

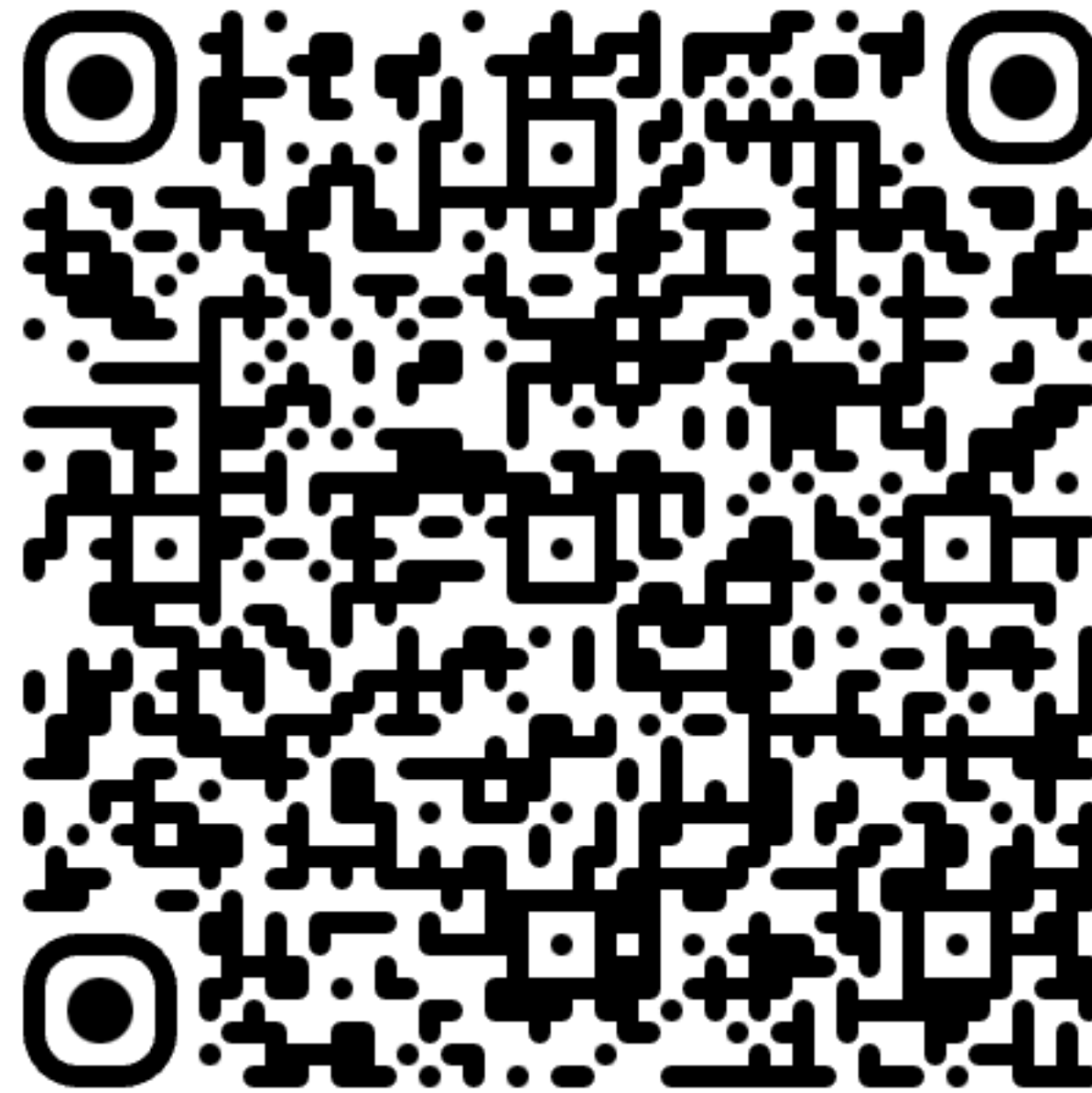
Coding for Economists

Session 8

Jian Cao

31 March 2025

Module Files



[Google Drive Folder](#)

Outline

Outline

- Random Forest Classification

Outline

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 - Ensemble methods

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 - Parameter tuning

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 - Parameter tuning
- K-Means Clustering

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 - Converging centroid

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- Random Forest Classification
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 - Parameter tuning
- K-Means Clustering
 - Converging centroid
 - Choose k

Random Forest in Economics

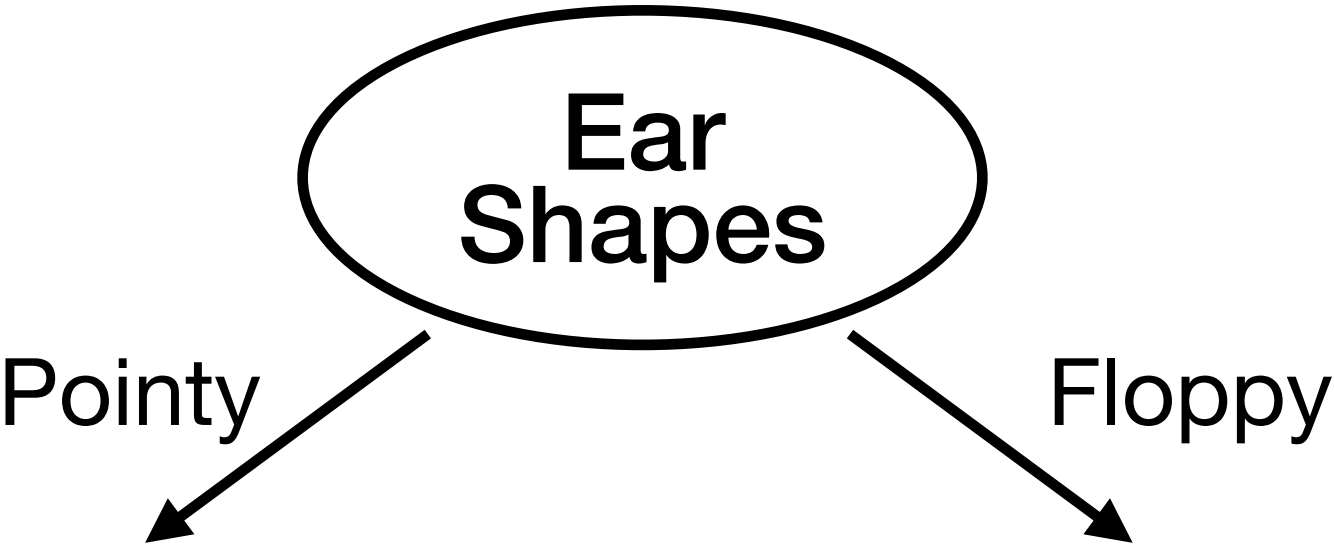
- Handle high-dimensional non-linear data.
- Robust to outliers and multicollinearity.
- Provide interpretable measures of variable importance.
- Great for prediction, feature selection, or exploratory analyses.

Decision Tree



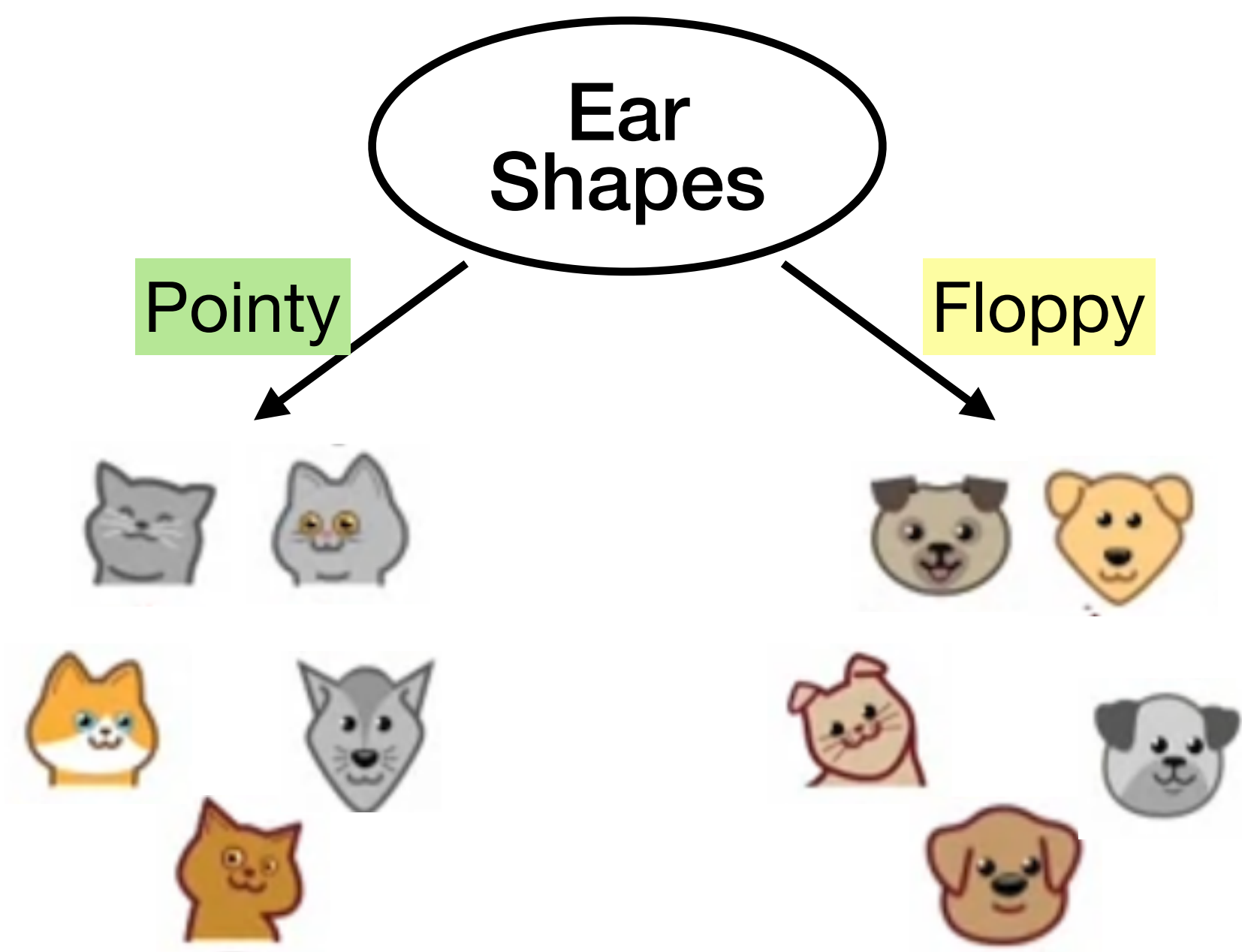
Ear Shape	Face Shape	Whiskers	Cat
Pointy	Round	Present	Yes
Floppy	Not Round	Present	Yes
Floppy	Round	Absent	No
Pointy	Not Round	Present	No
Pointy	Round	Present	Yes
Pointy	Round	Absent	Yes
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Pointy	Round	Absent	Yes
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Decision Tree



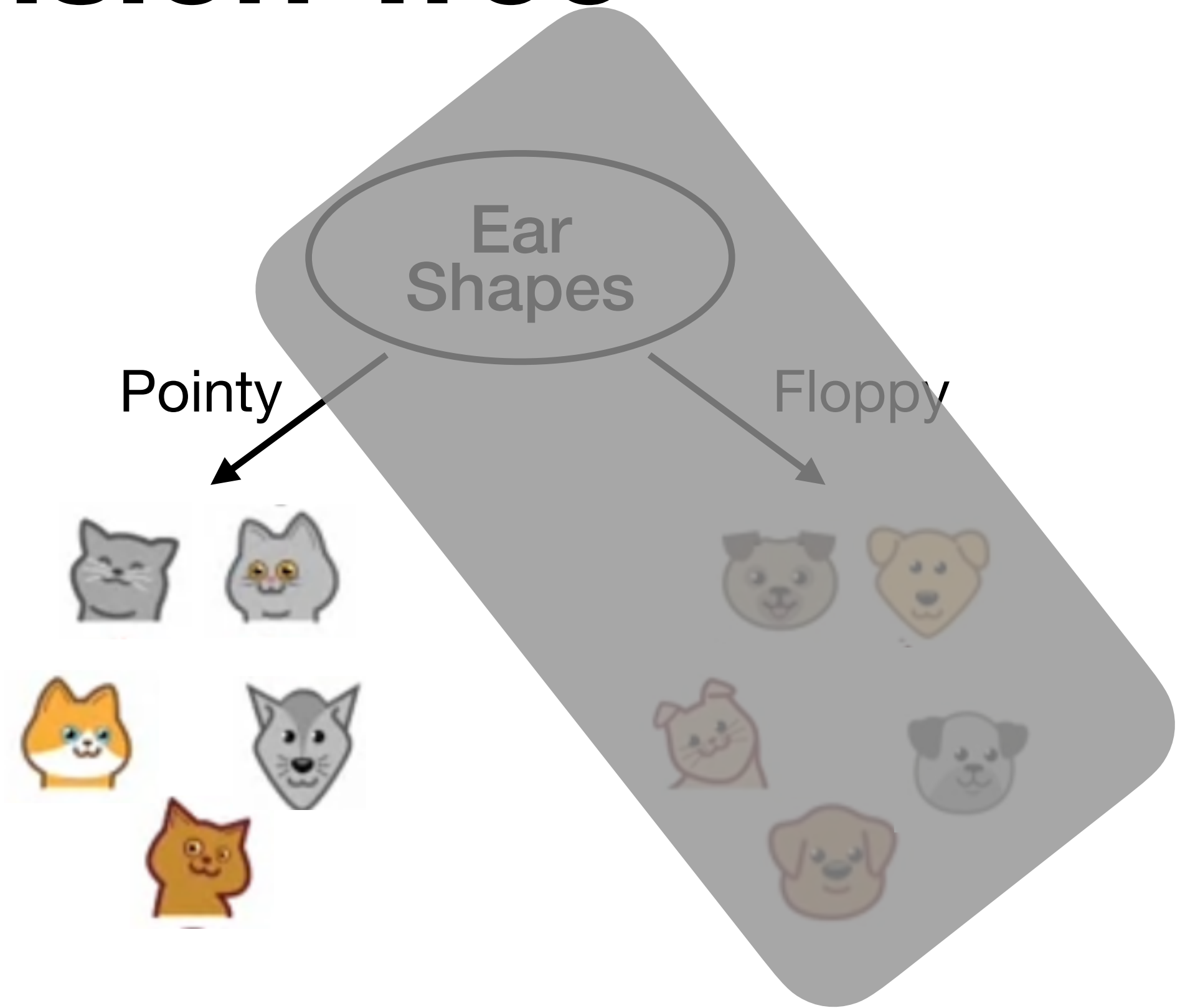
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Decision Tree



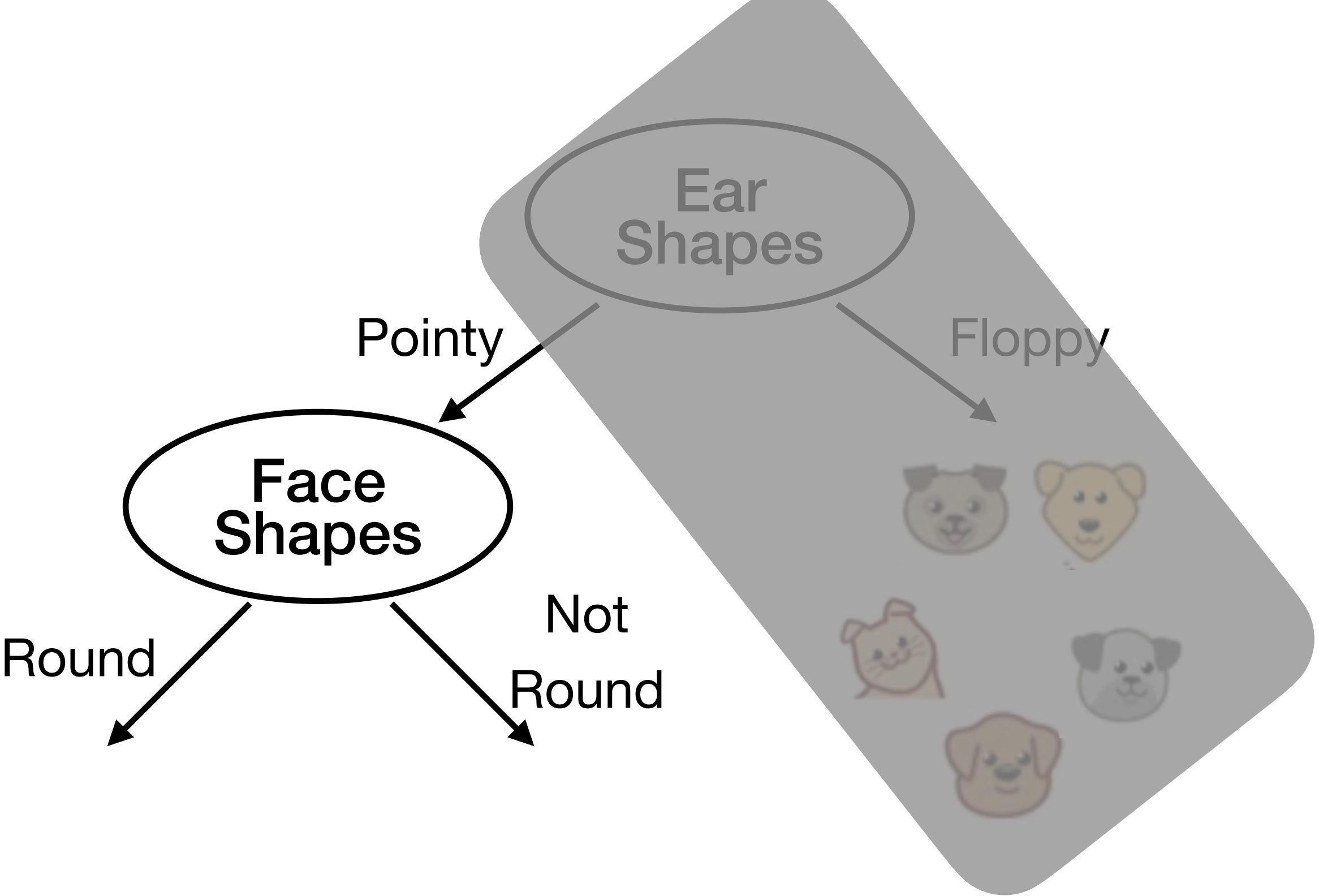
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Decision Tree



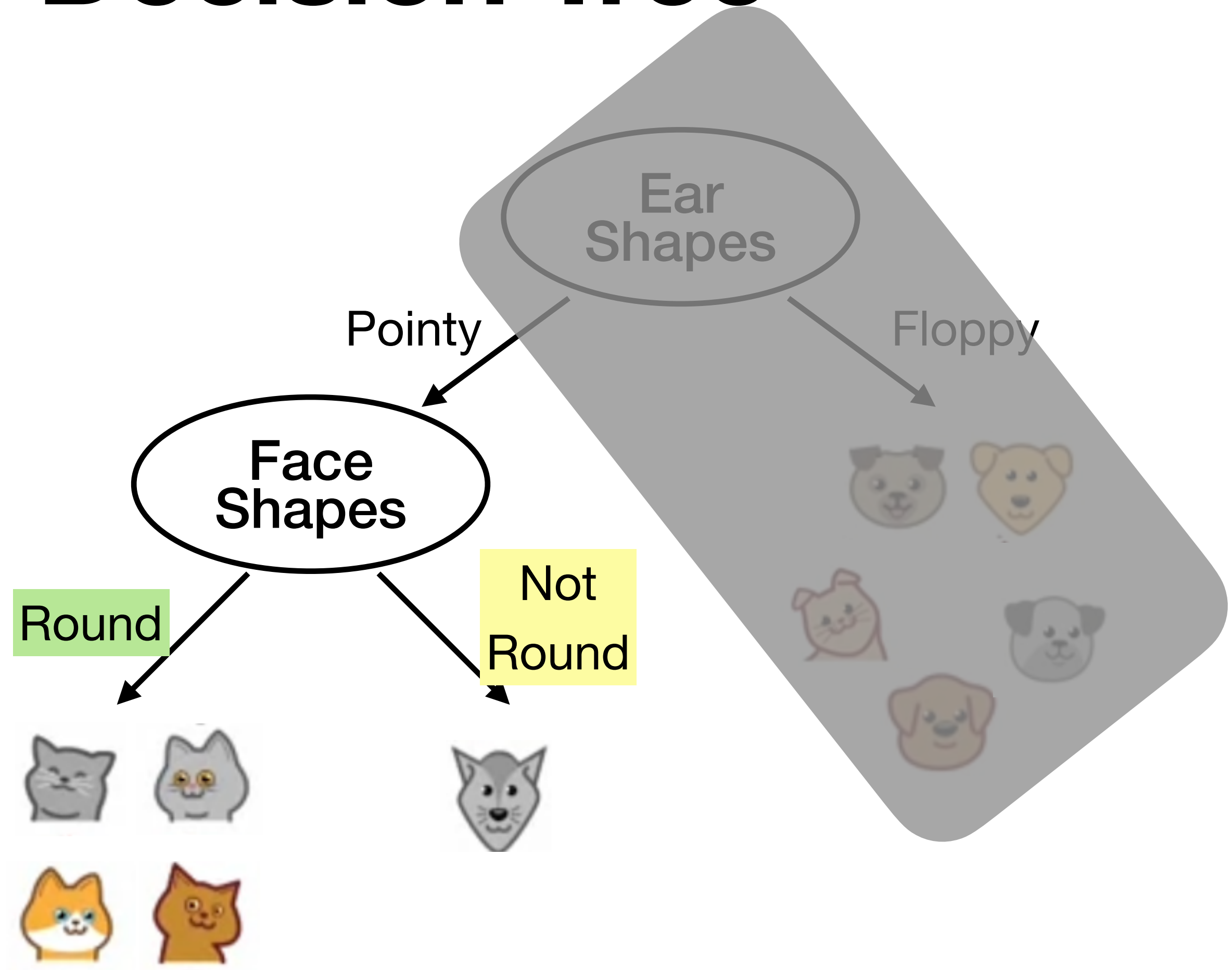
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Decision Tree



