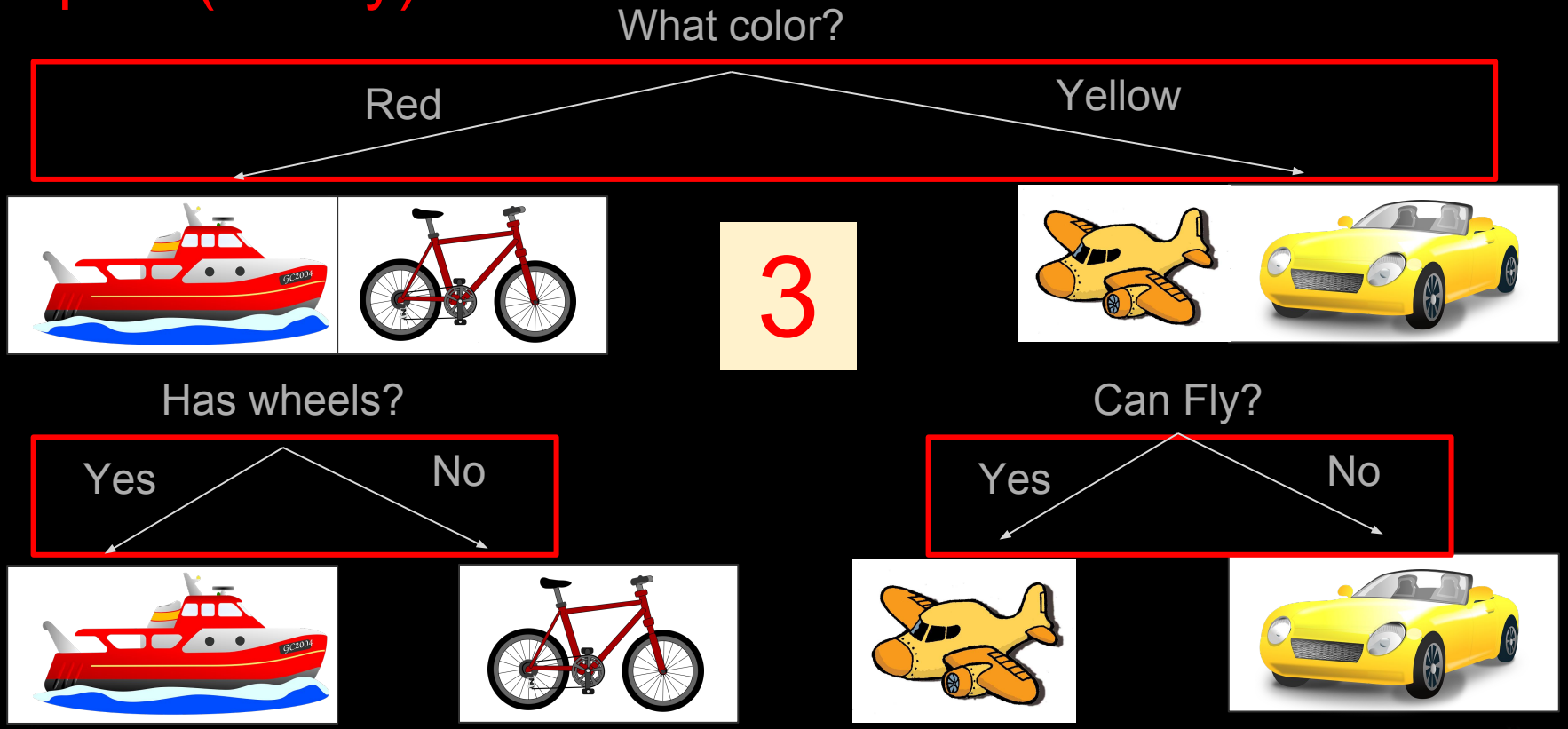
Can Fly?

Yes



No

Splits (binary)

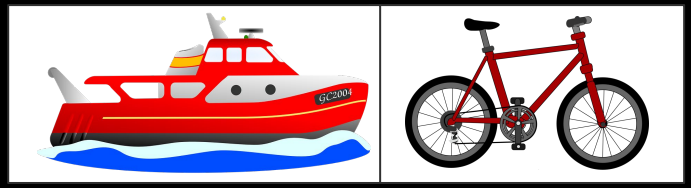


Branches

What color?

Red

Yellow



Has wheels?

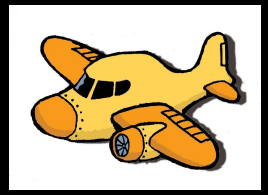
Yes

No

Can Fly?

Yes

No

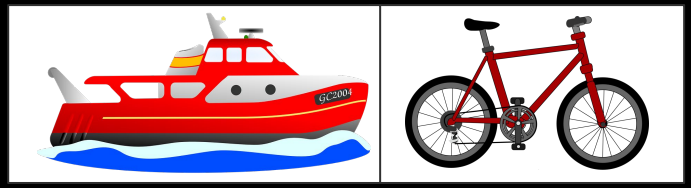


Practice - nodes

What color?

