

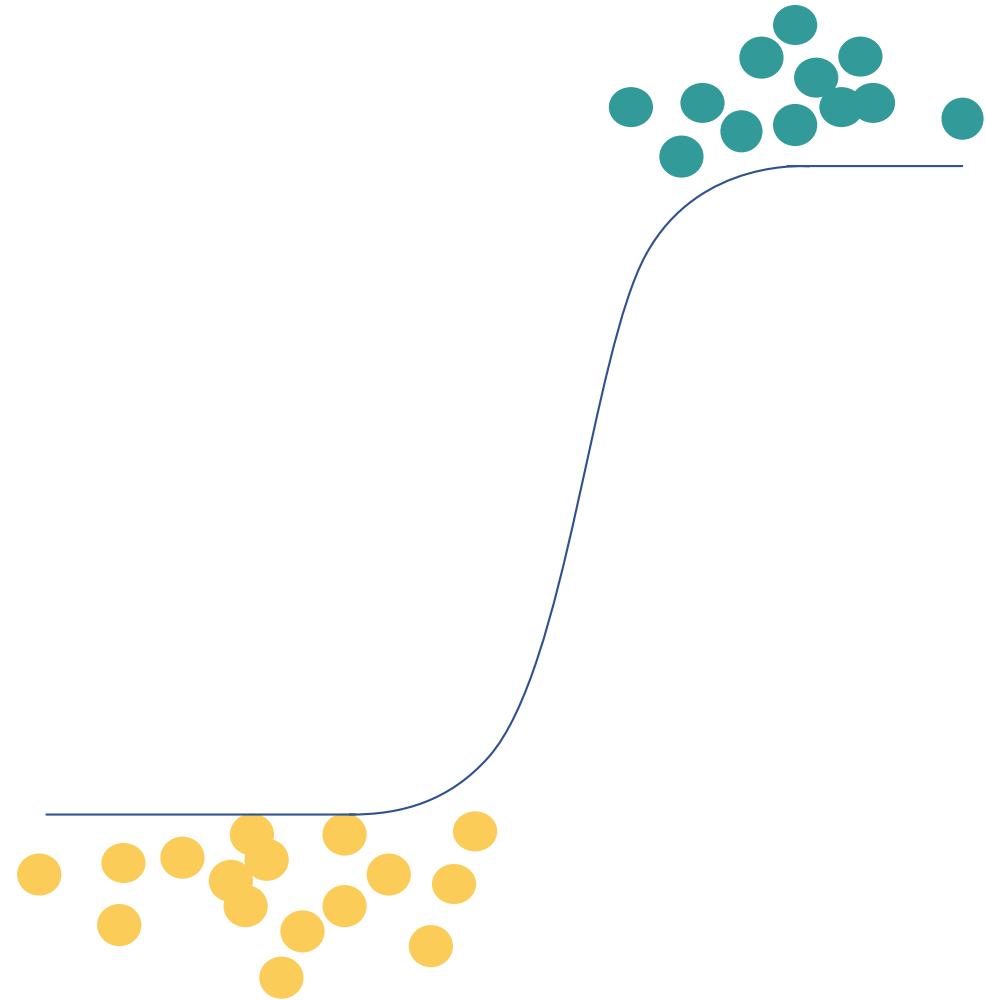
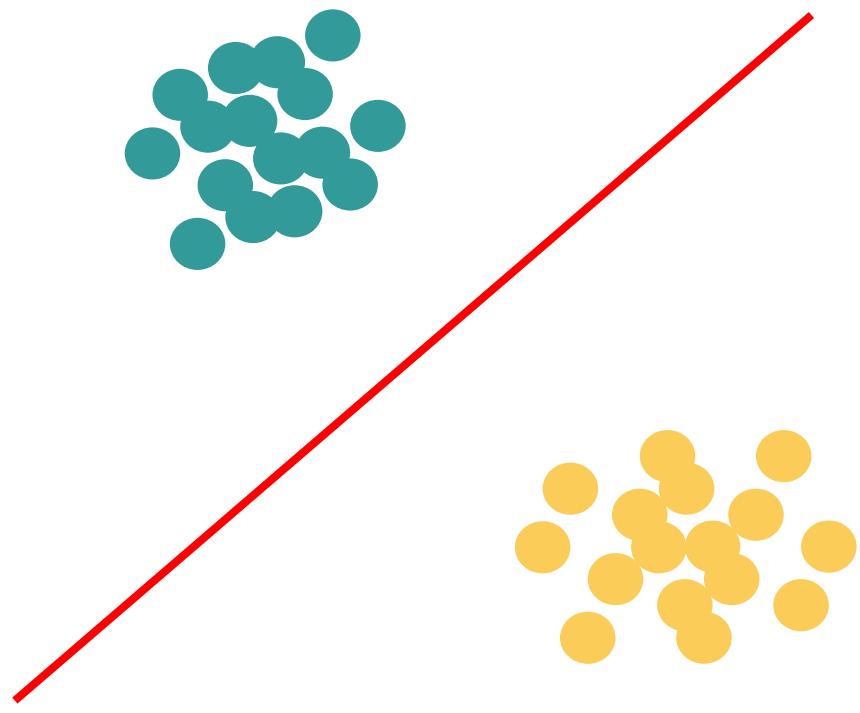
# Applied Machine Learning Classification: Recap