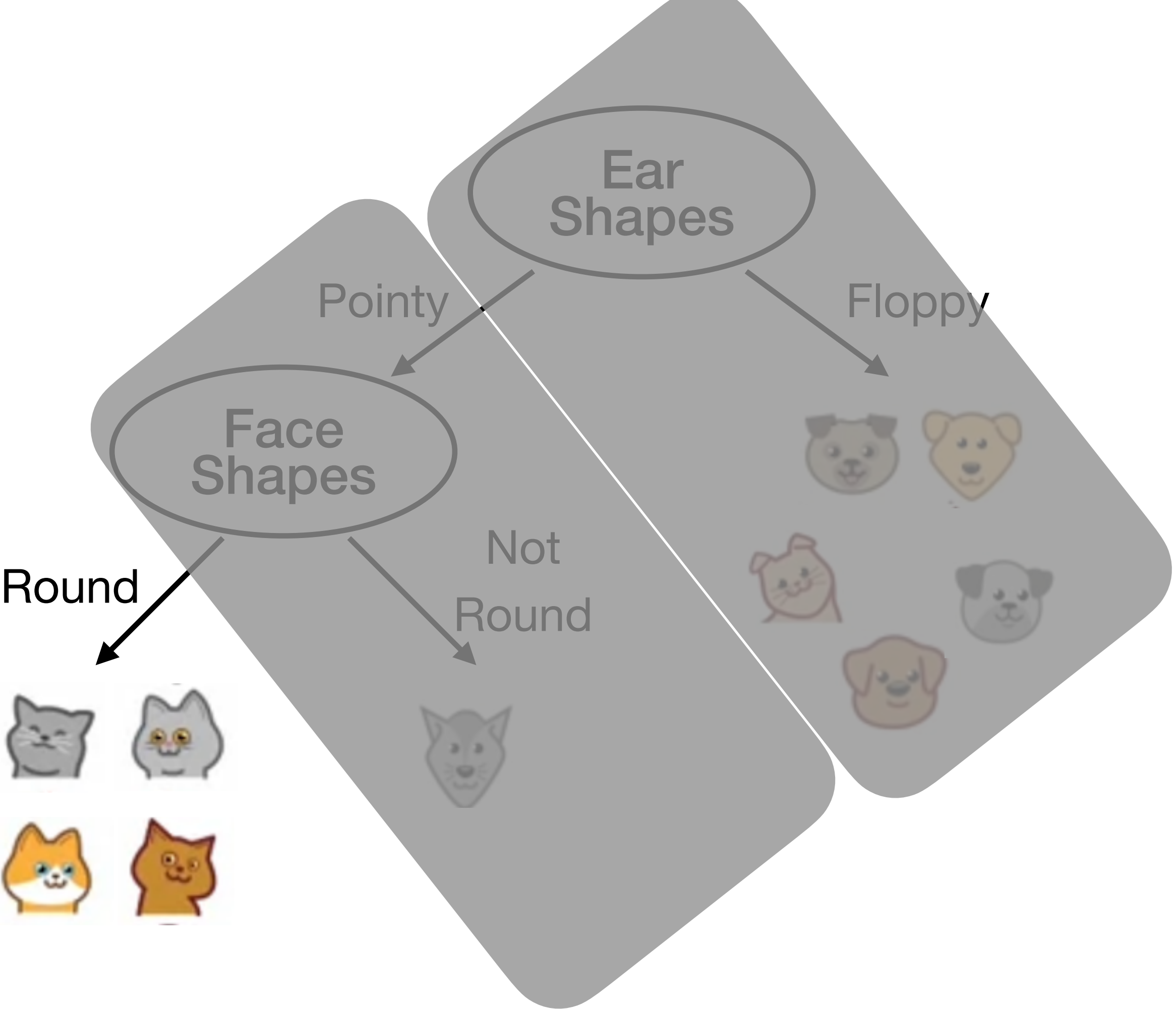
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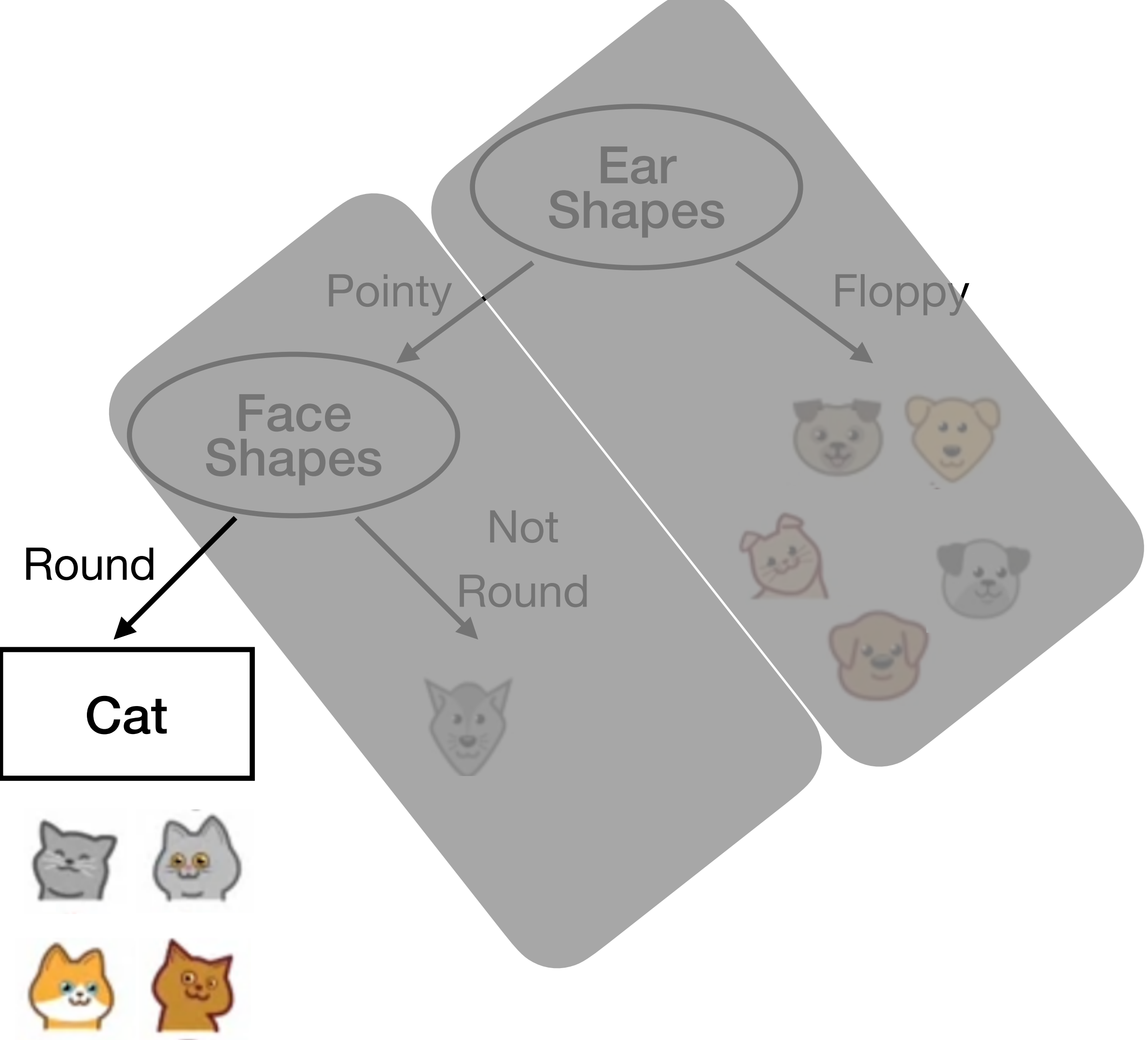
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Decision Tree



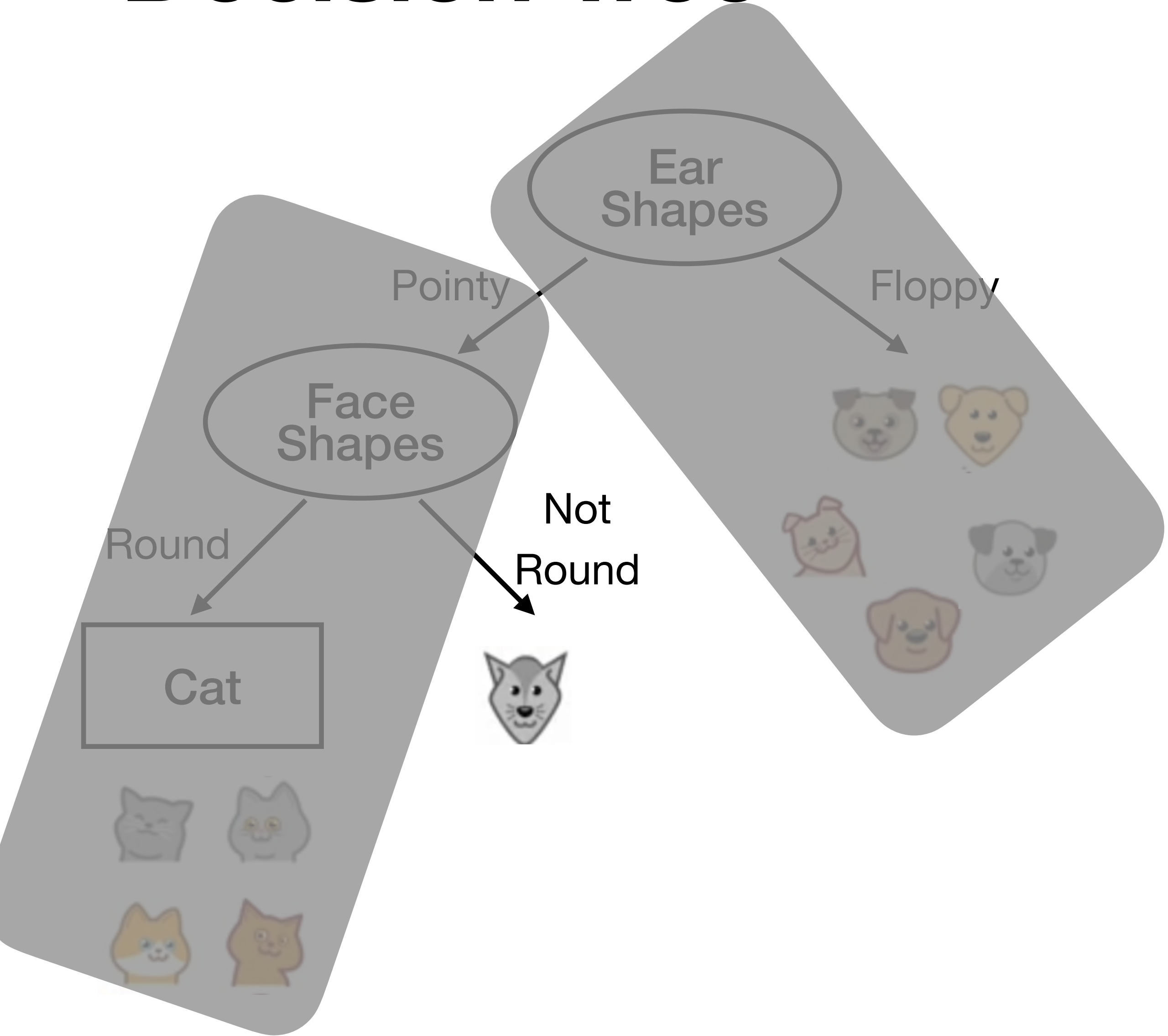
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Decision Tree



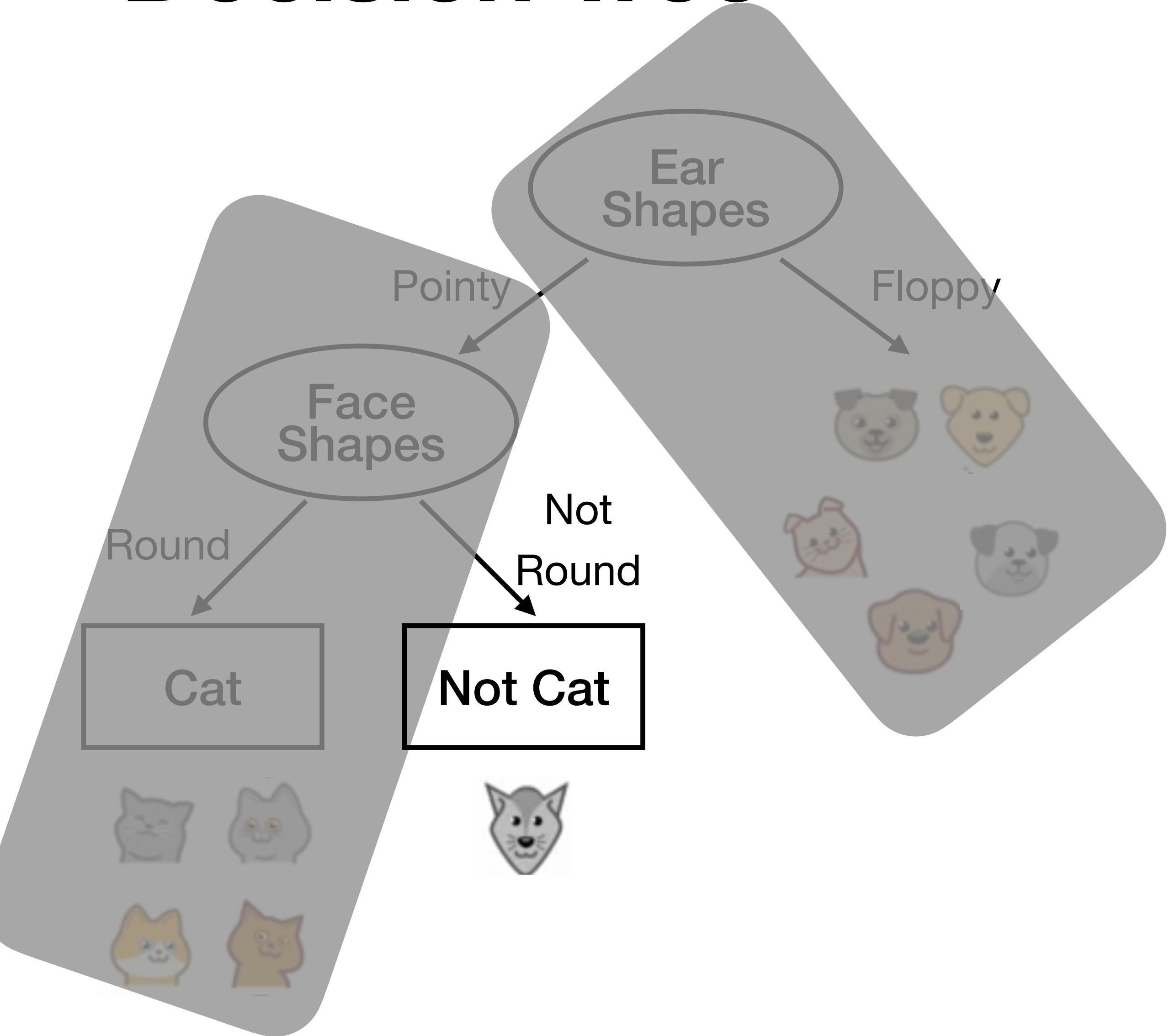
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Decision Tree



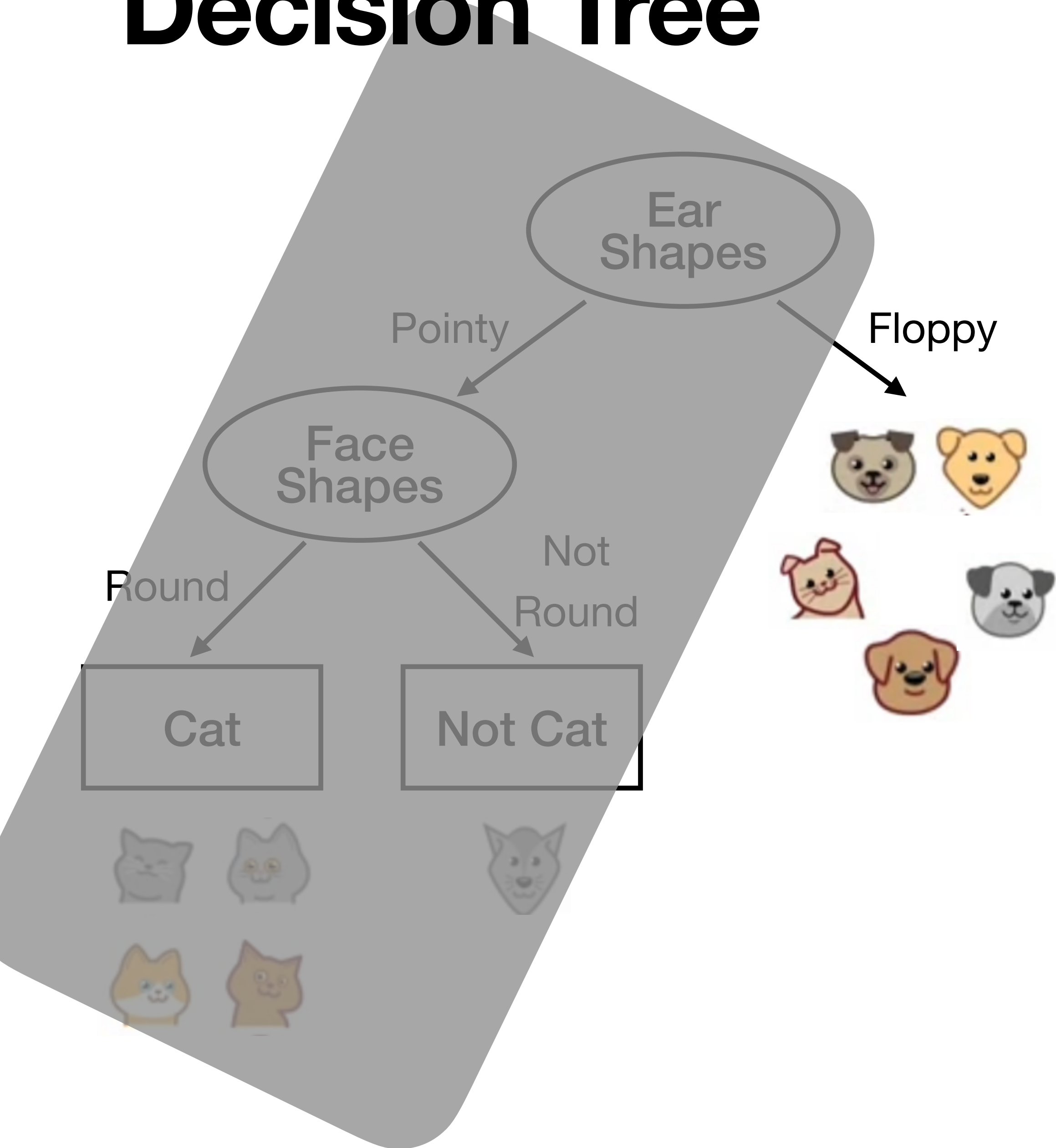
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Decision Tree



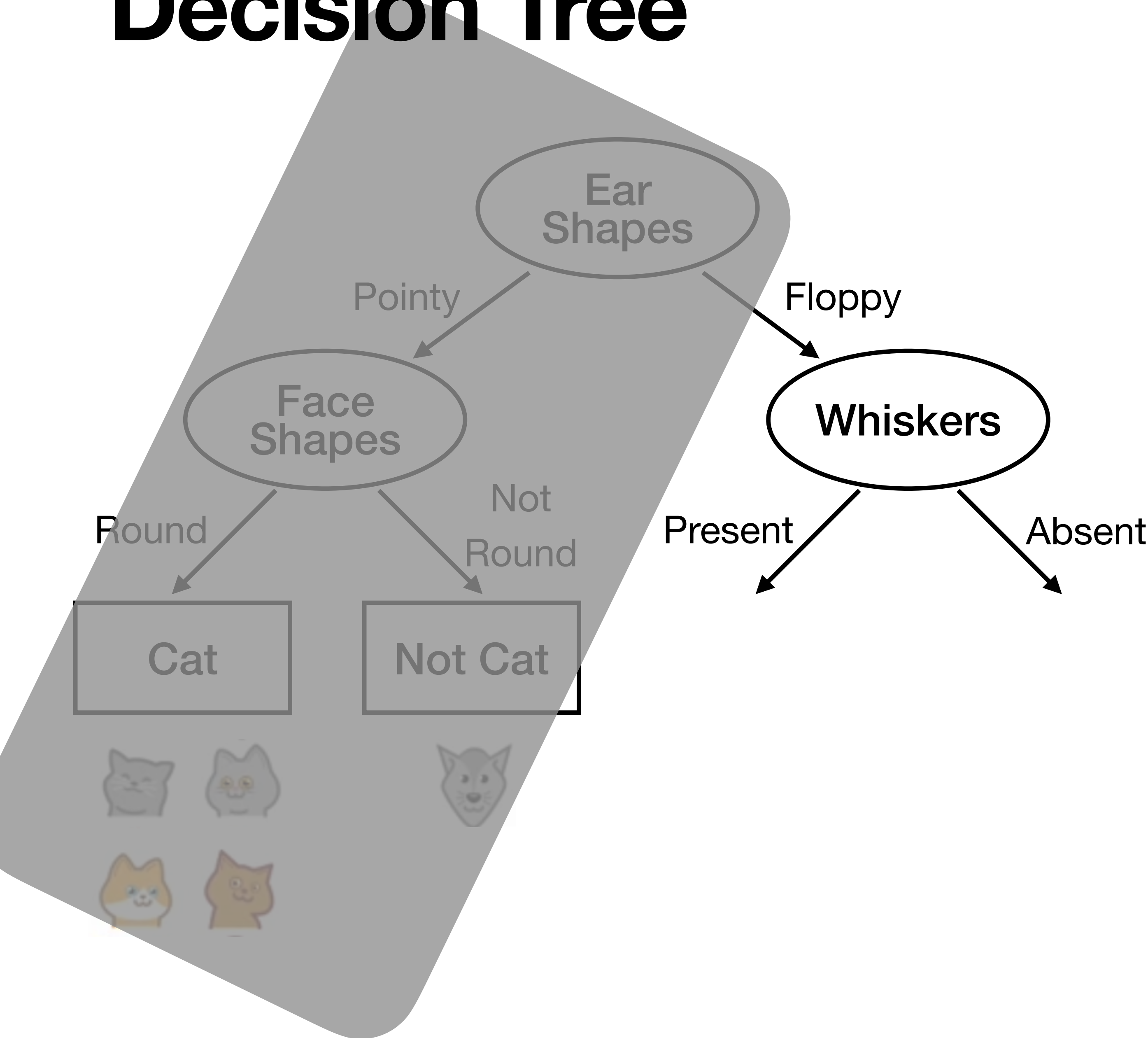
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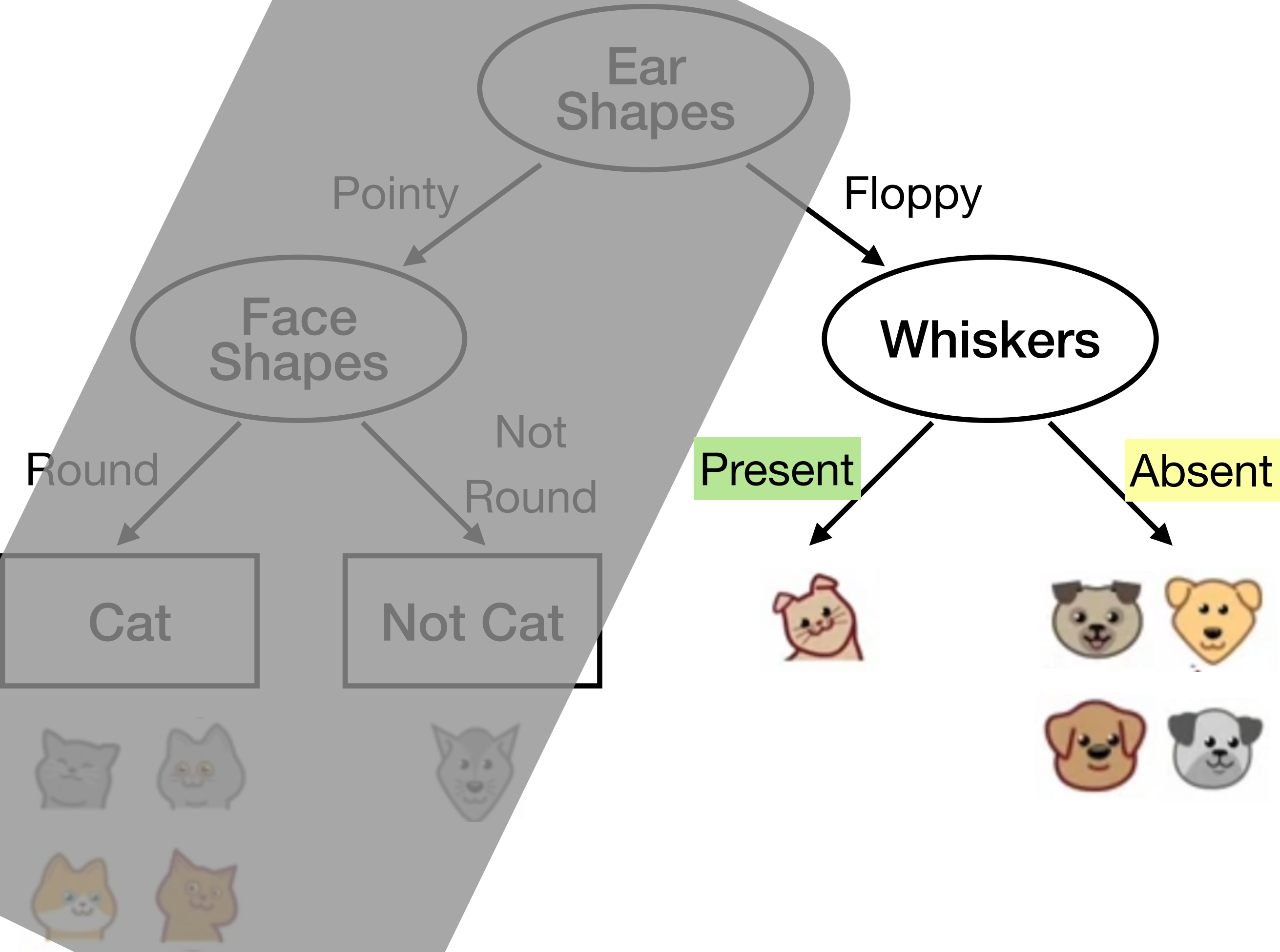
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Decision Tree