Red

Yellow



Has wheels?

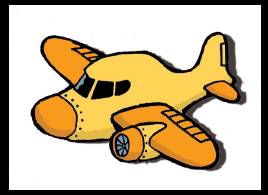
Yes

No

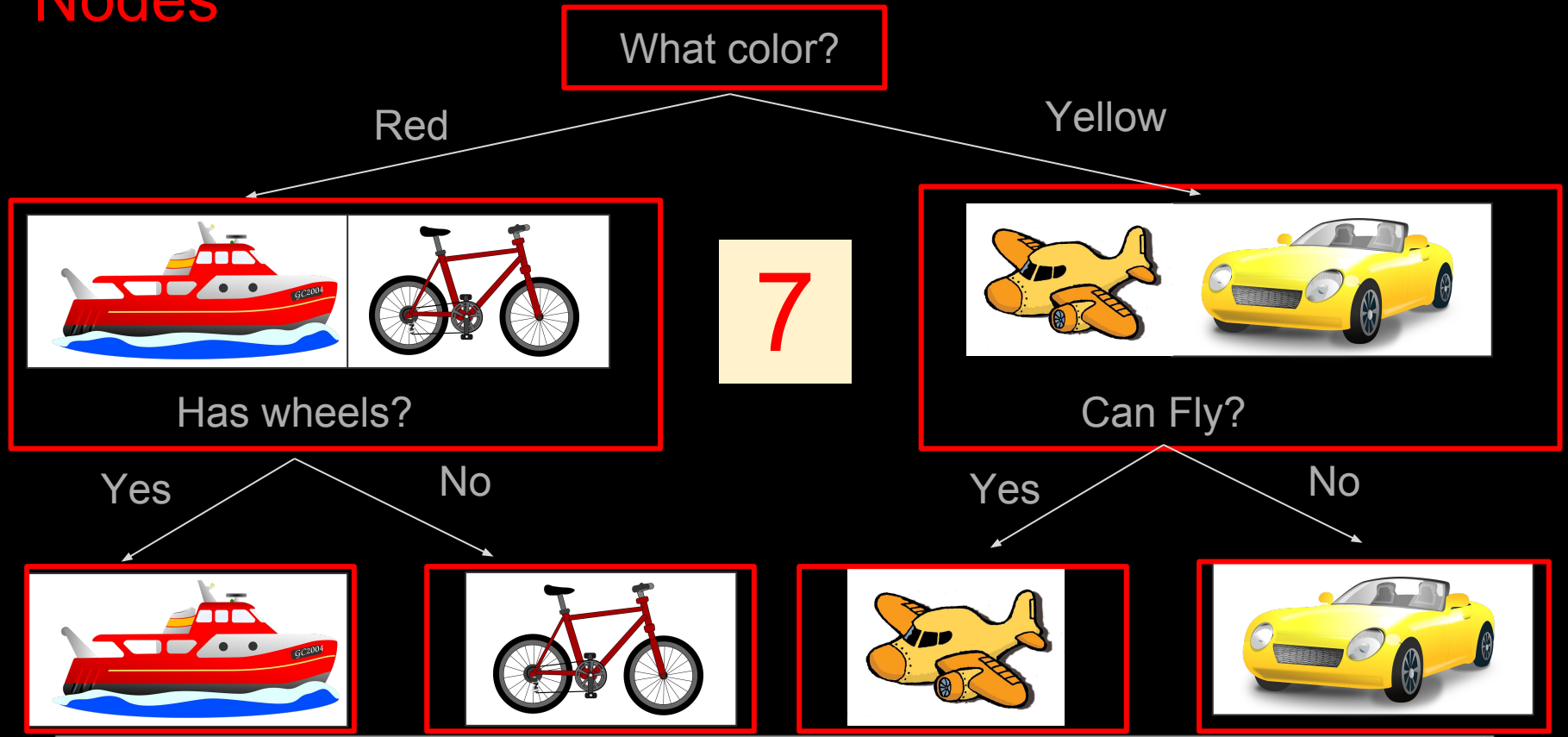
Can Fly?

Yes

No



Nodes

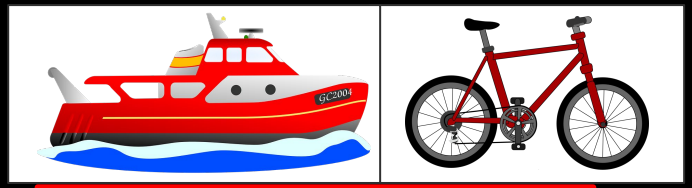


Different Questions

Is it Red?

Yes

No



Can float?

Yes

No

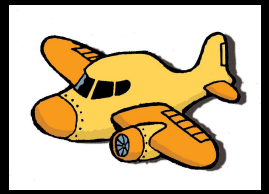
Can Fly?