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# What we have learnt

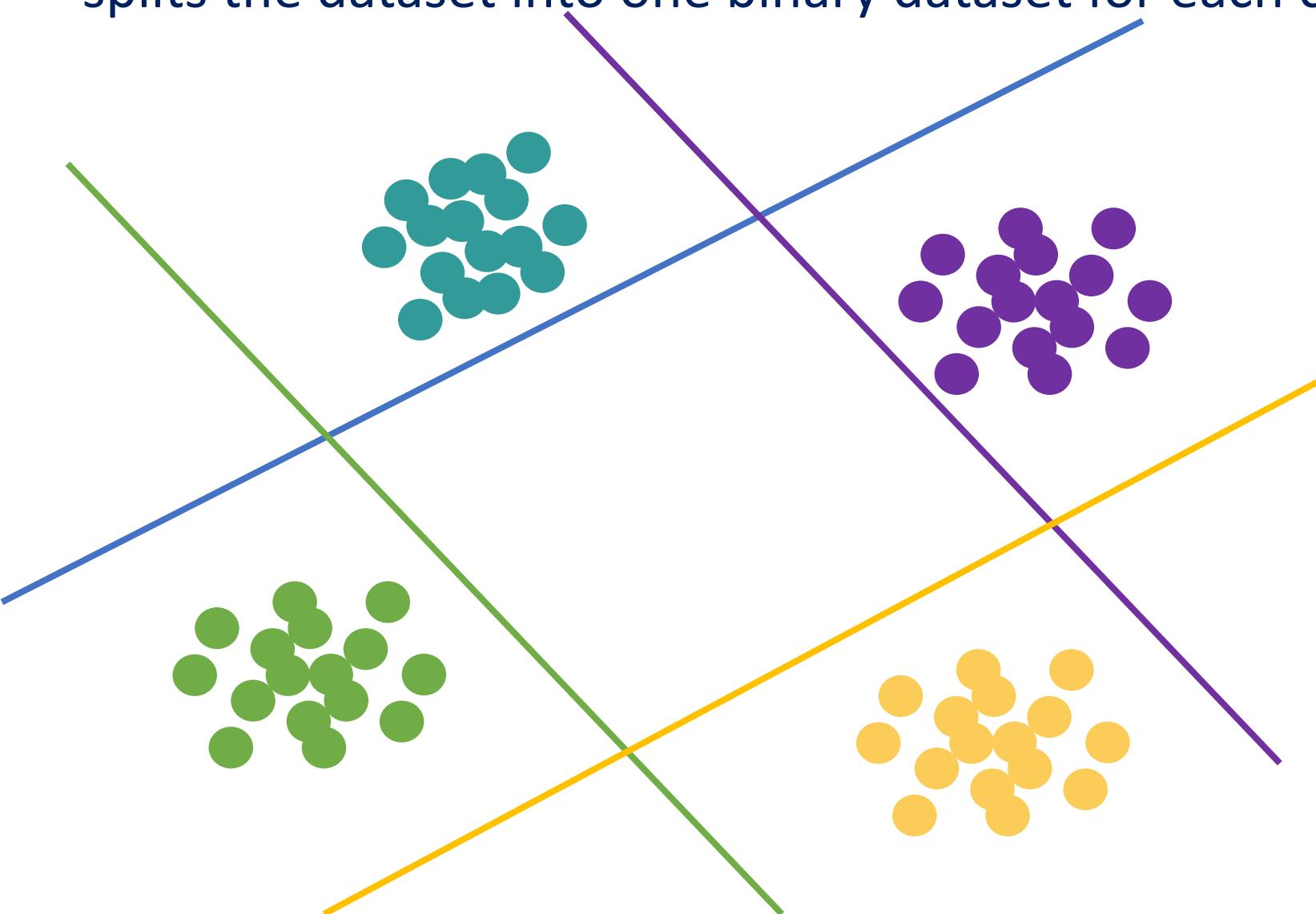
- **Week 1**
  - Introduction to Python
  - Intermediate Python
  - Introduction to Machine Learning
  - Introduction to ML Models
  - ML Fairness
  