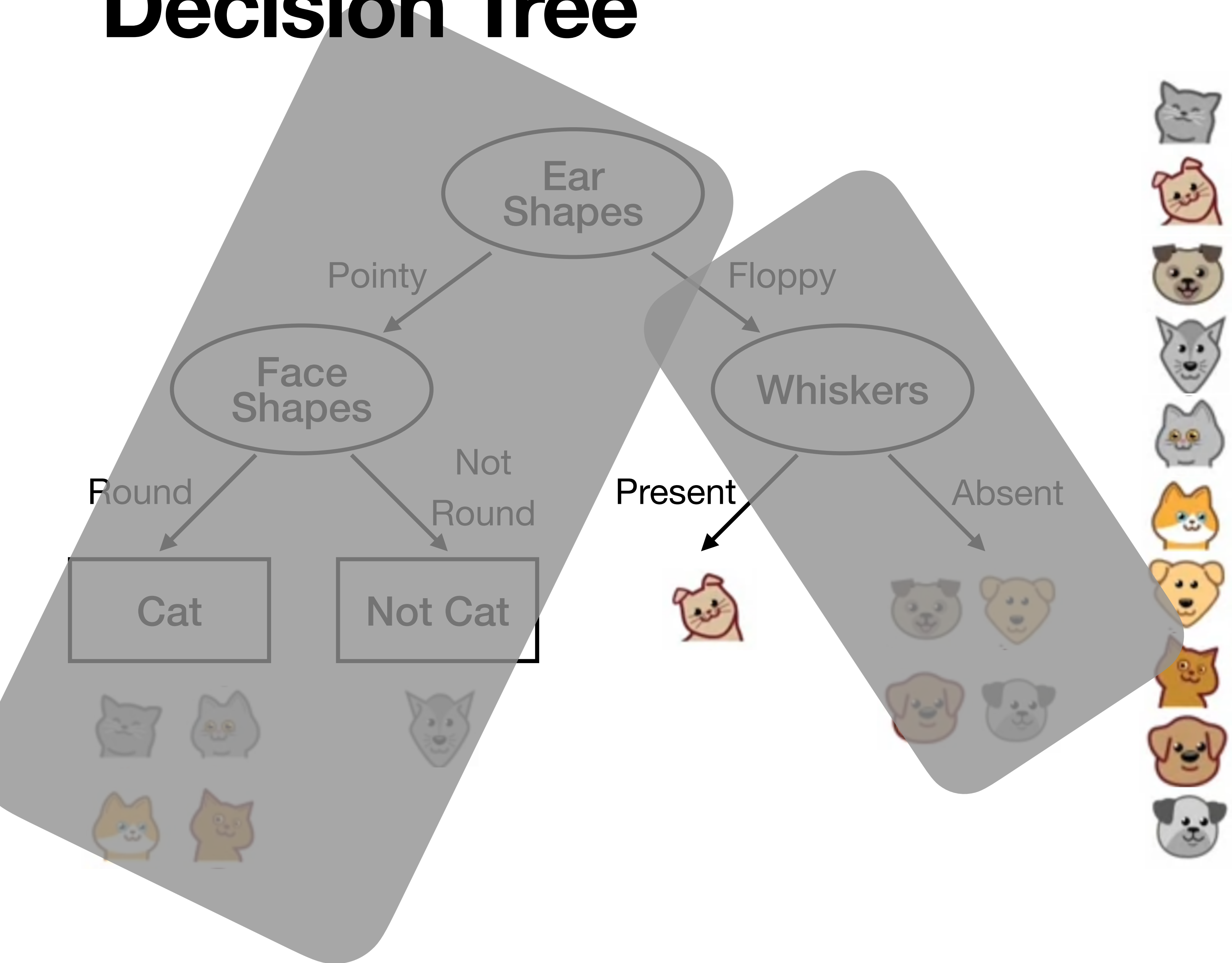
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Decision Tree



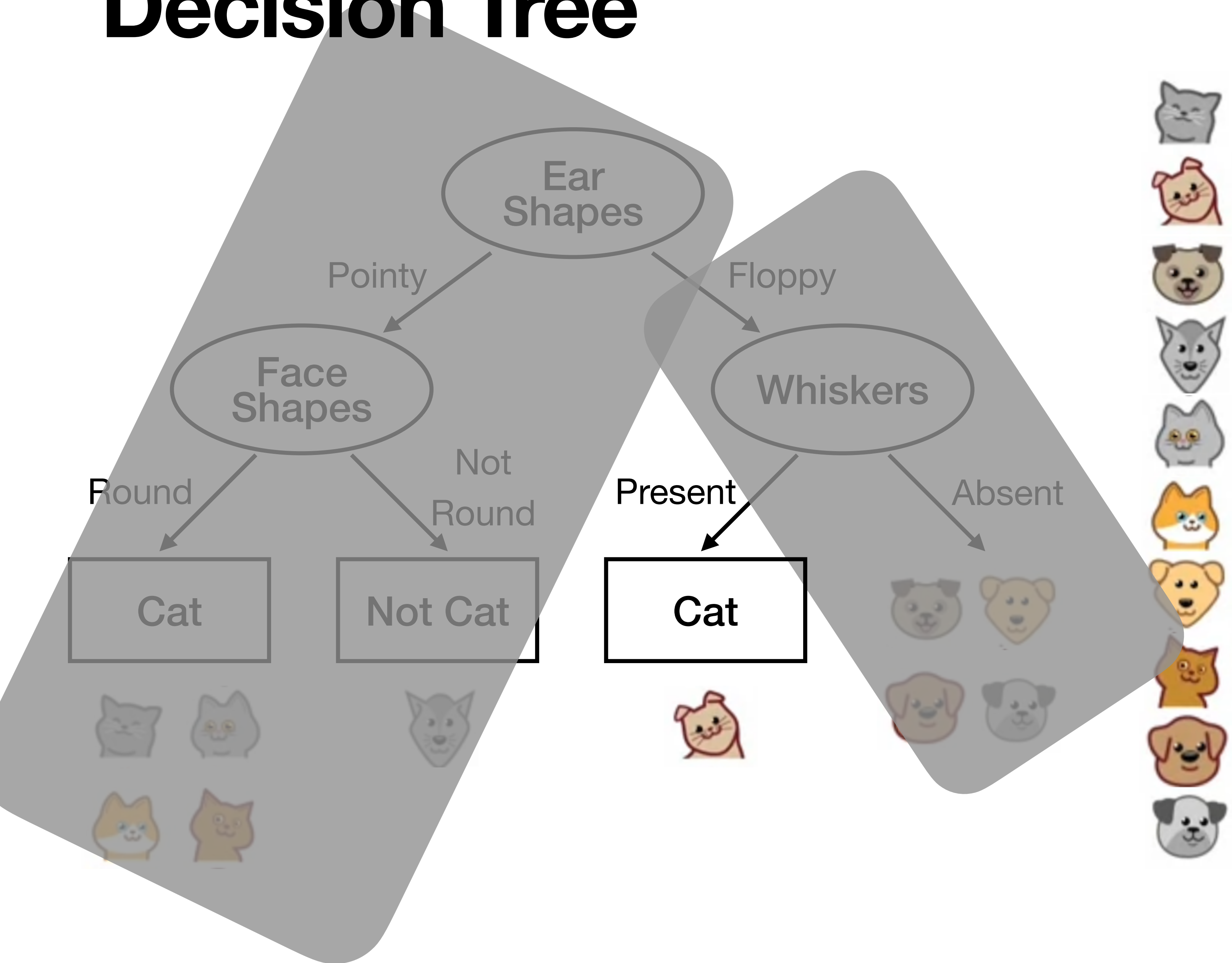
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Decision Tree



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Decision Tree



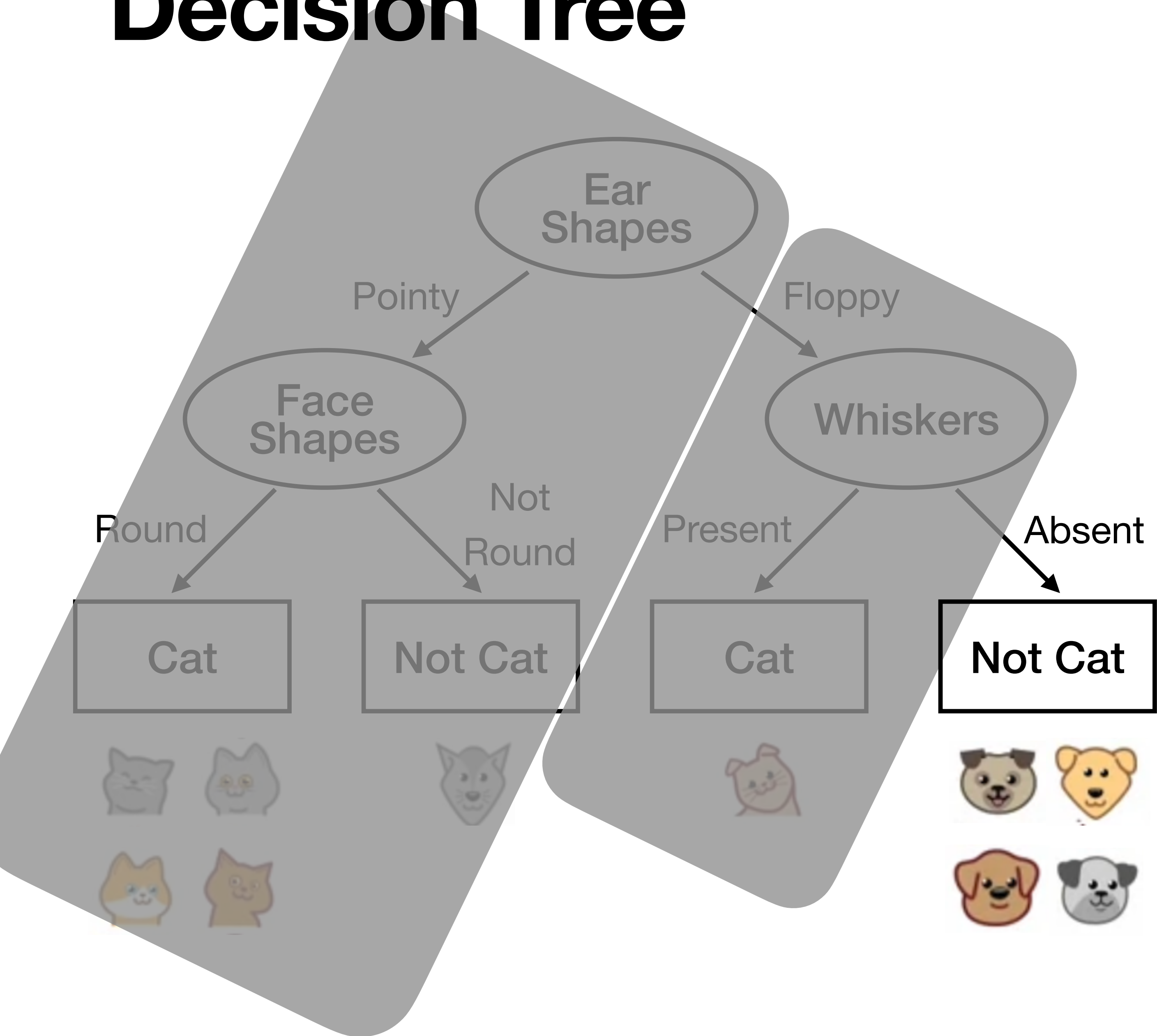
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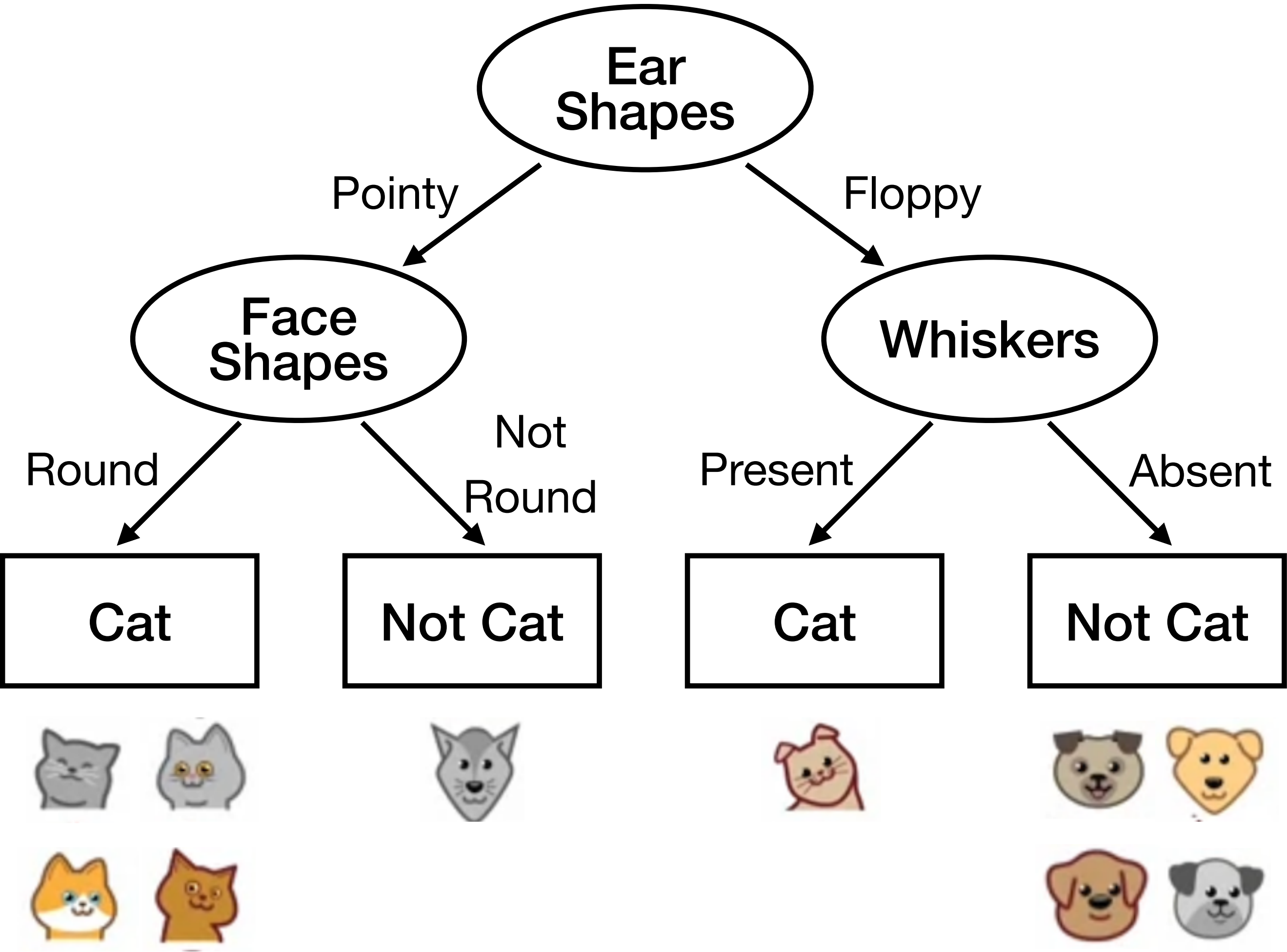
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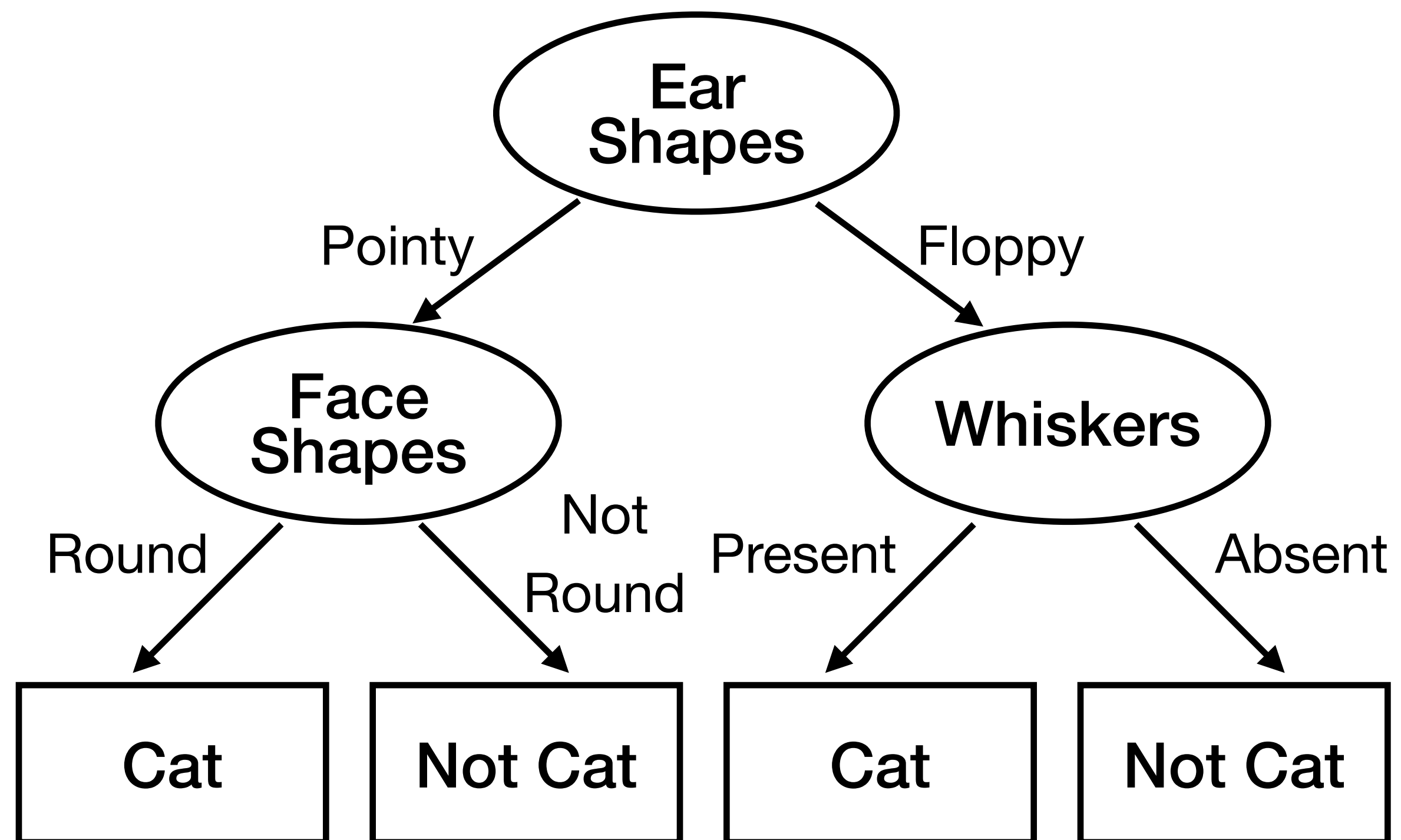
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Decision Tree

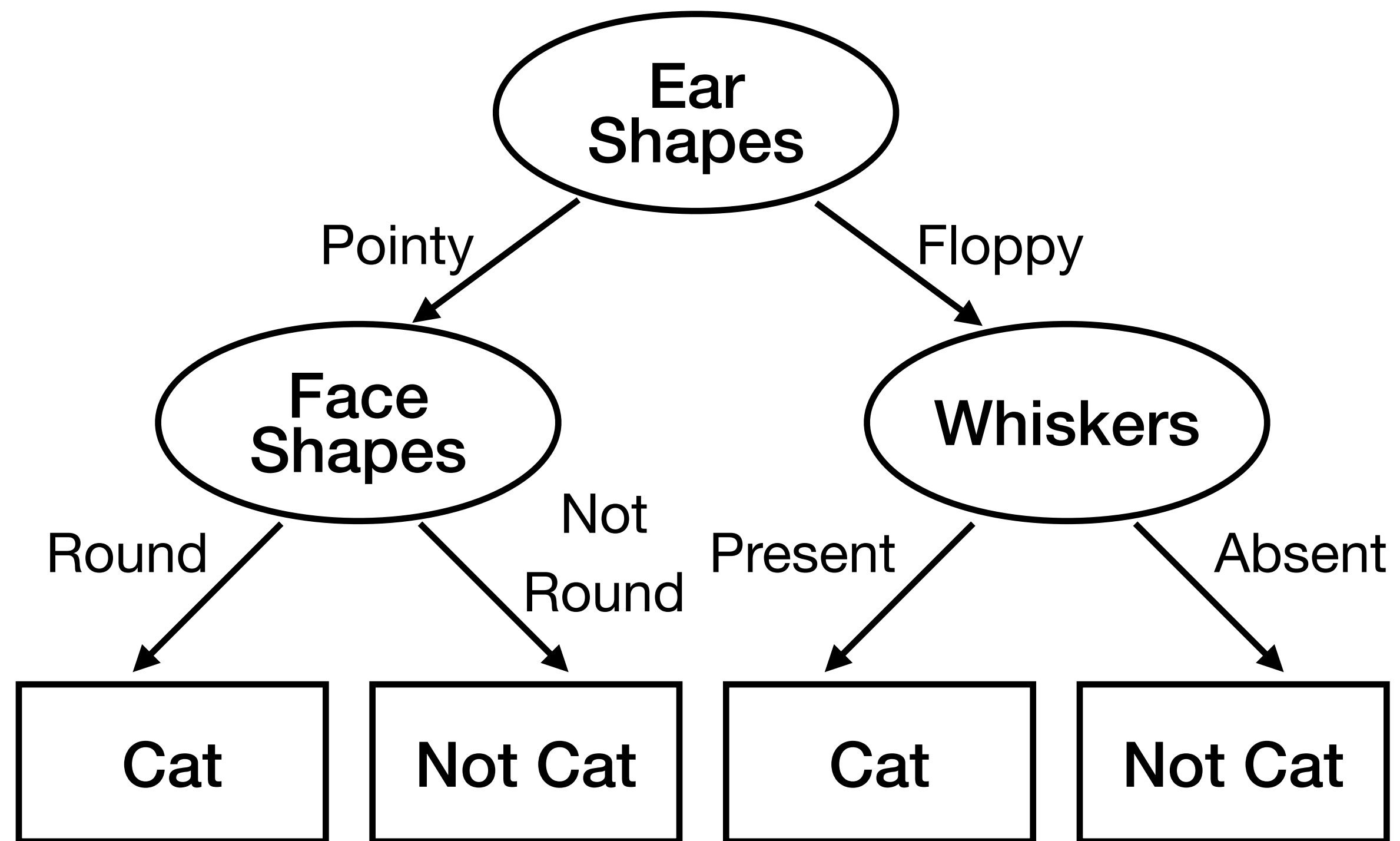


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Floppy	Round	Absent	No
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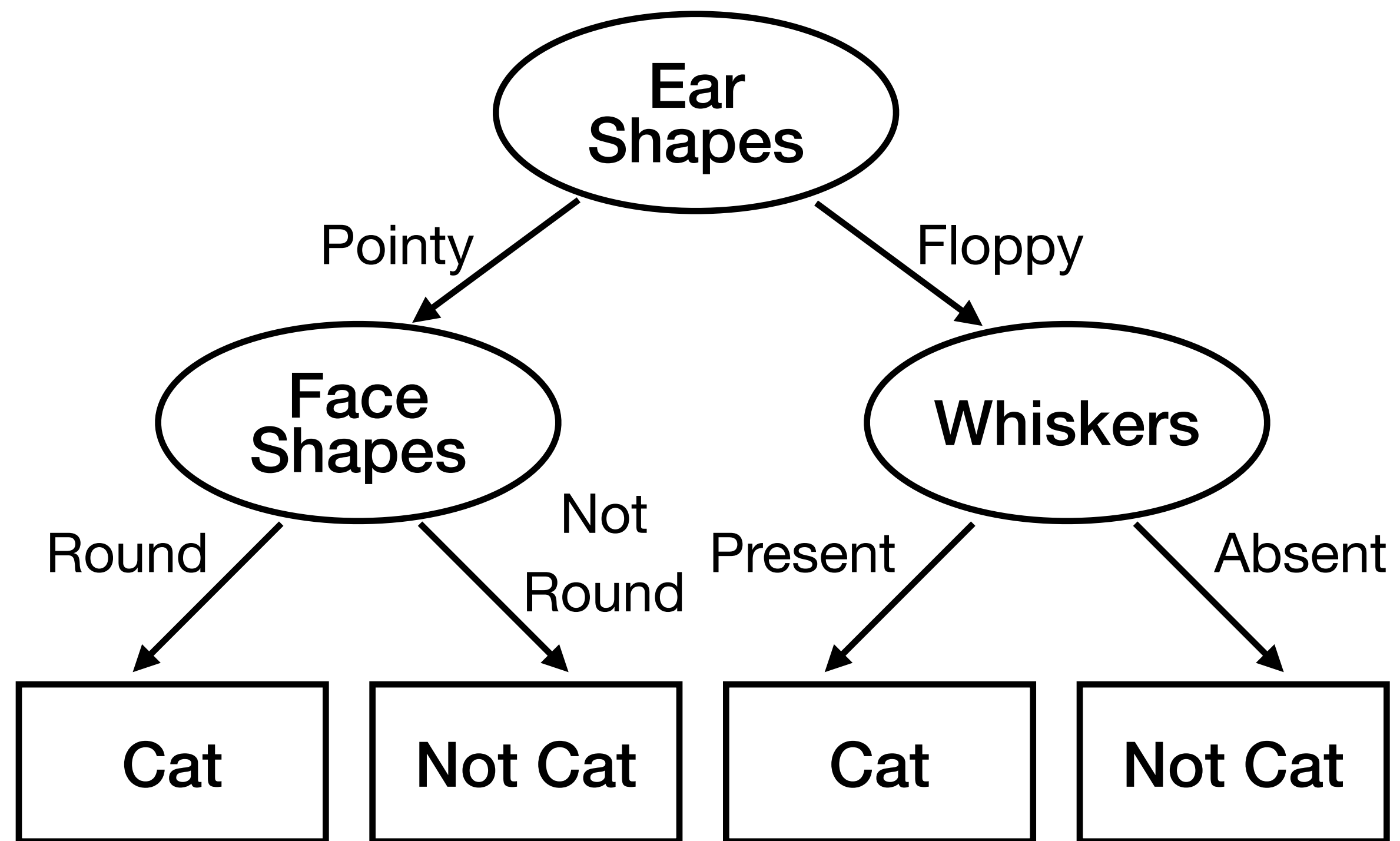
Trees are sensitive