Yes

No

Boat

Bike



Plane

Car

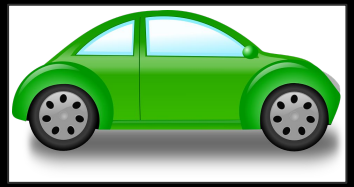
Vocabulary

- Levels
- Nodes
  - Leaves
- Split
  - Multiway
  - 2-way / Binary
- Branches

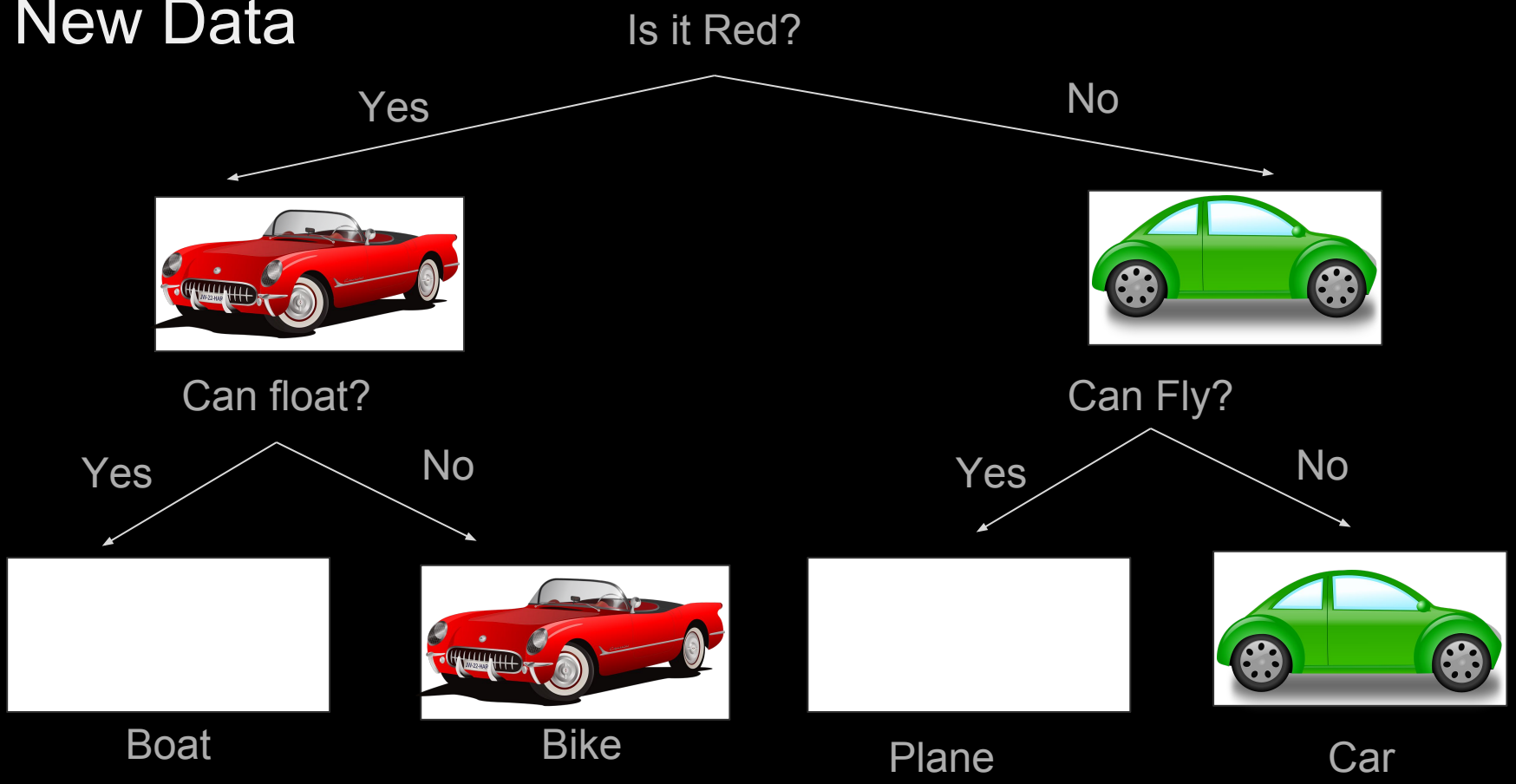
New Data

Goal: classify new data

Run new objects through the model



New Data


Is it Red?
Yes
No
Can float?
Can Fly?
Yes
No
Yes
No
Boat
Bike
Plane
Car

Your turn (10 min)

Analyze coins
Determine properties
Create questions based on properties
Create a decision tree to classify by country

https://www.usmint.gov/learn/coin-and-medal-programs/circulating-coins
https://en.wikipedia.org/wiki/Coins_of_the_pound_sterling

Assessment

- How well are classes separated
- Does new data fit well
- Order to ask the questions

How can machine learning help?

Resources

Wikipedia

- https://en.wikipedia.org/wiki/Decision_tree_model
- https://en.wikipedia.org/wiki/Decision_tree