- **Week 2**
  - Introduction to Colab
  - Introduction to Pandas
  - Intermediate Pandas
  - Visualizing and Acquiring Data
  - Exploratory Data Analysis
  - Project #1 - Project Data Processing
  
- **Week 3**
  - Introduction to Regression
  - Introduction to scikit-learn
  - Regression Quality
  - Polynomial Regression
  - Introduction to Tensorflow
  - Linear Regression with Tensorflow
  - Neural Networks
  - Project #2 - Regression Project
  
- **Week 4**
  - Introduction to Classification
  - Classification with Tensor-flow
  - Multiclass Classification
  - Project #3 - Classification Project
  - Image-Video Classification
  - Saving and Loading Models
  - **Project #4**

# Binary- Classification



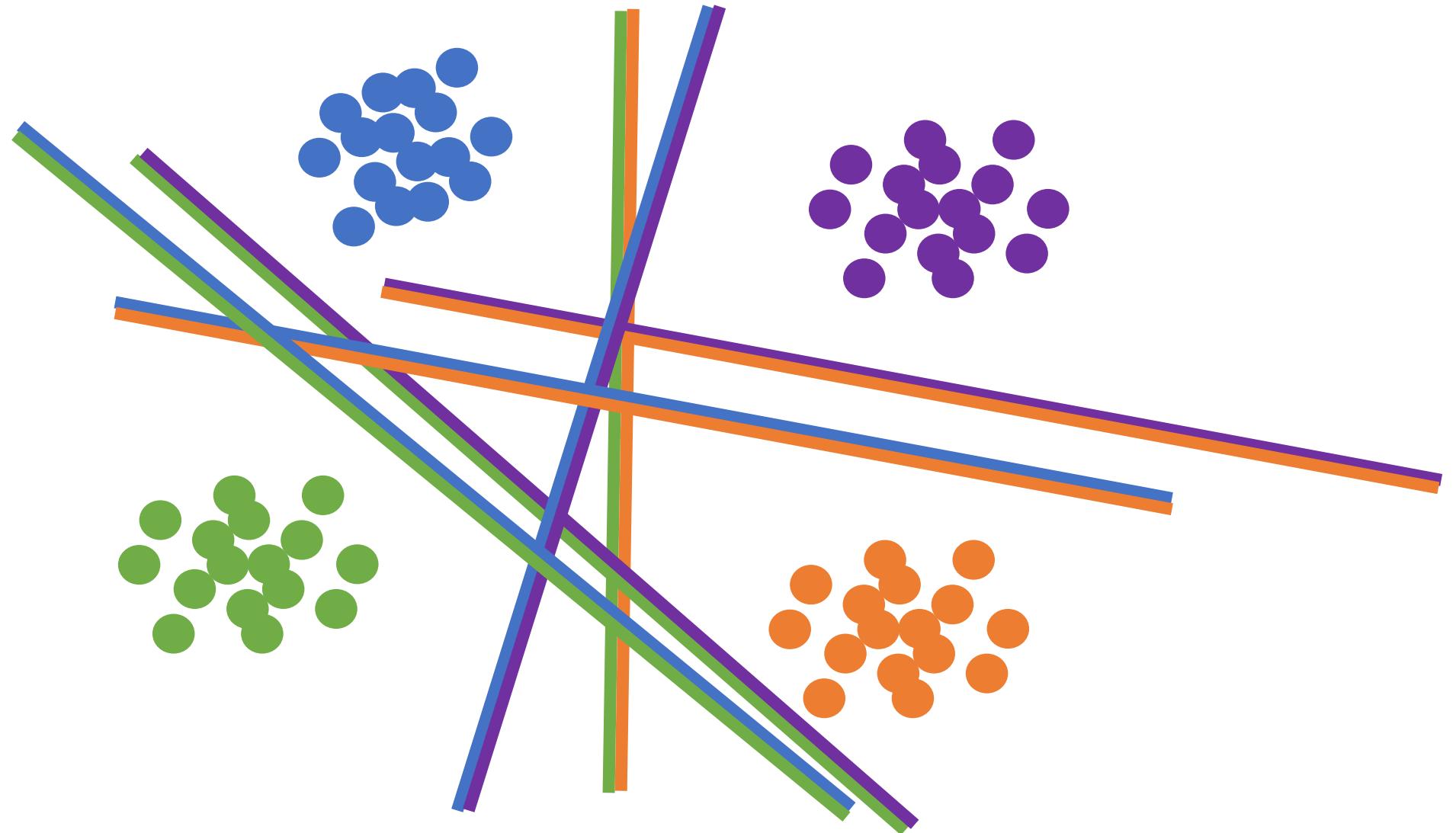
# Multiclass Classification: OvA

splits the dataset into one binary dataset for each class