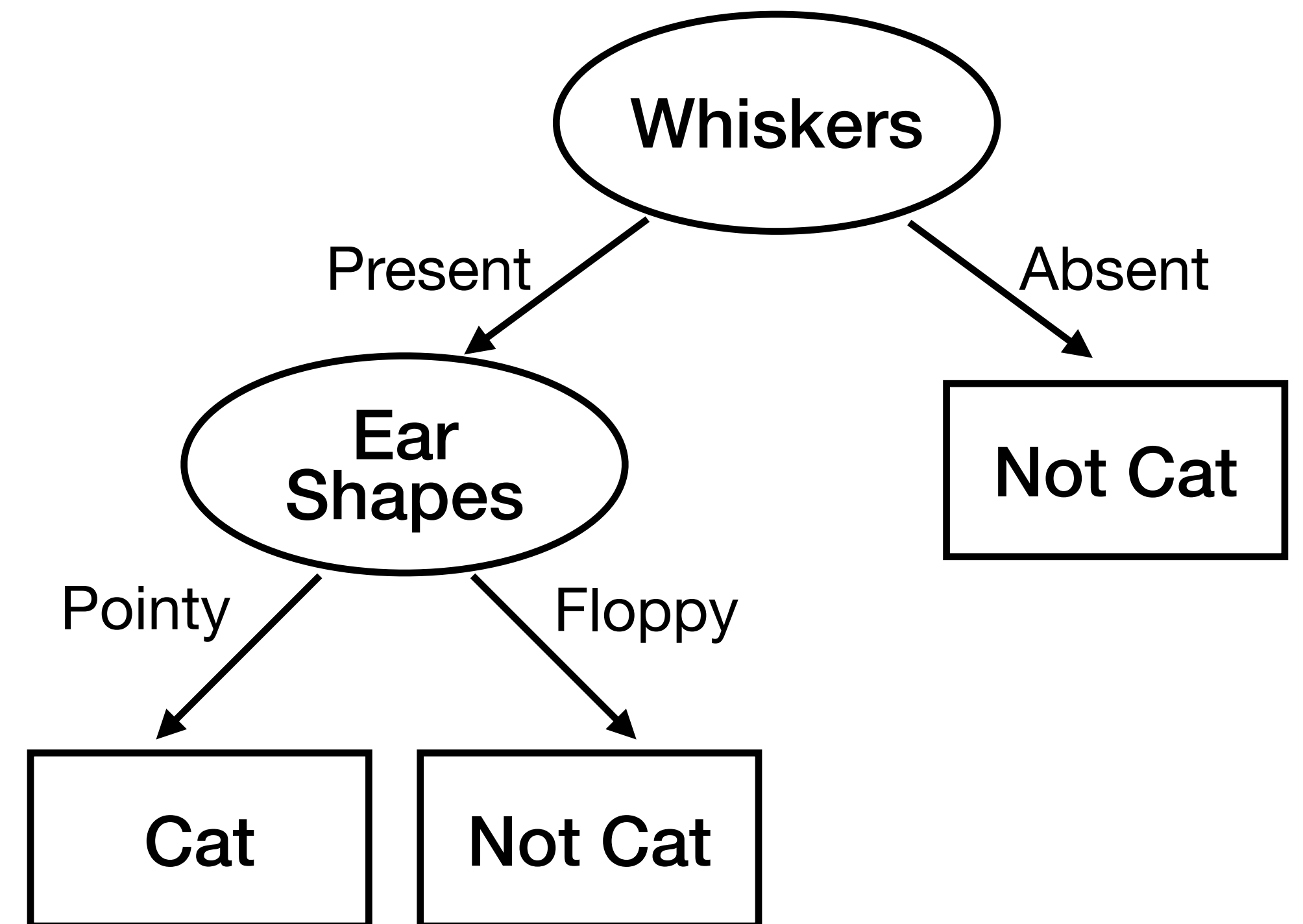
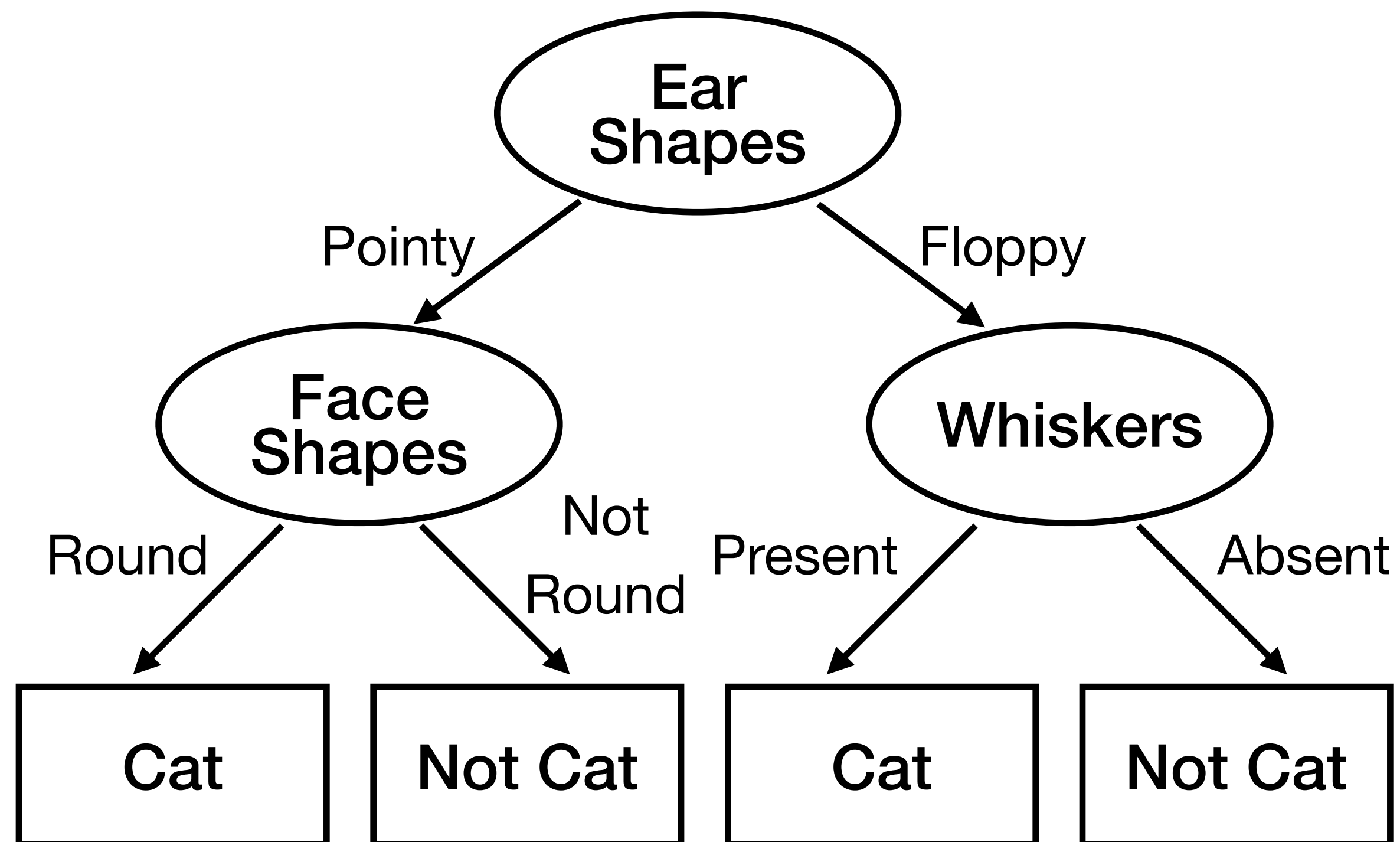
Trees are sensitive



Trees are sensitive

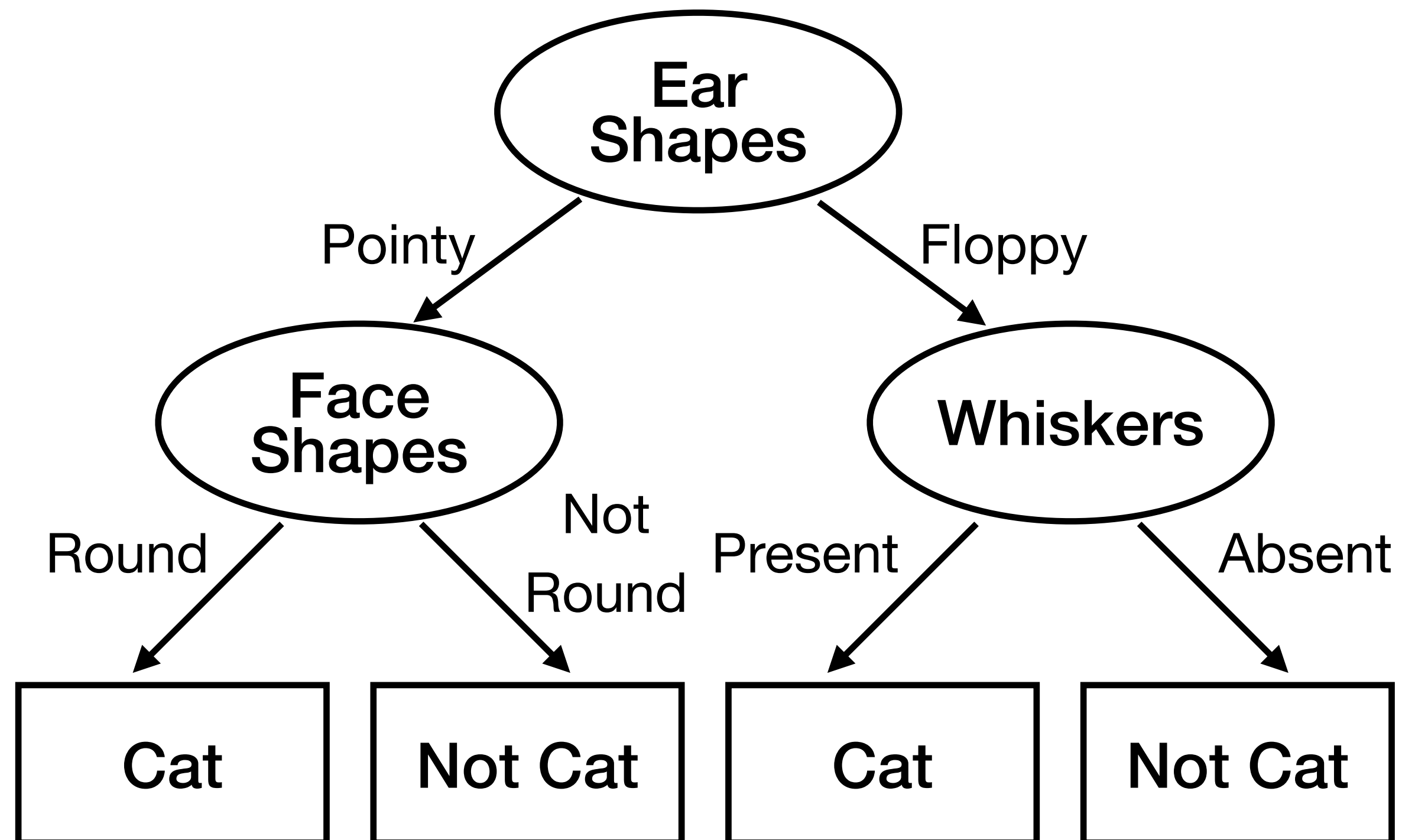


Trees are sensitive

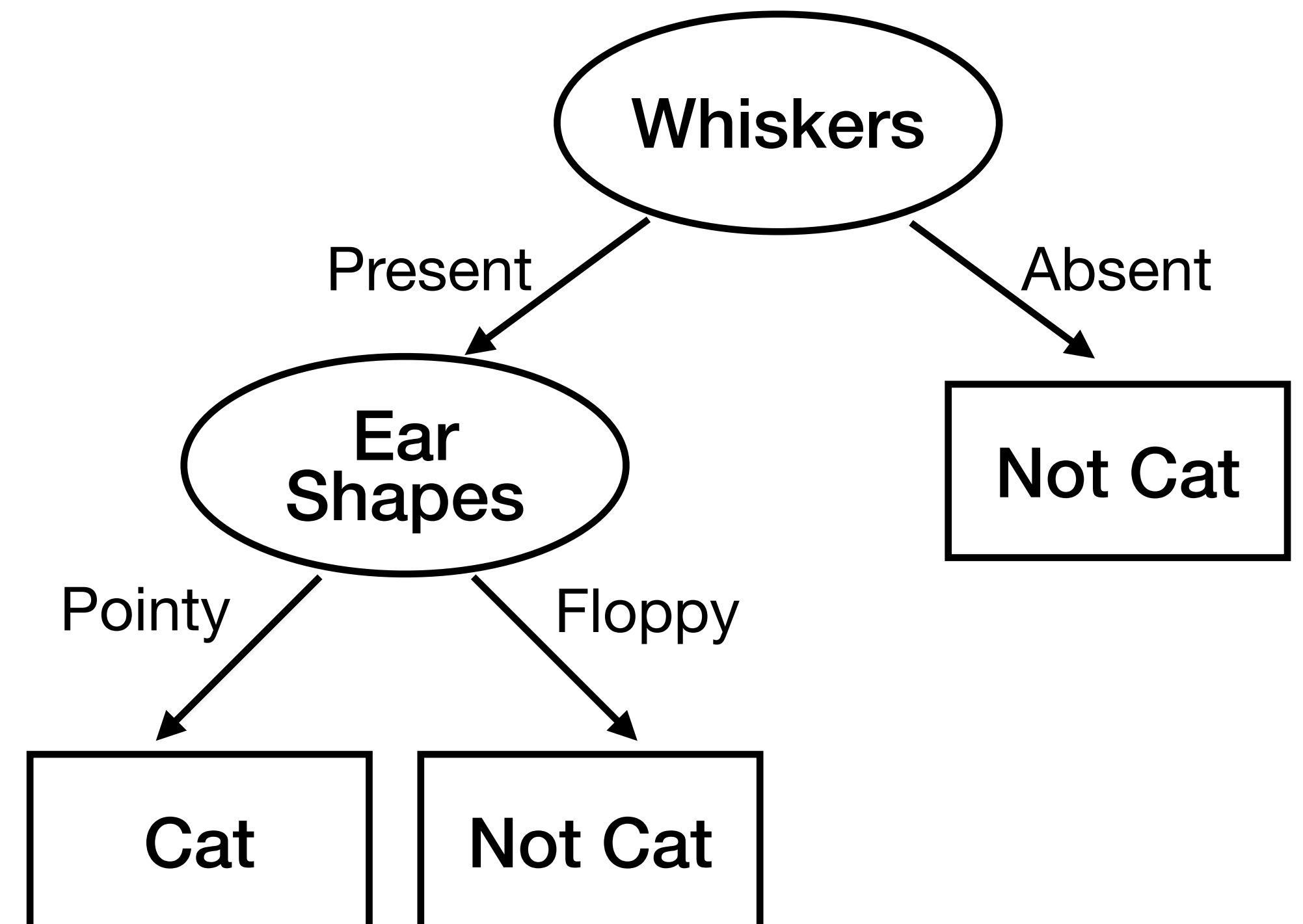


Single trees are not robust

Tree A



Tree B



Single trees are not robust



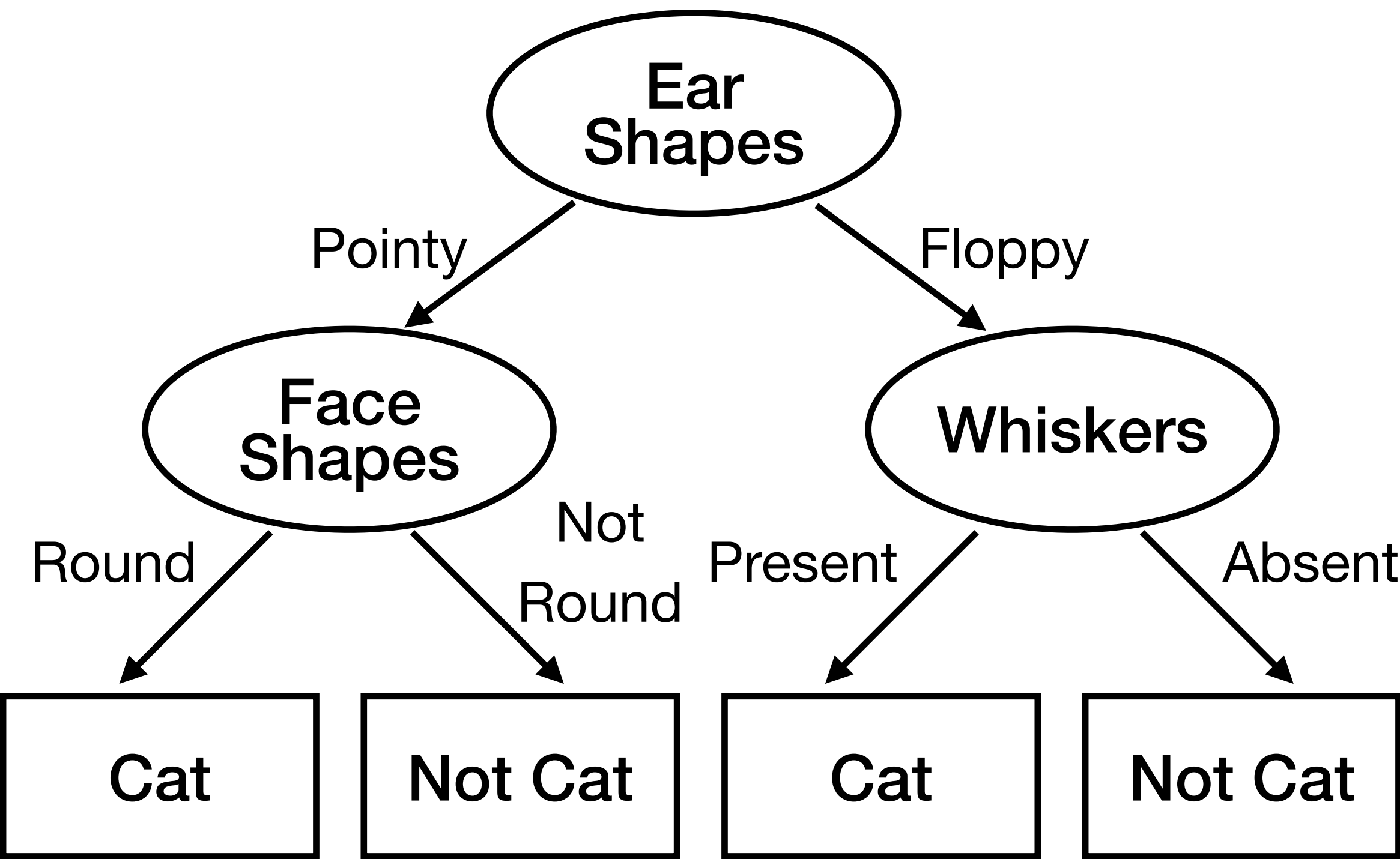
New cat

Ear shape: Pointy

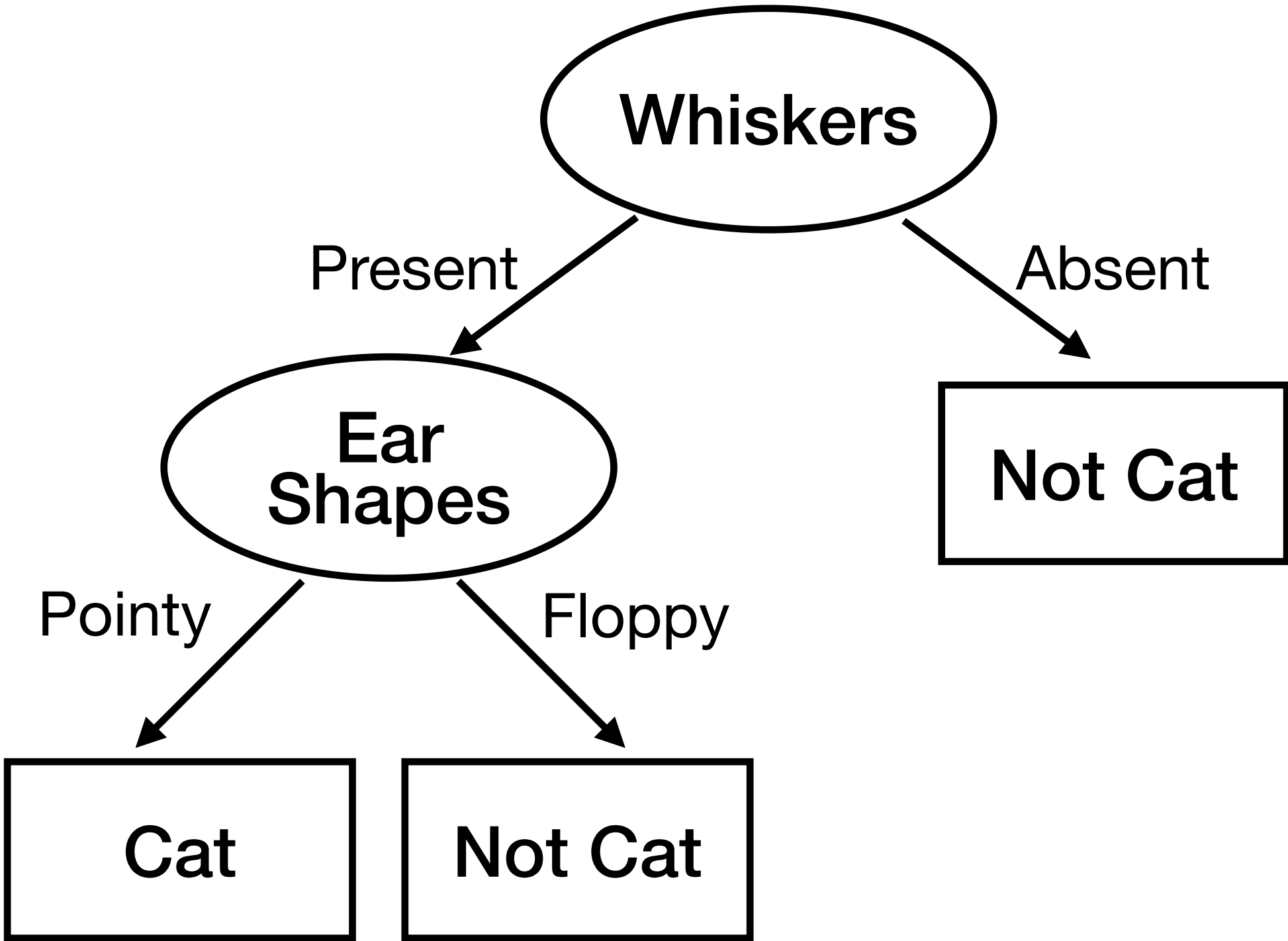
Face shape: Not Round

Whiskers: Present

Tree A



Tree B



Single trees are not robust



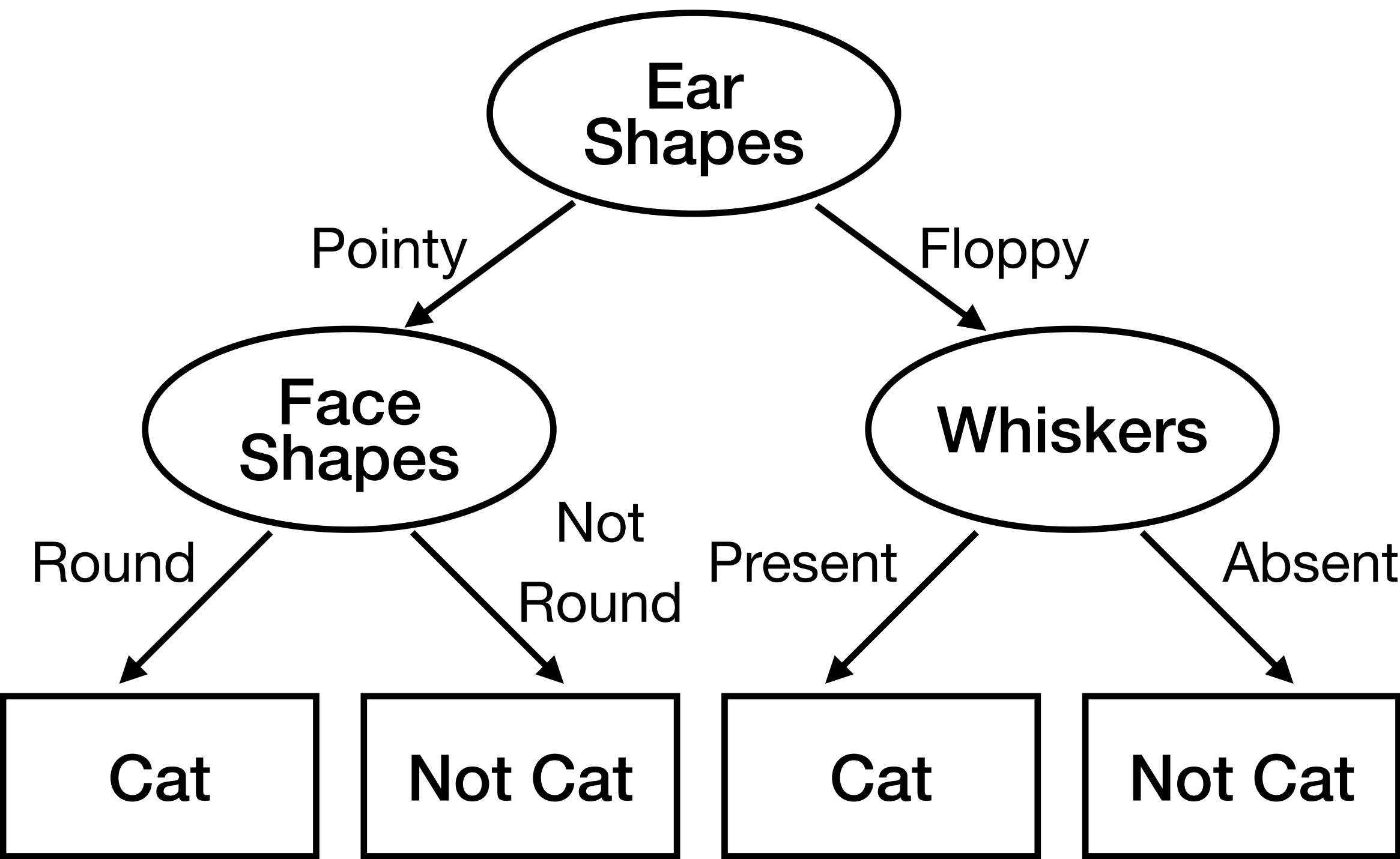
New cat

Ear shape: Pointy

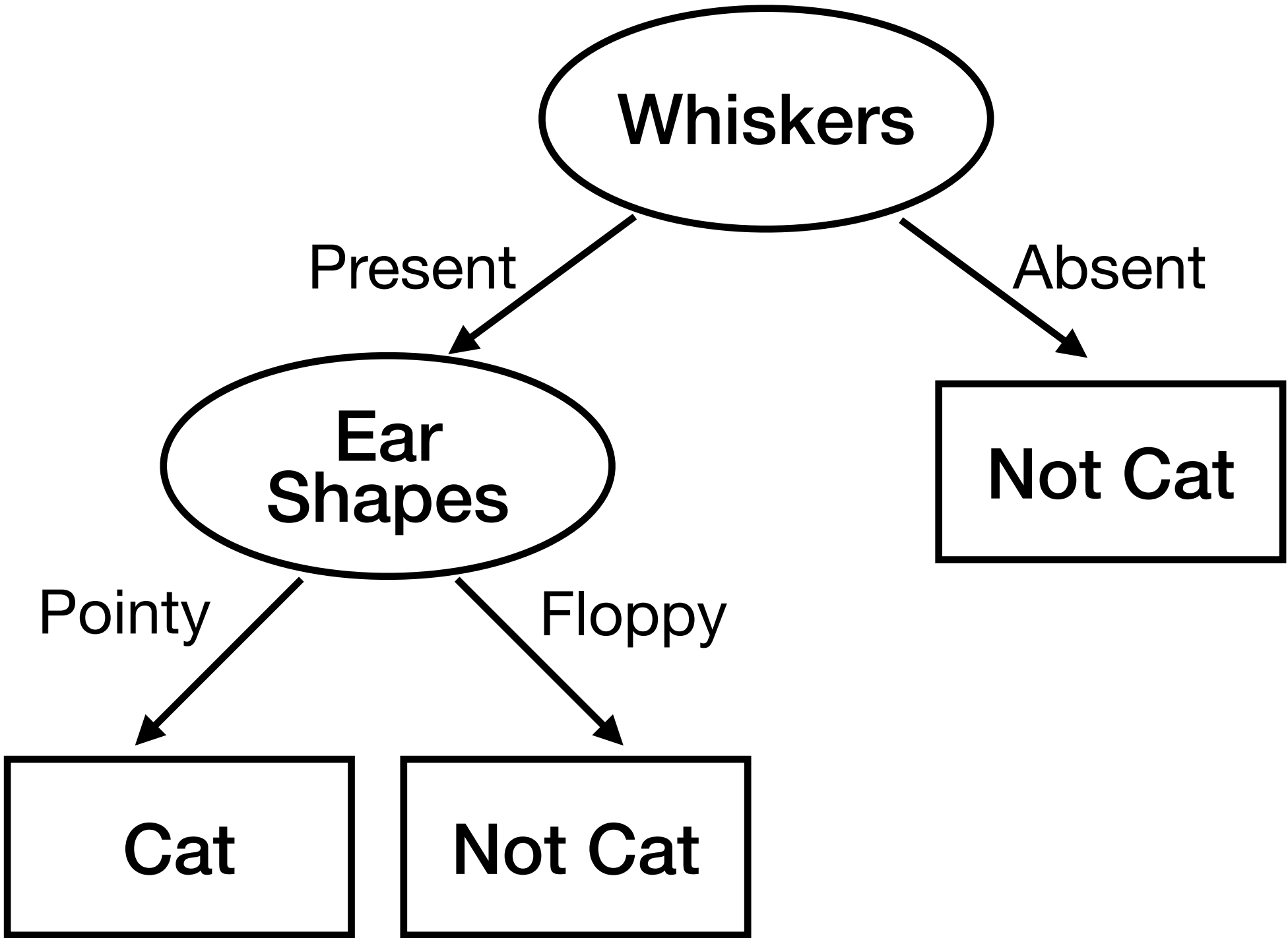
Face shape: Not Round

Whiskers: Present

Tree A



Tree B



Single trees are not robust



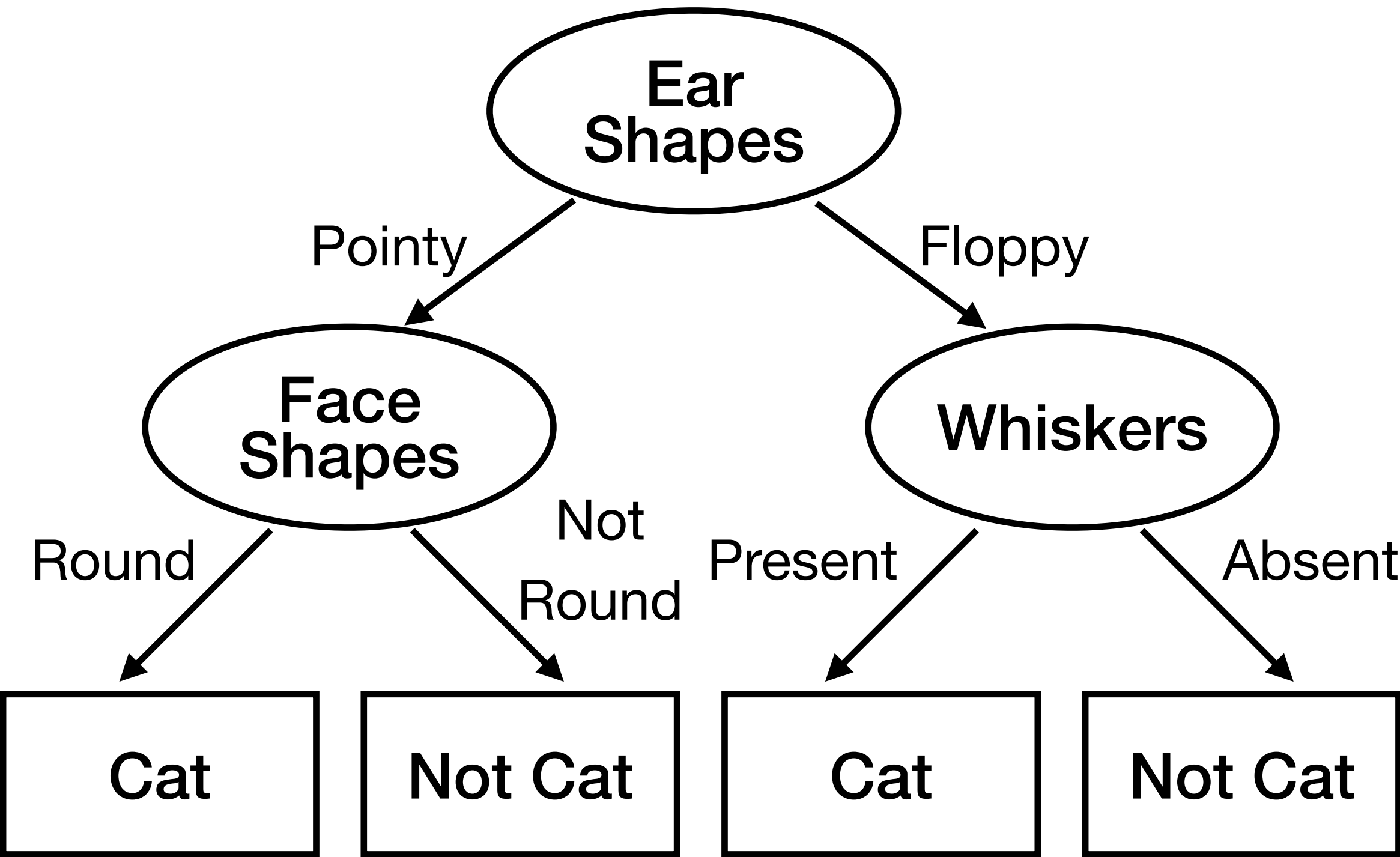
New cat

Ear shape: Pointy

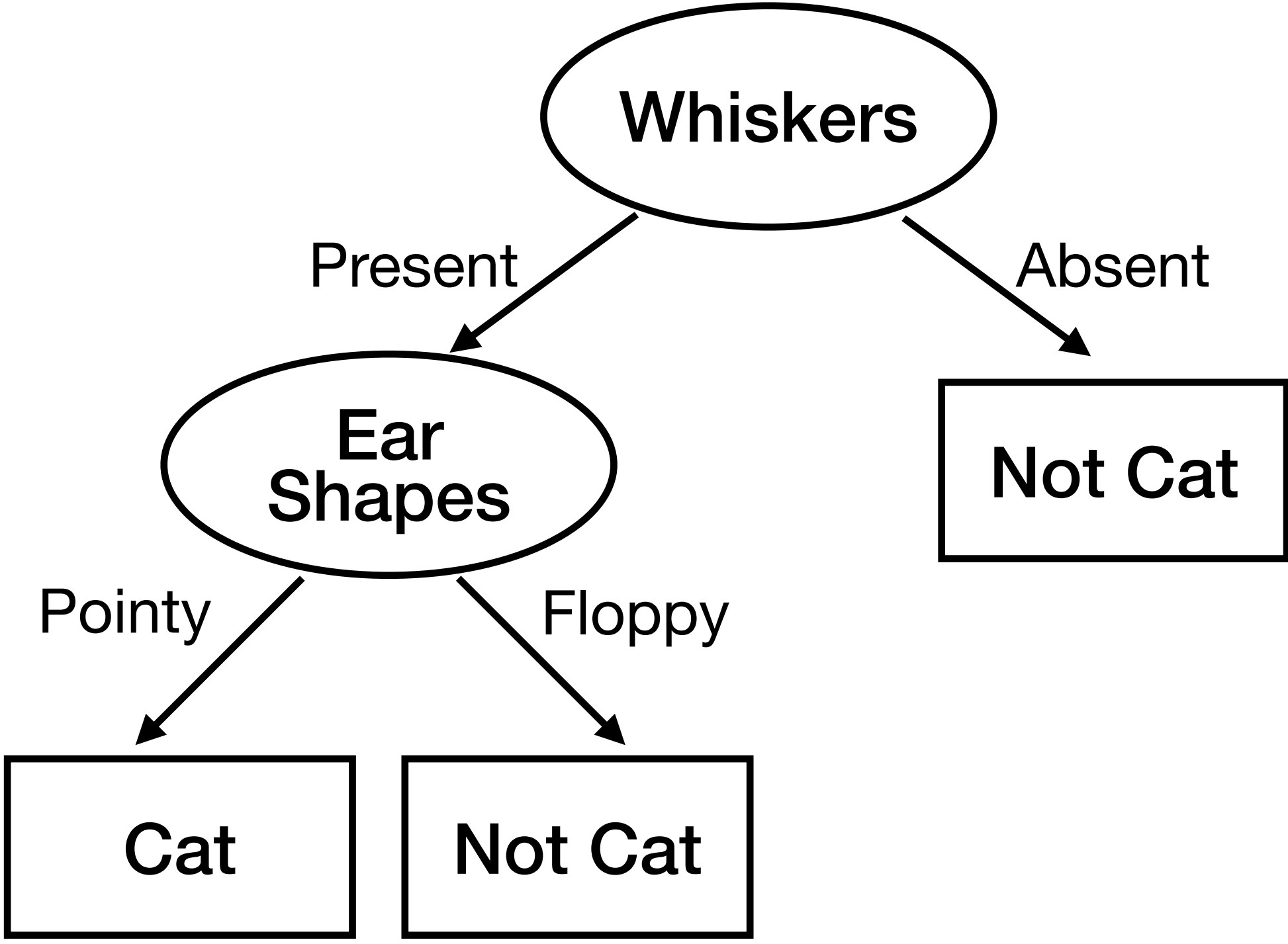
Face shape: Not Round

Whiskers: Present

Tree A



Tree B



Tree ensemble



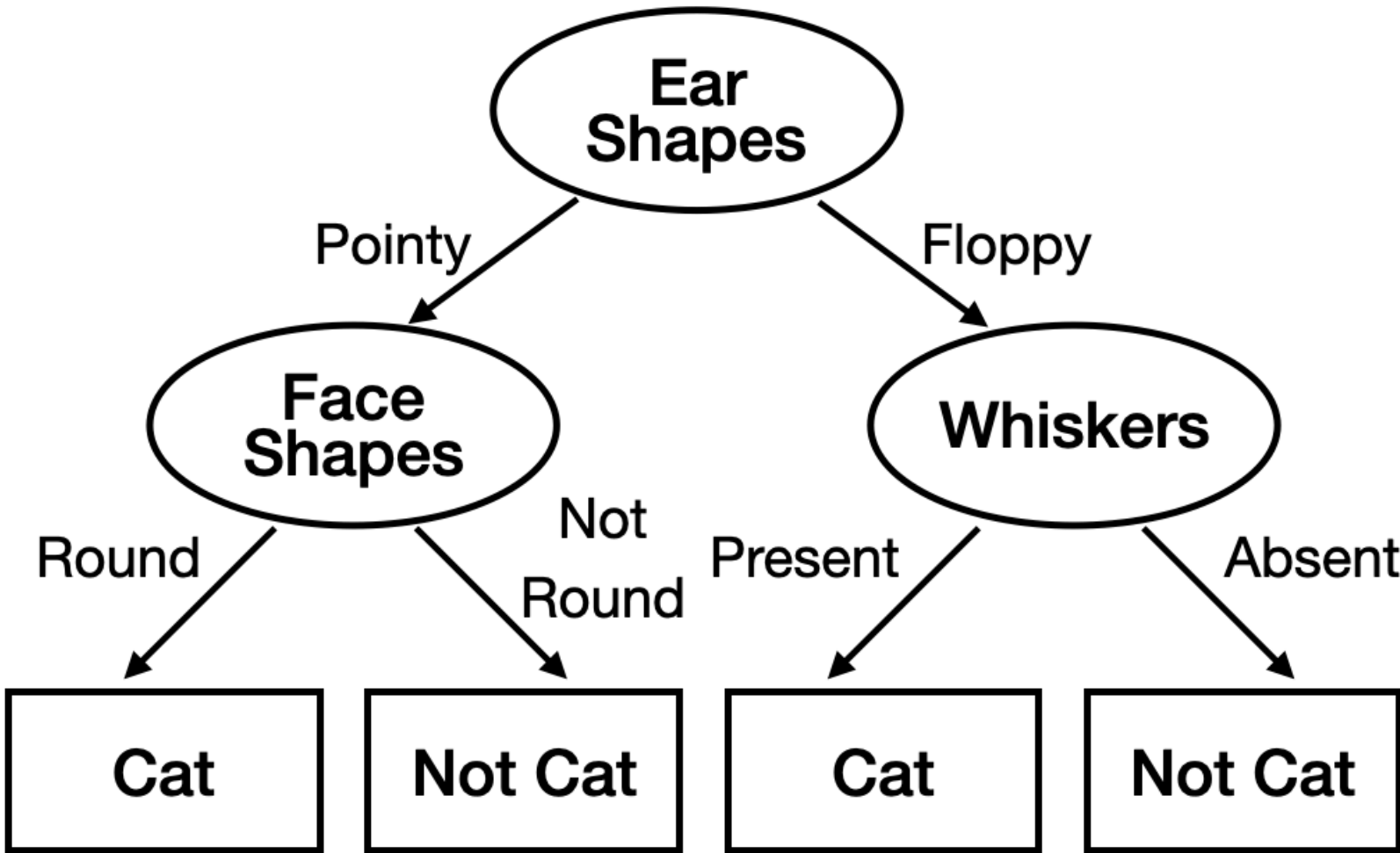
New cat

Ear shape: Pointy

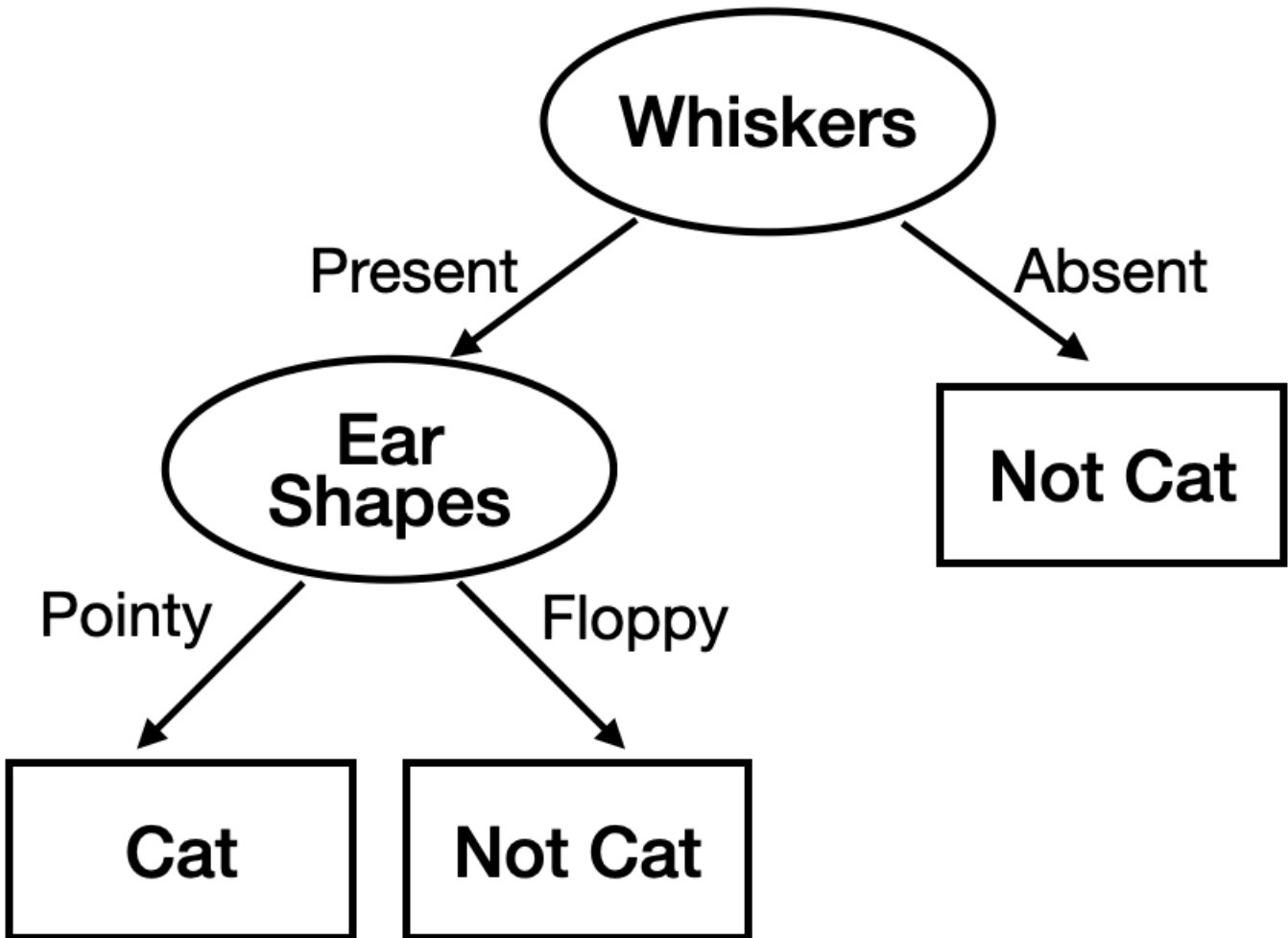
Face shape: Not Round

Whiskers: Present

Tree A



Tree B



Tree ensemble



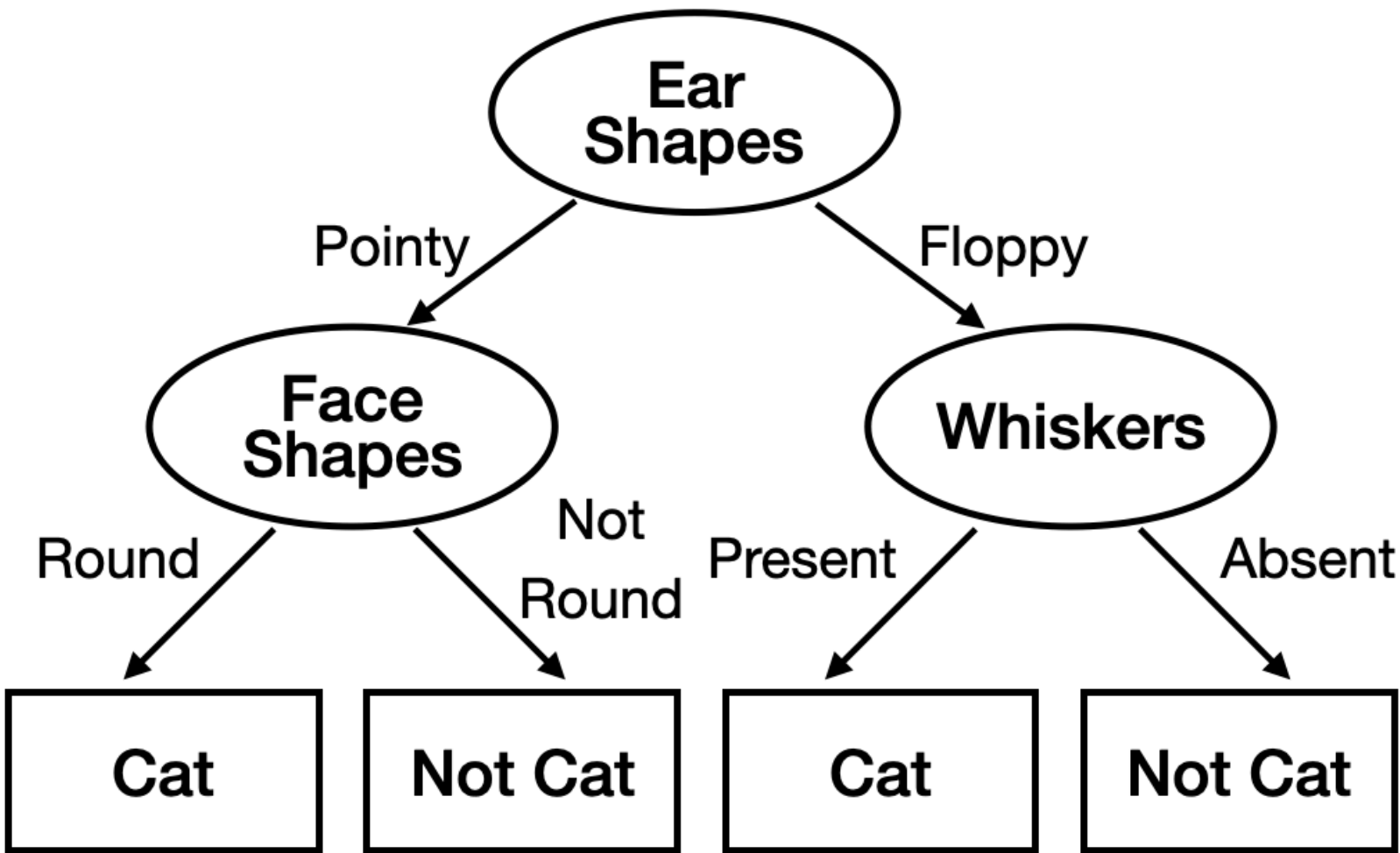
New cat

Ear shape: Pointy

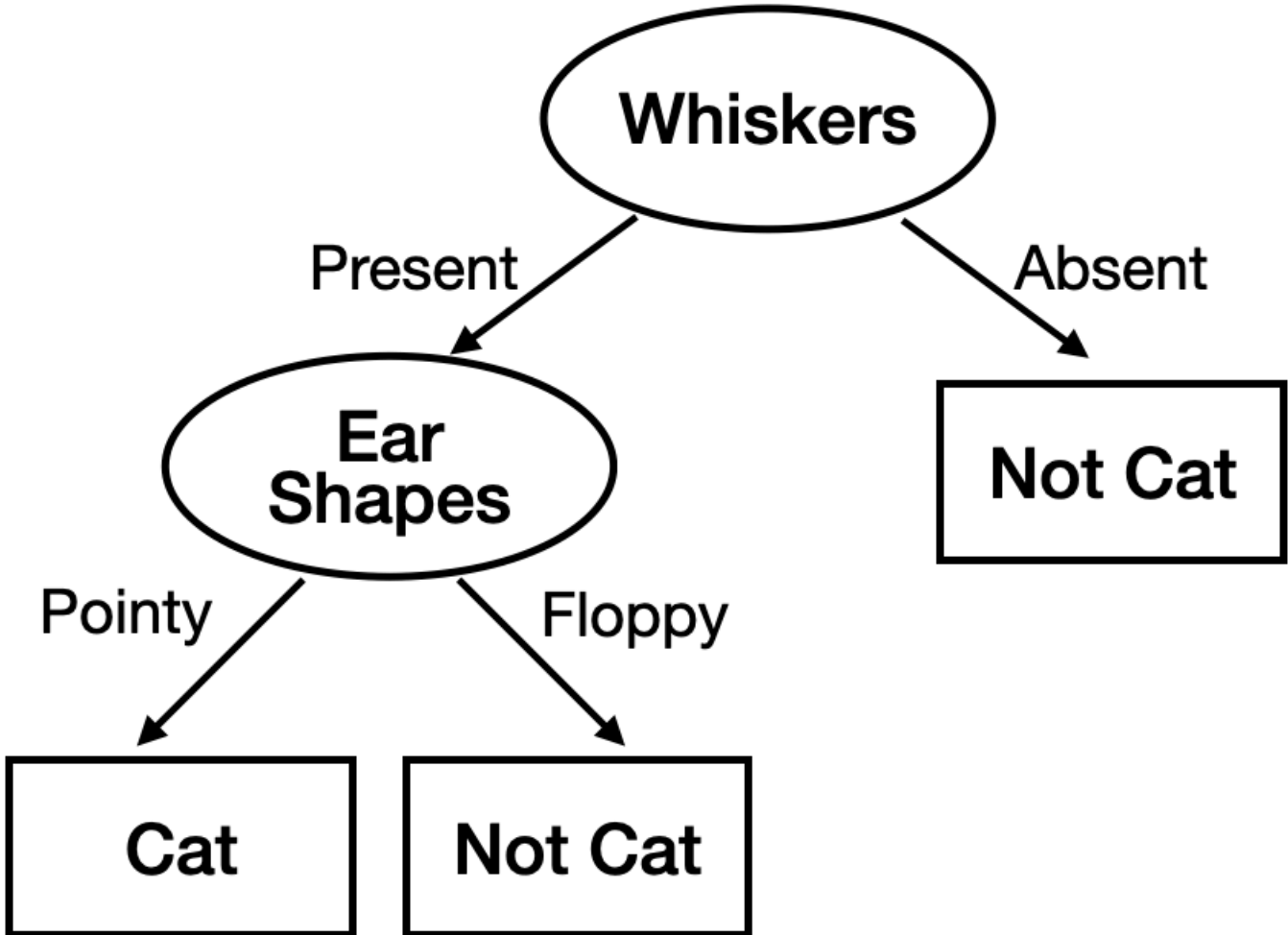
Face shape: Not Round

Whiskers: Present

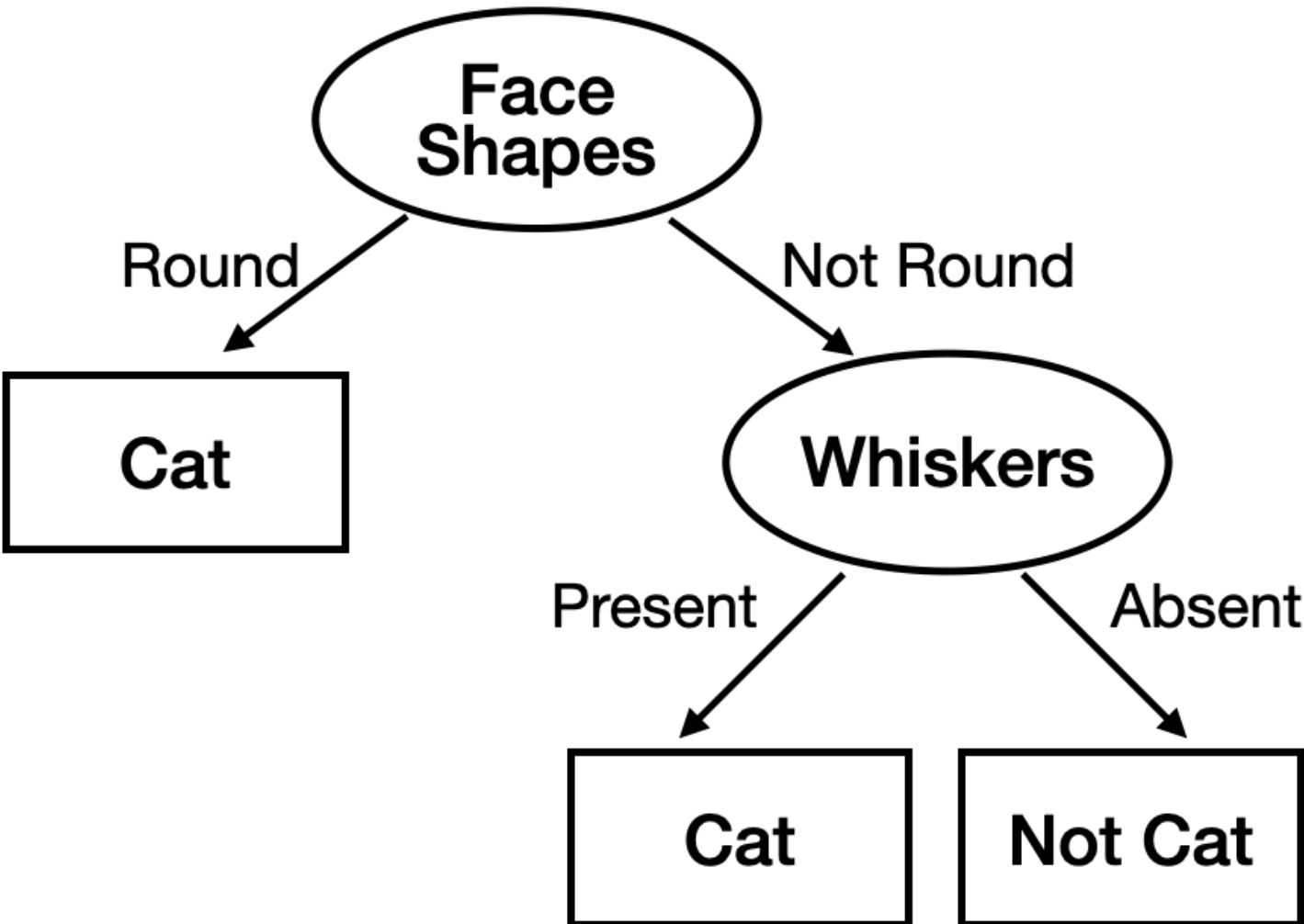
Tree A



Tree B



Tree C



Tree ensemble



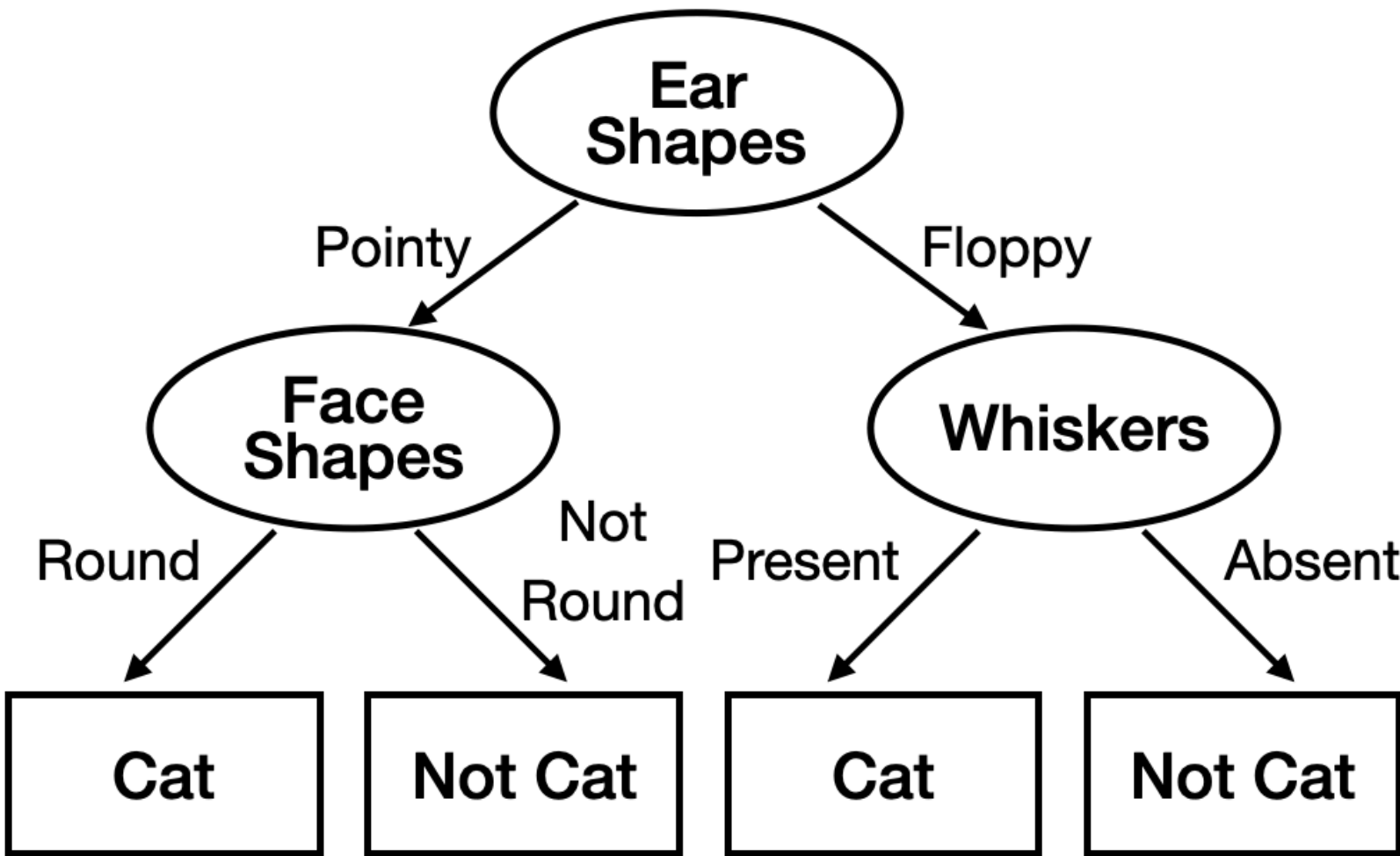
New cat

Ear shape: Pointy

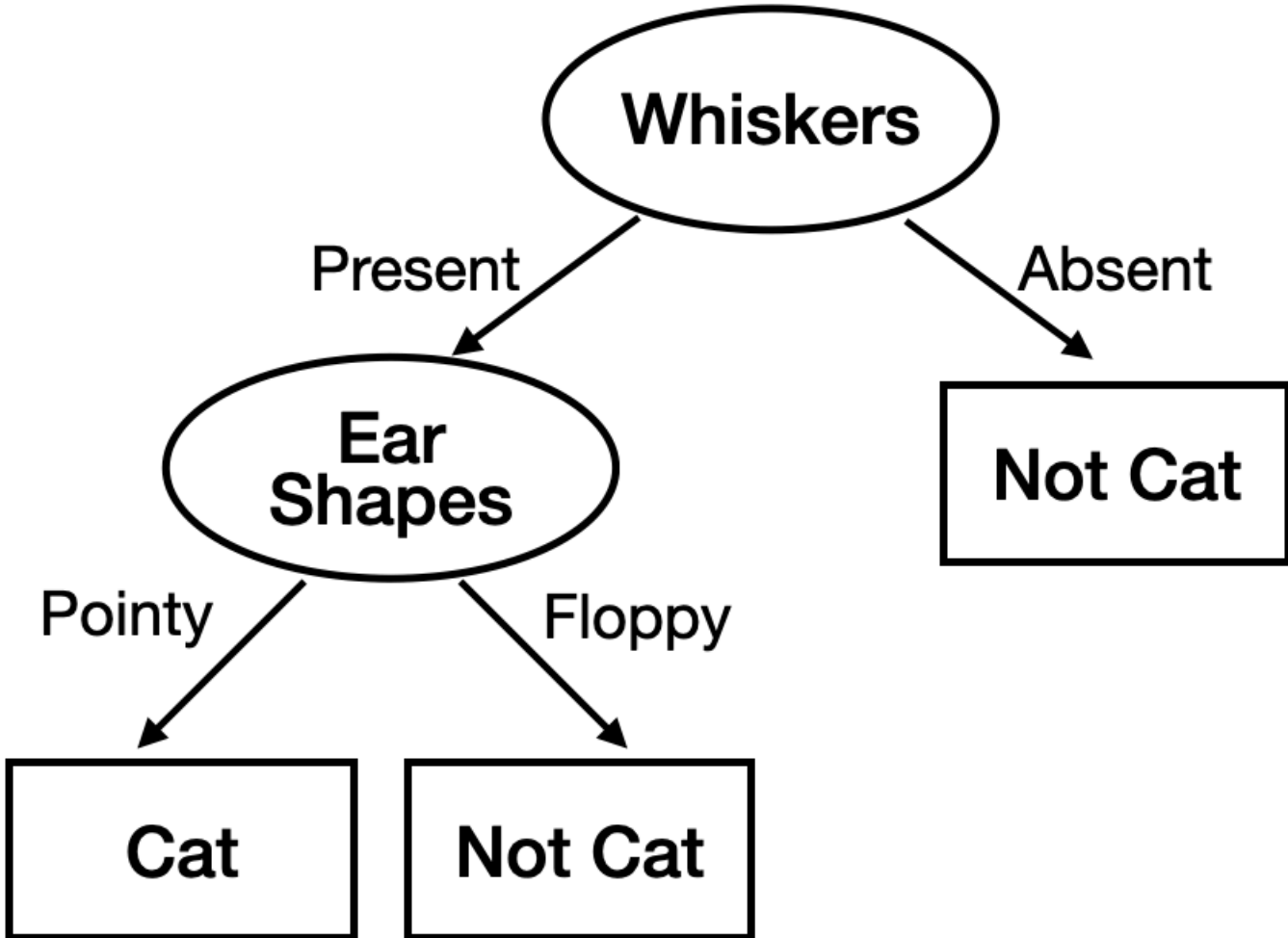
Face shape: Not Round

Whiskers: Present

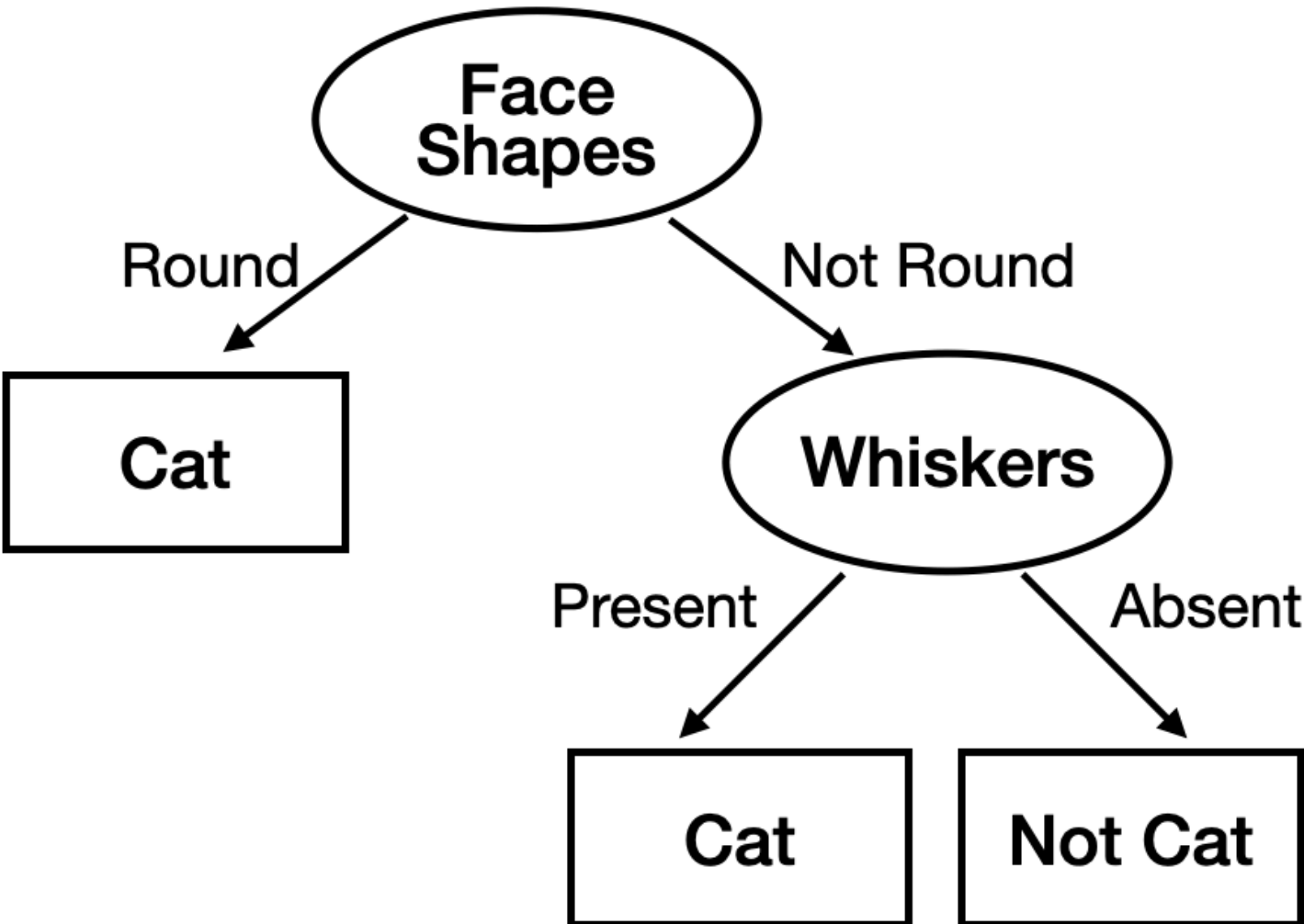
Tree A



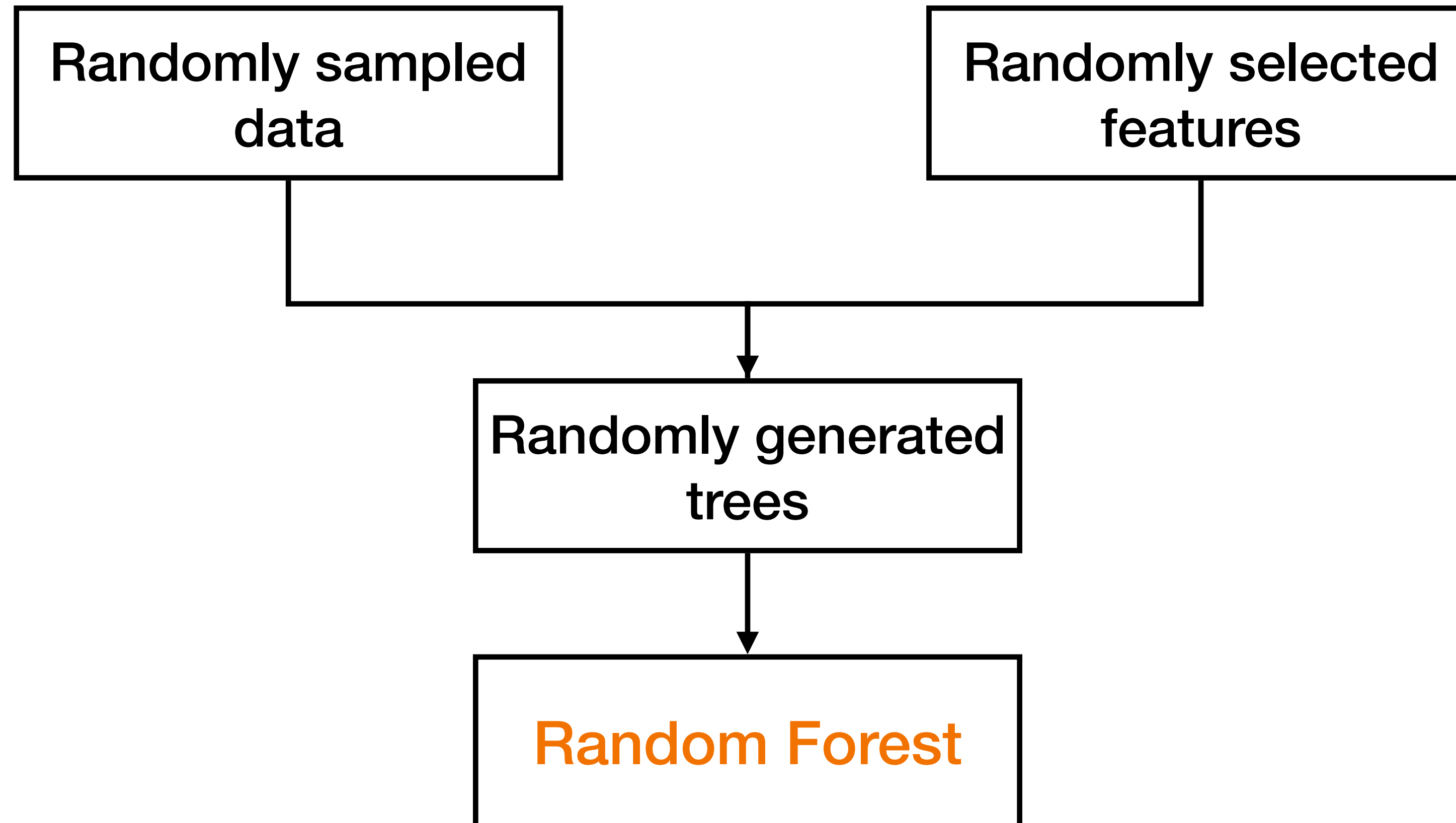
Tree B



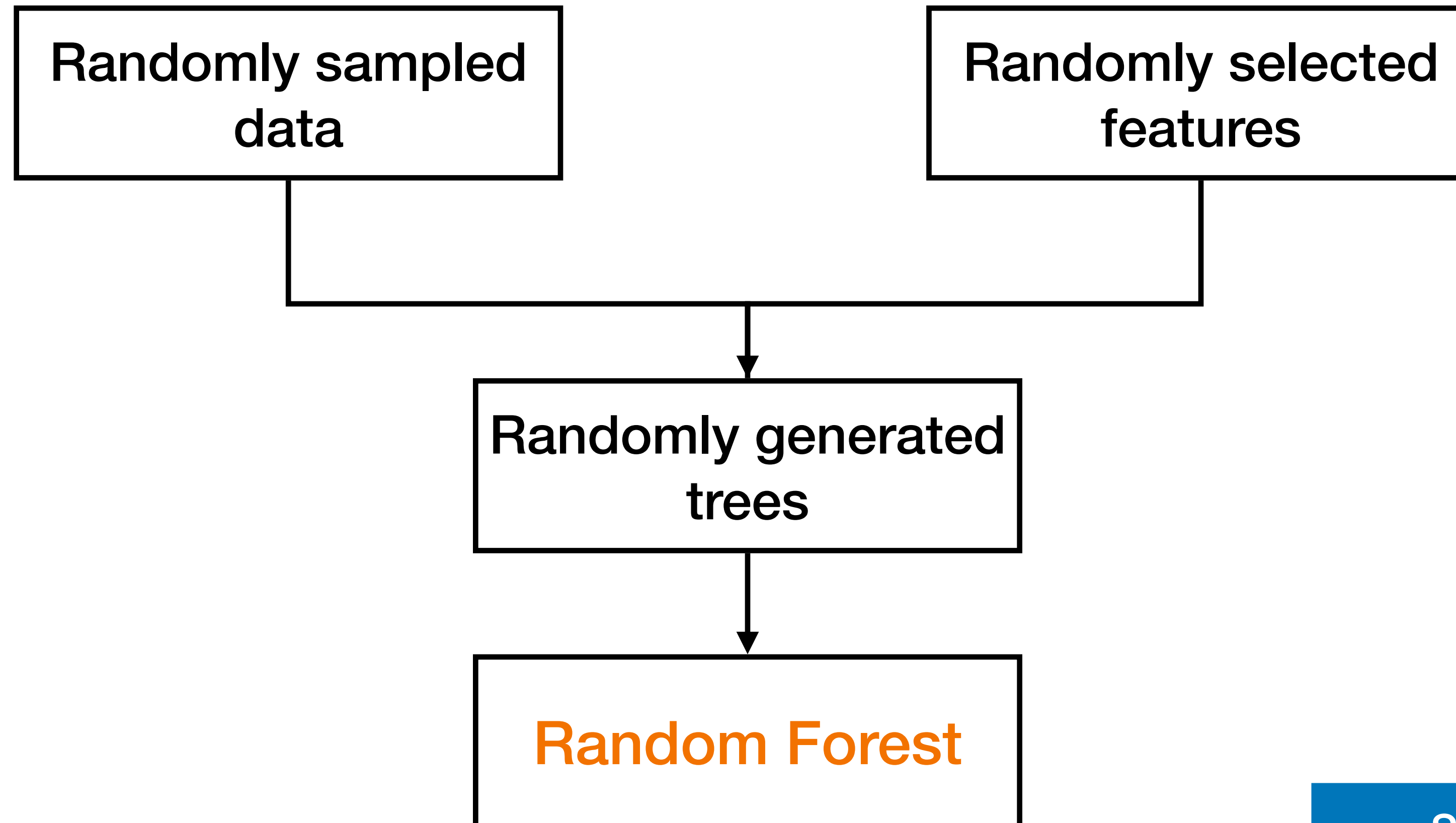
Tree C



Random Forest



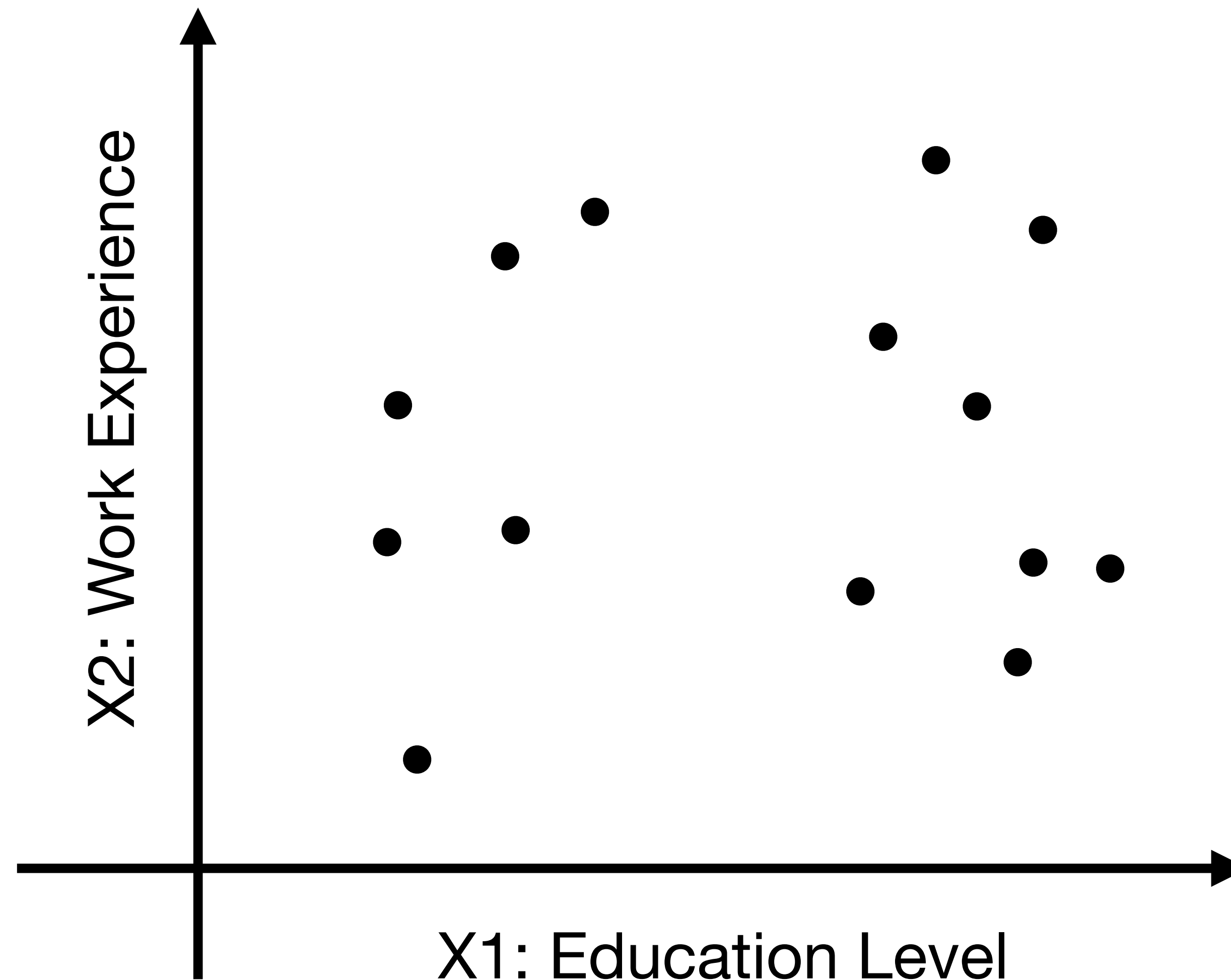
Random Forest



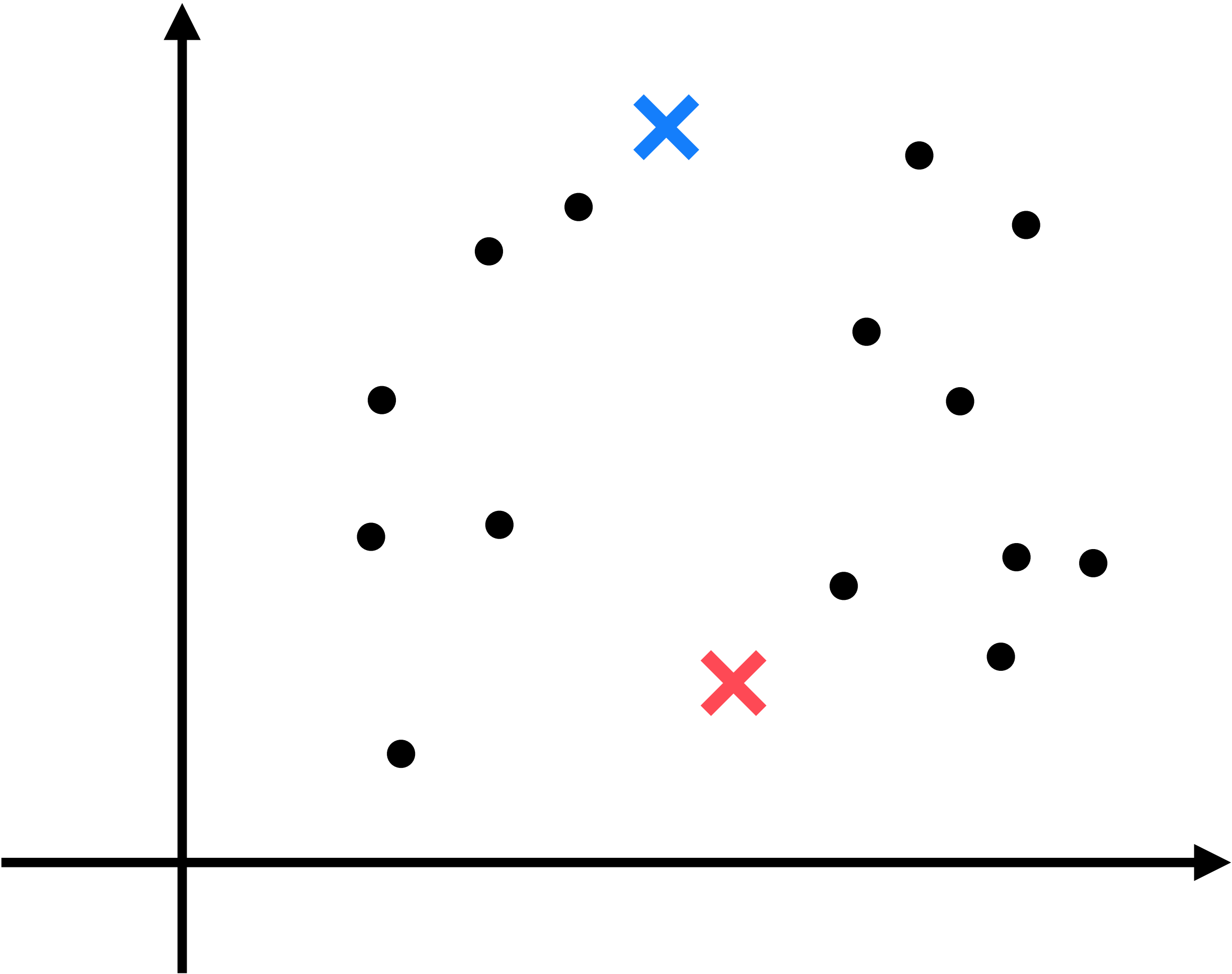
Clustering in Economics

- Uncover patterns
- Classify data into meaningful groups
- Enhance model fitting.
- Simplify complex economic phenomenon

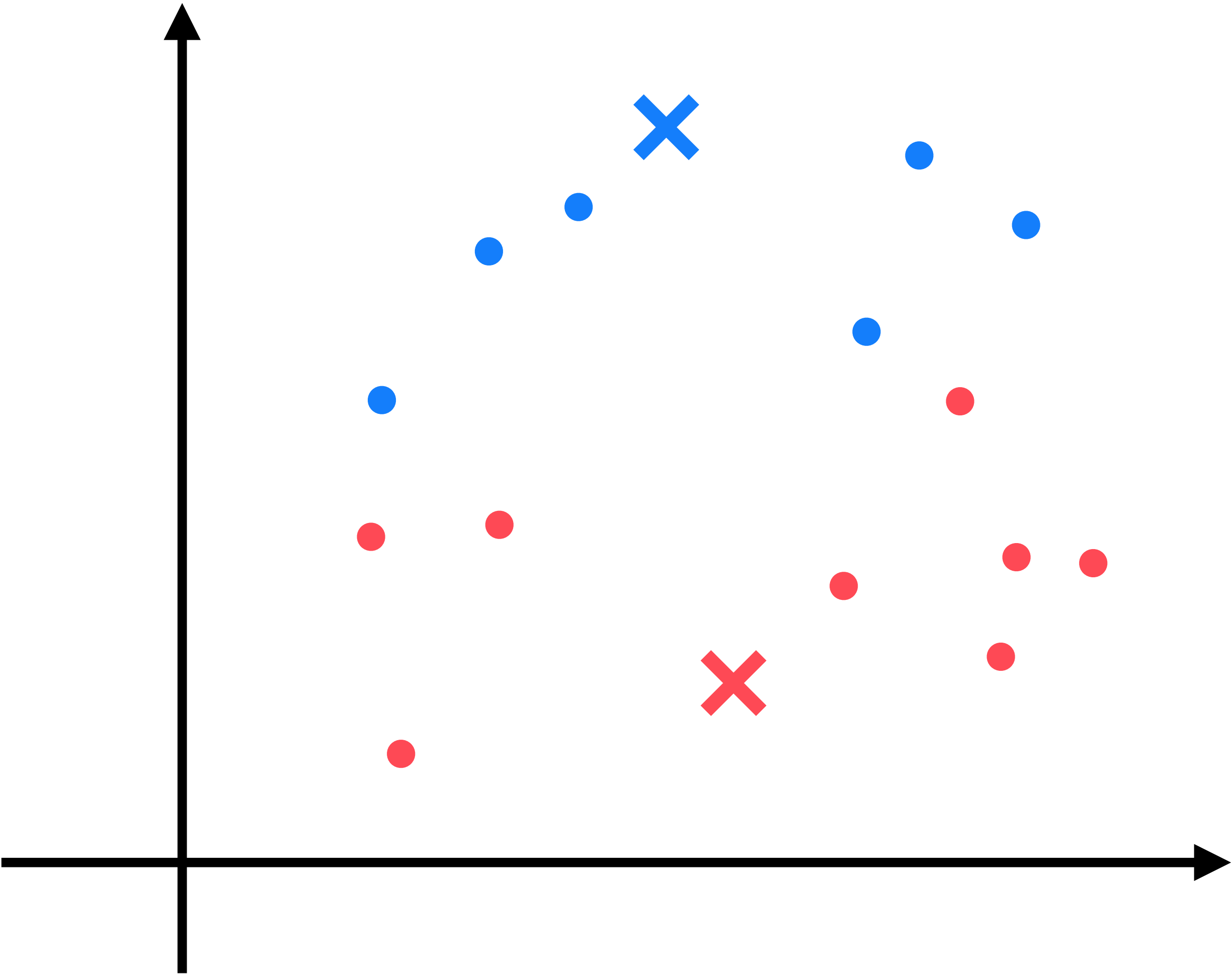
K-means clustering



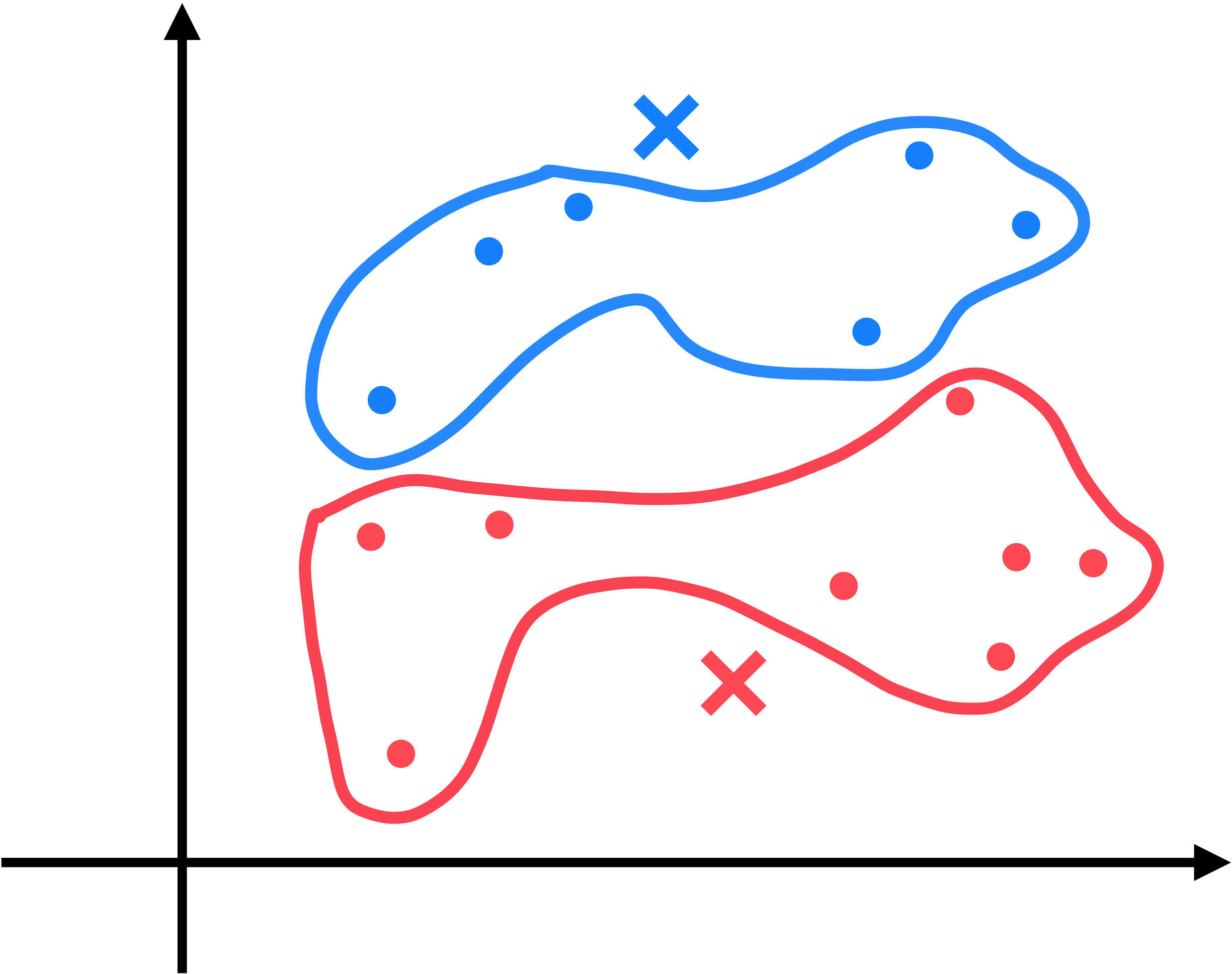
K-means clustering



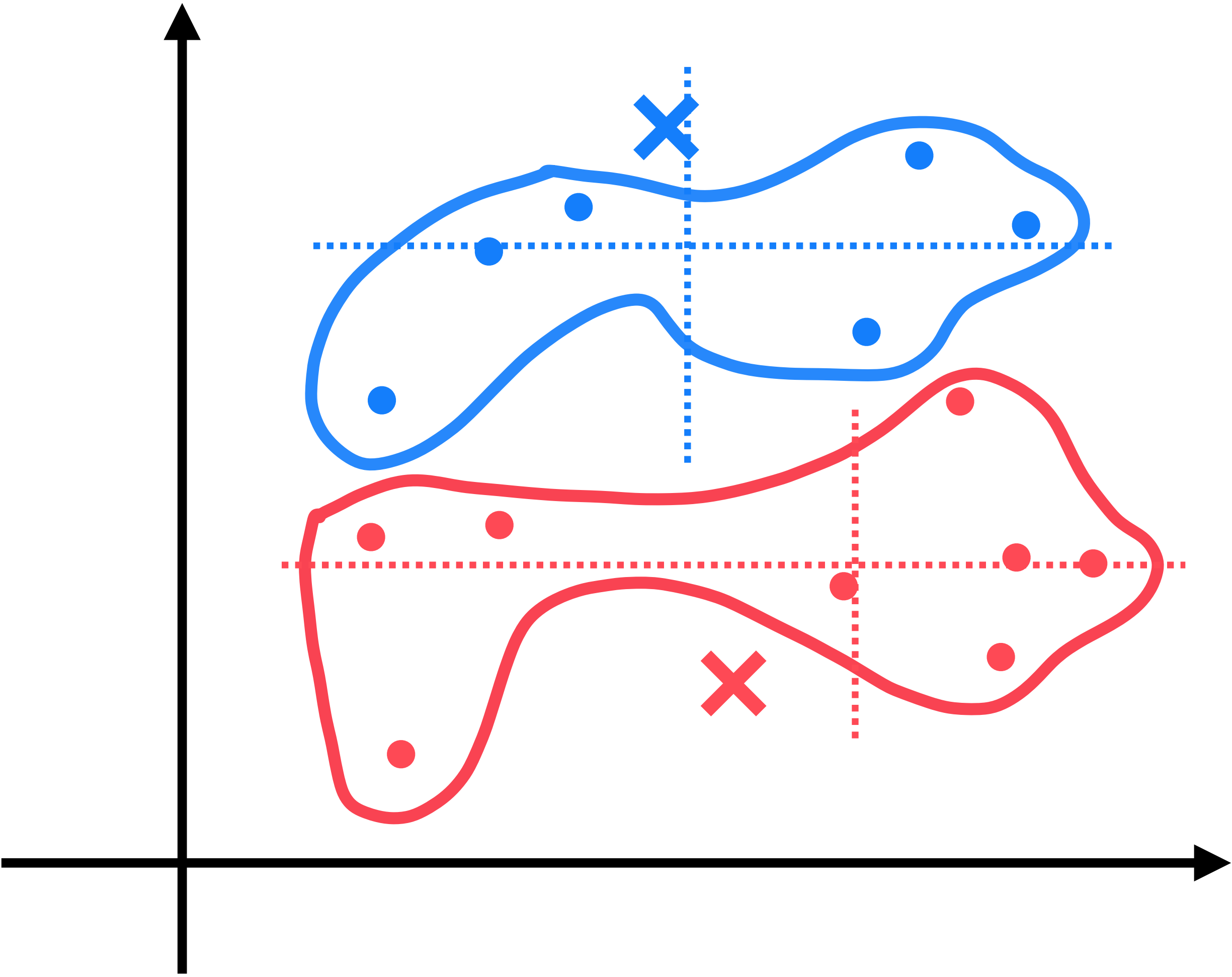
K-means clustering



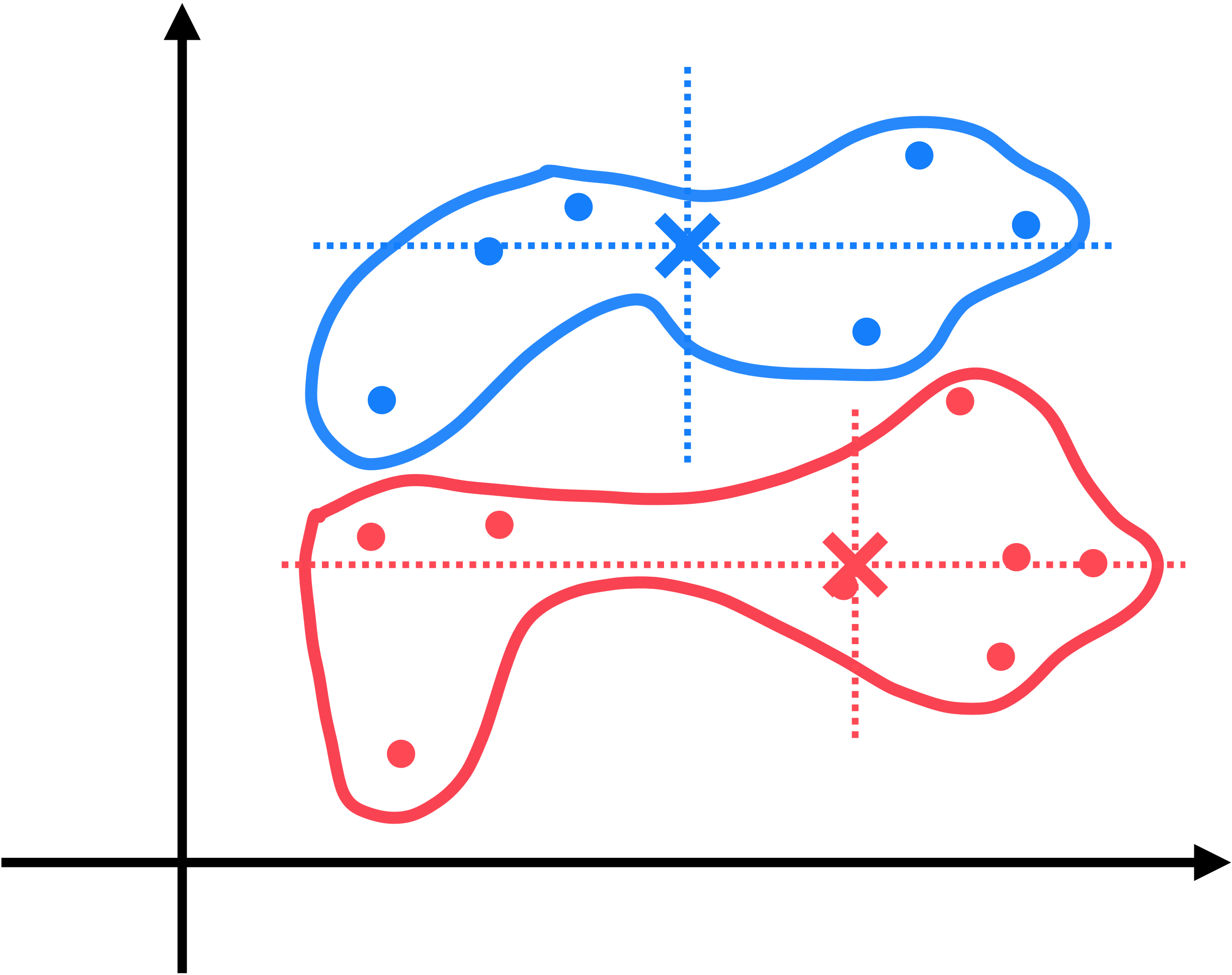
K-means clustering



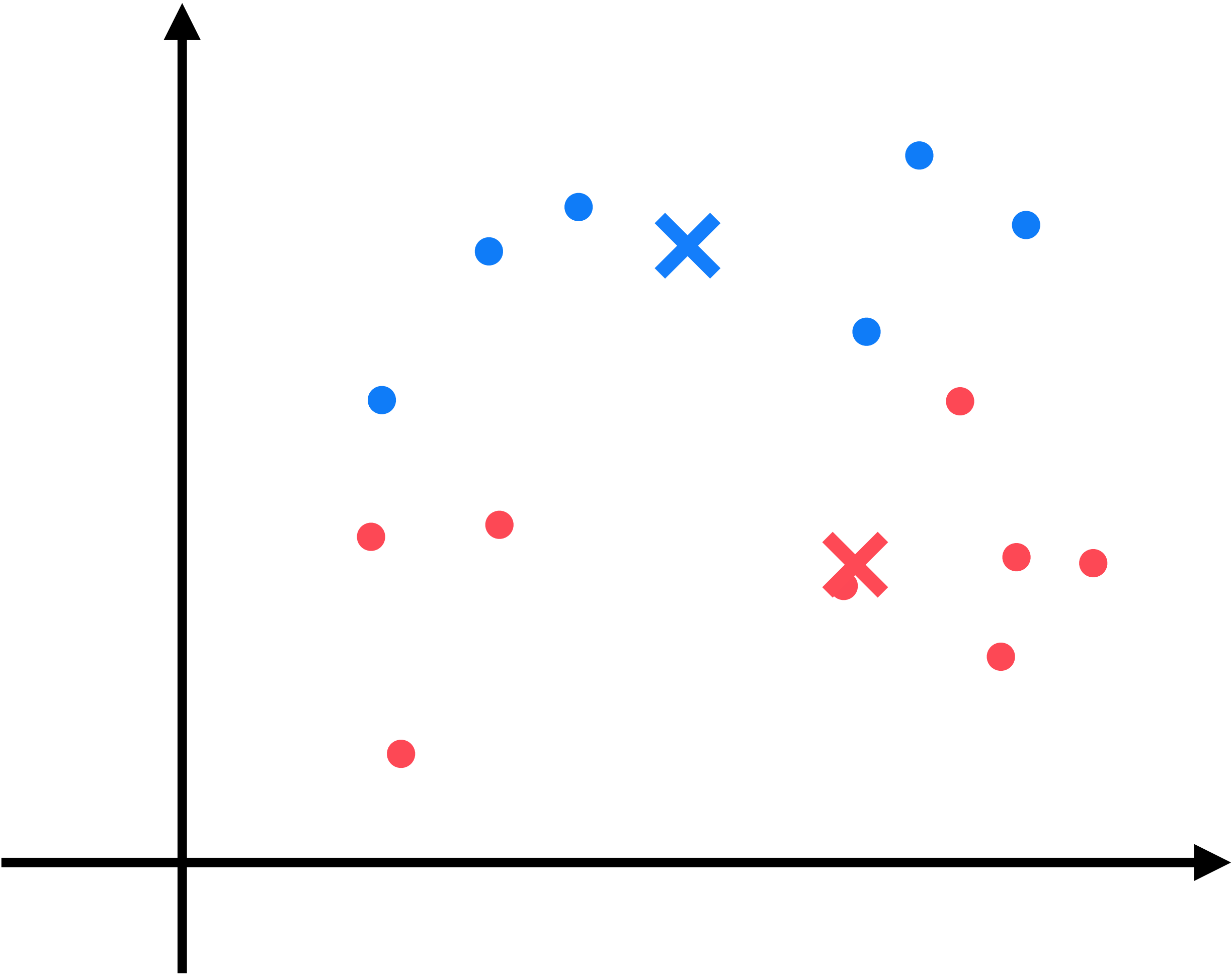
K-means clustering



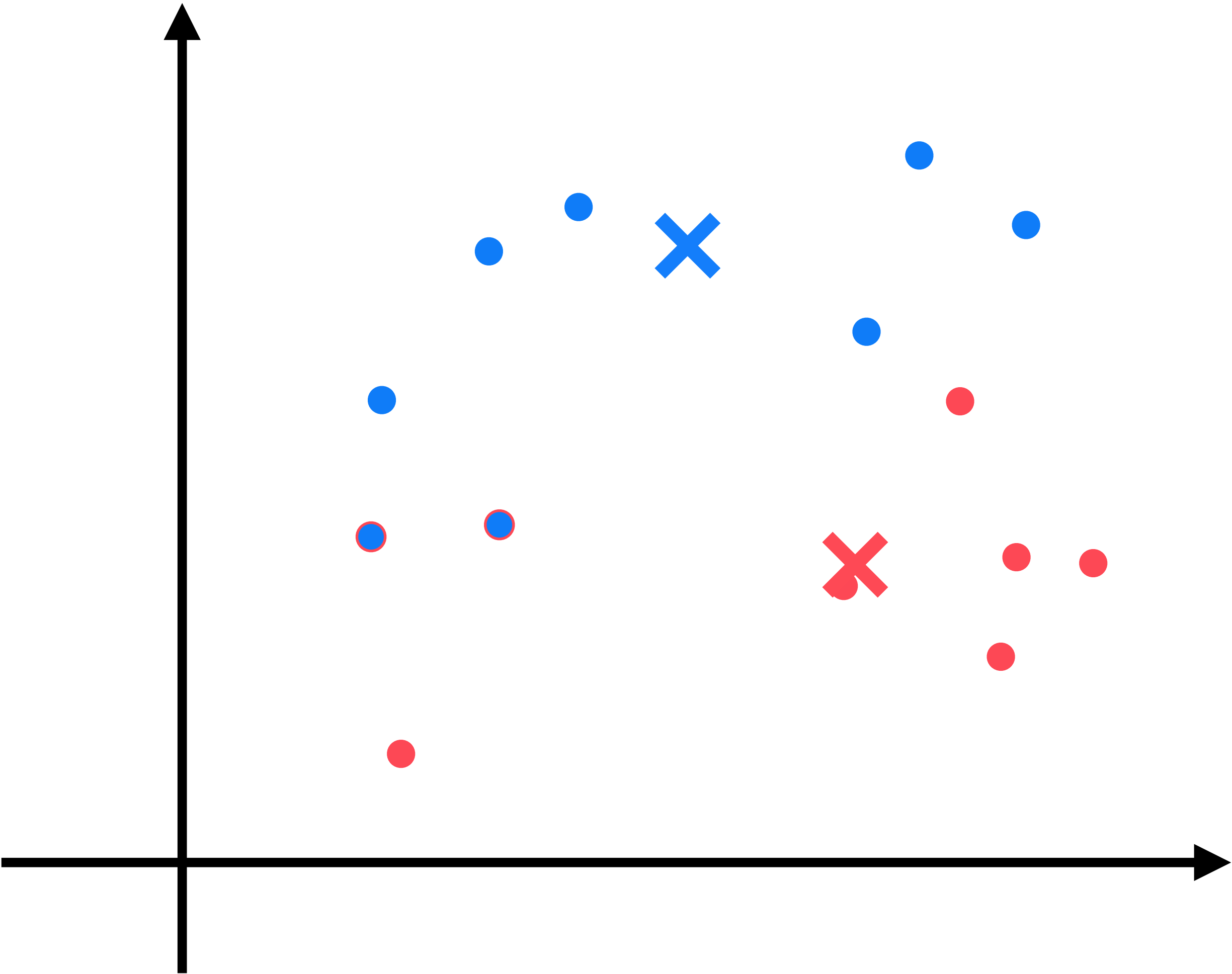
K-means clustering



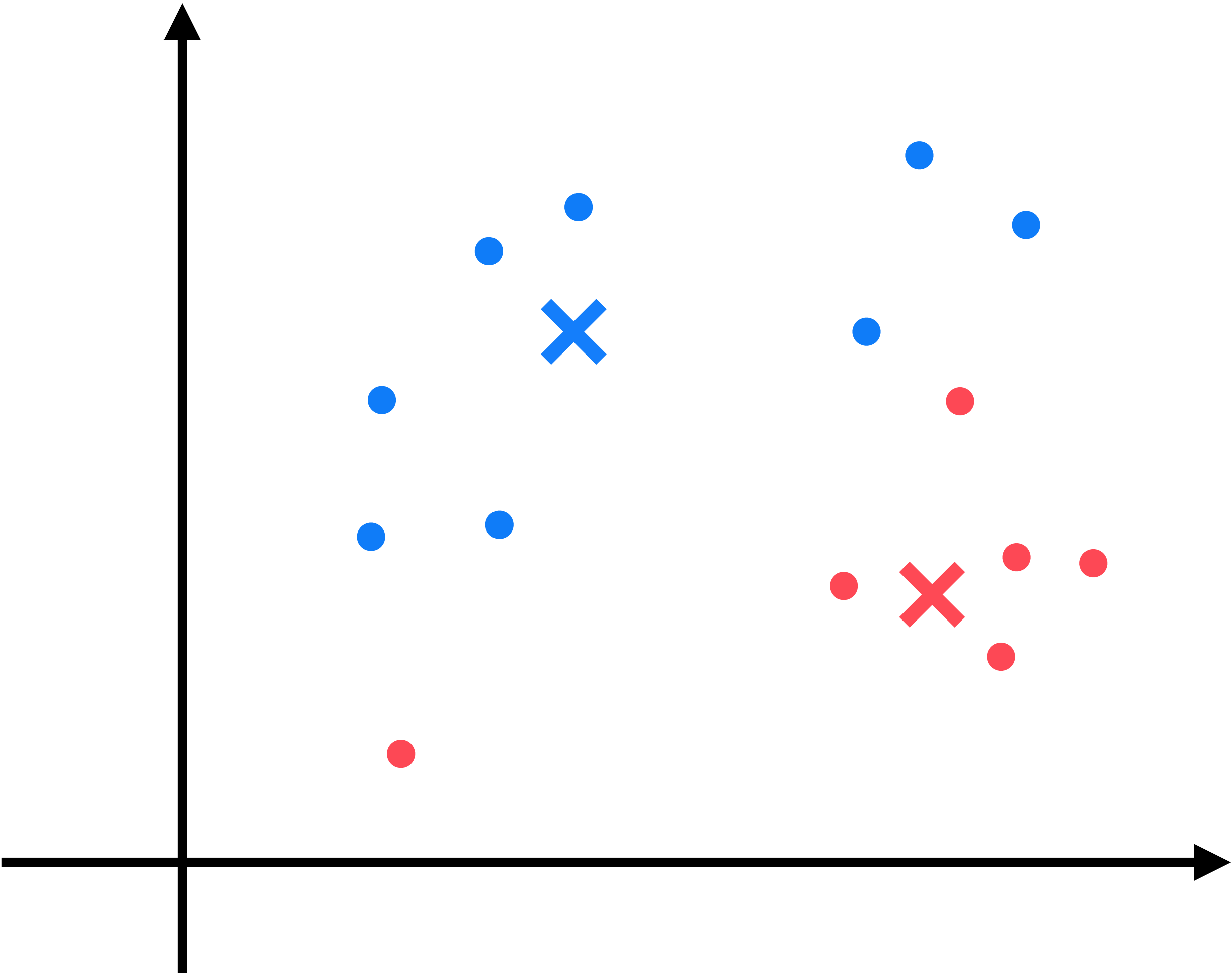
K-means clustering



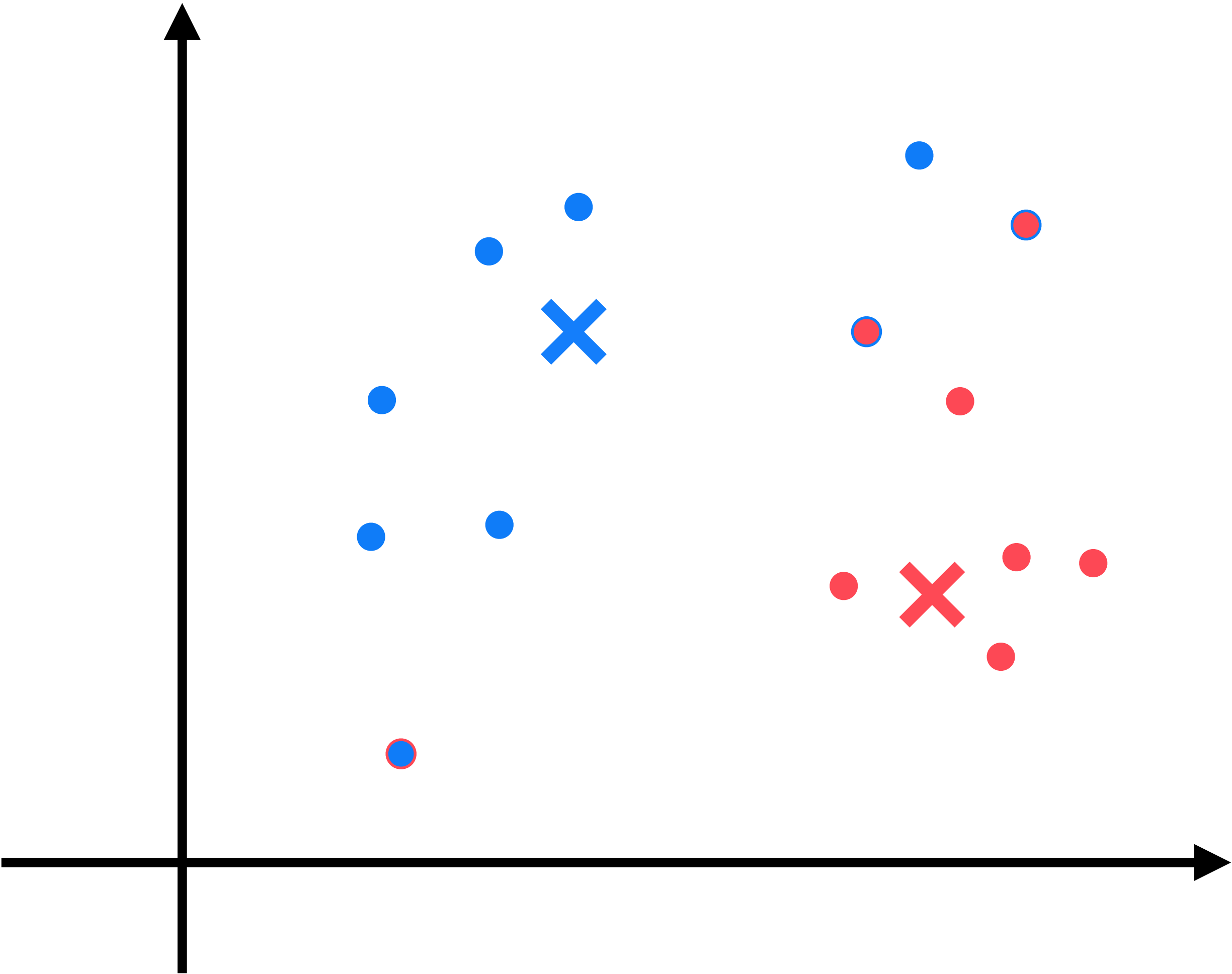
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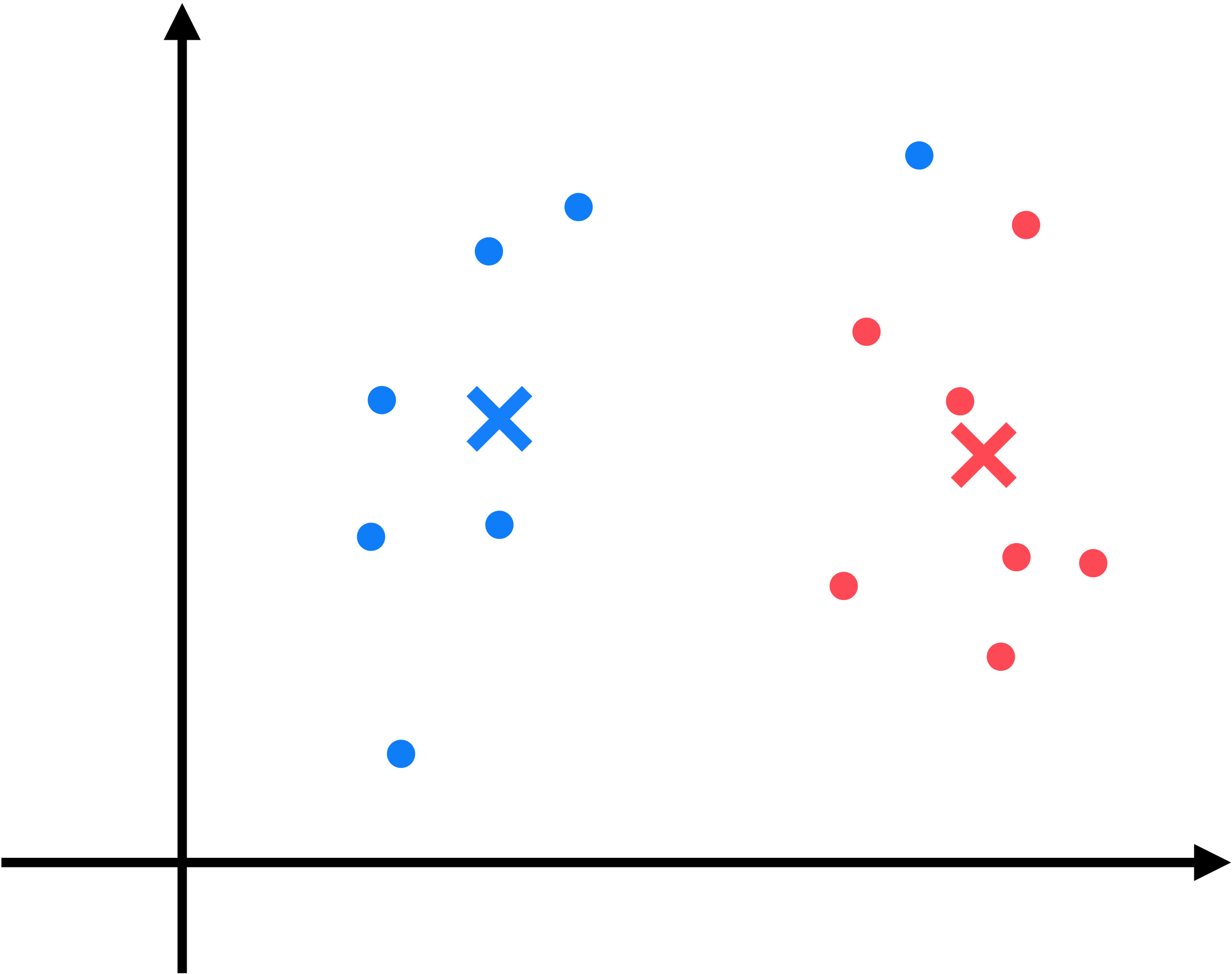
K-means clustering



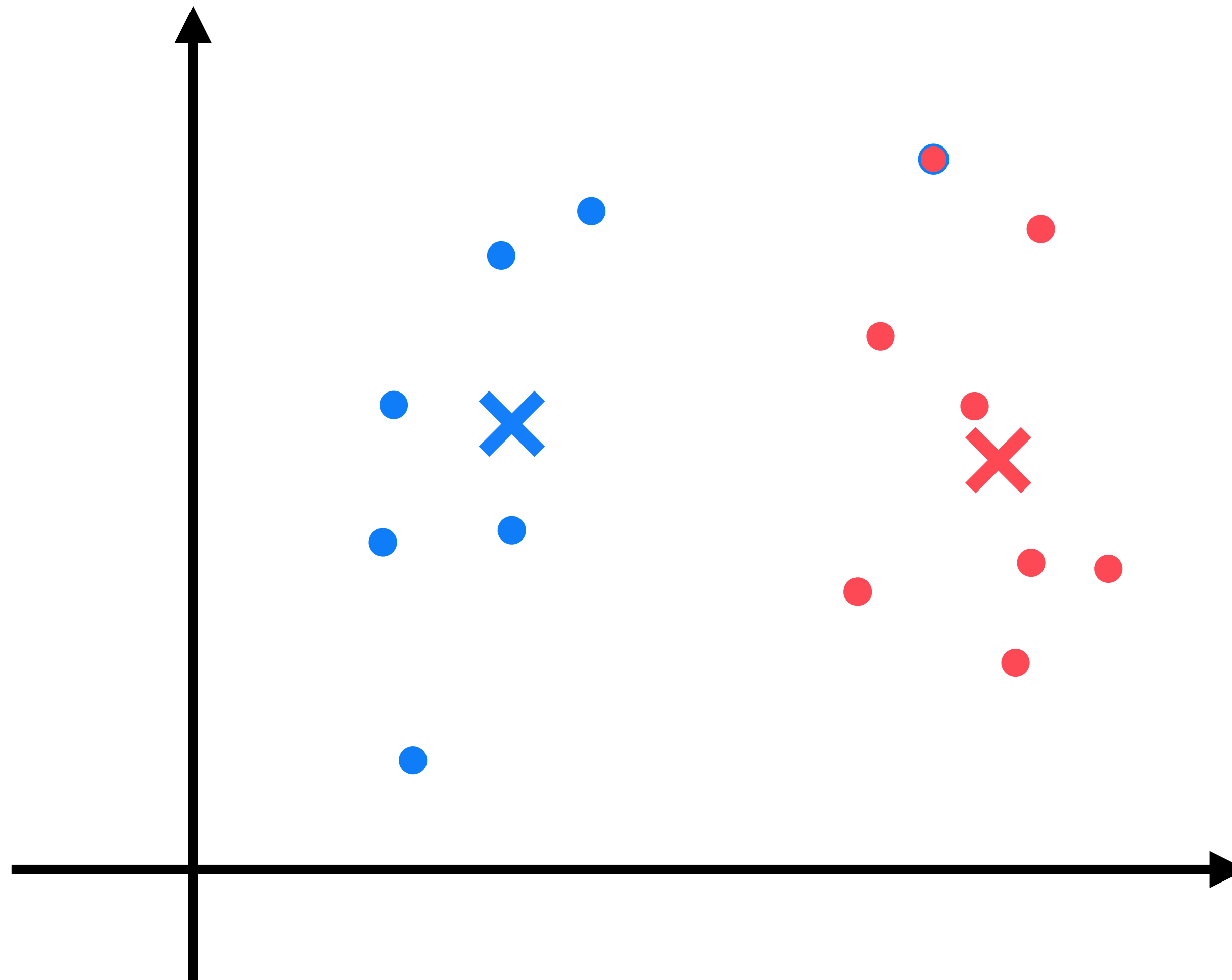
K-means clustering



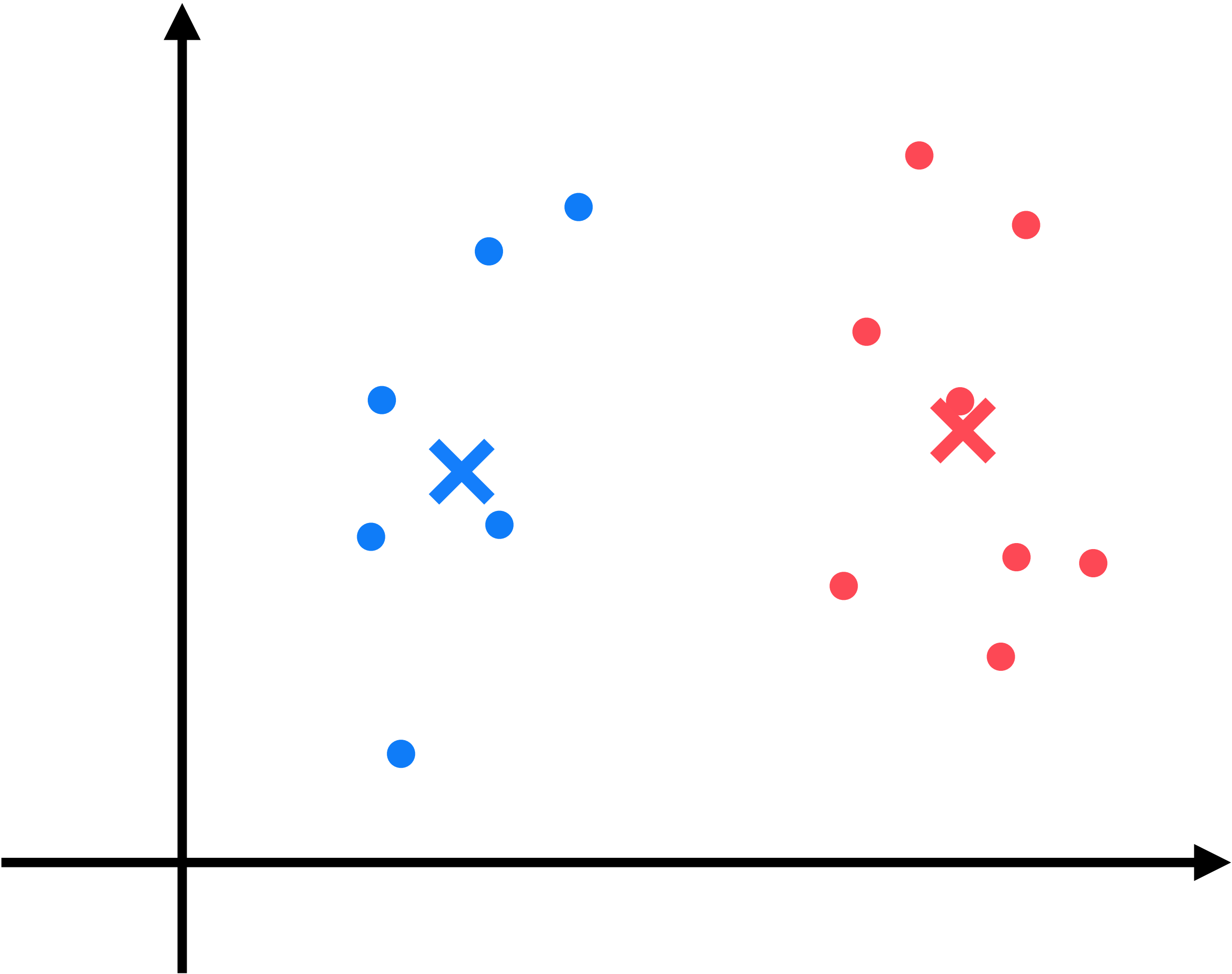
K-means clustering



K-means clustering



K-means clustering



K-means clustering