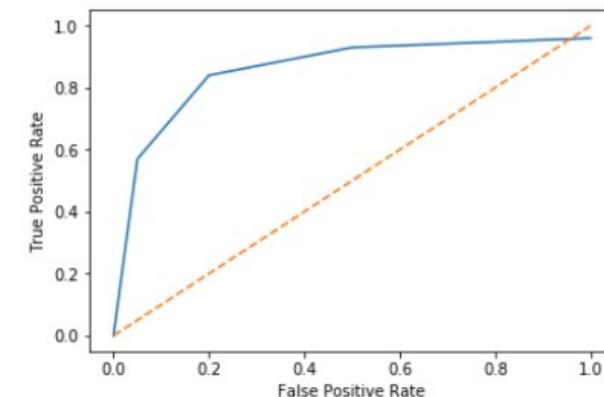
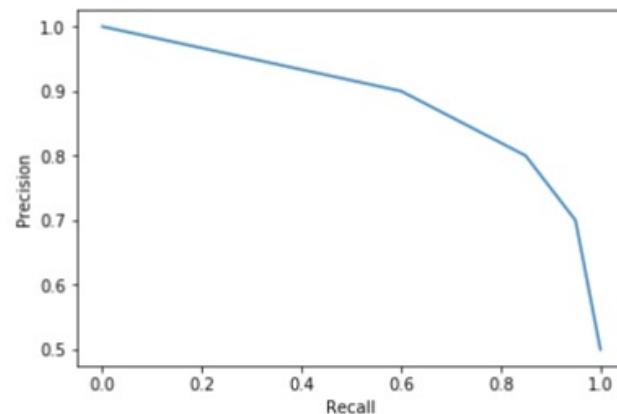
# Multiclass Classification: OvO

splits the dataset into one dataset for each class versus every other class

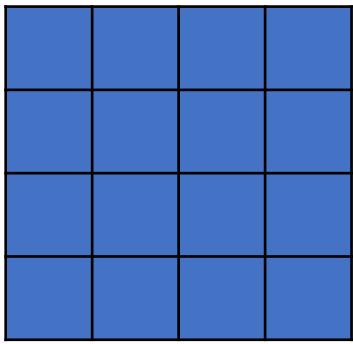


# Classification Performance: Recap

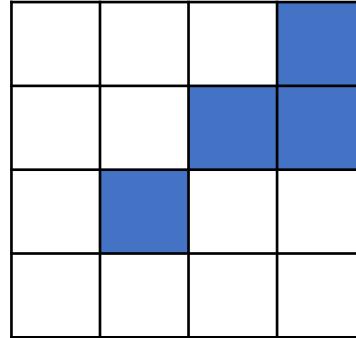
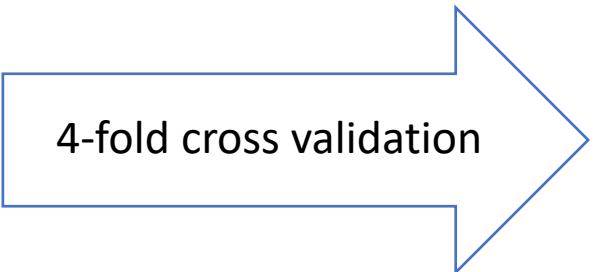
Accuracy	Precision	Recall	F1
<p>number of predictions that the classifier got <u>correct</u></p> $\frac{TP + TN}{TP + TN + FP + FN}$ <p>the total number of predictions made</p>	<p>True positive: correct positive case prediction</p> $\frac{TP}{TP + FP}$ <p>all positive case predictions</p>	<p>True positive: correct positive case prediction</p> $\frac{TP}{TP + FN}$ <p>all actual positive</p>	$\frac{TP}{TP + \frac{FN + FP}{2}}$



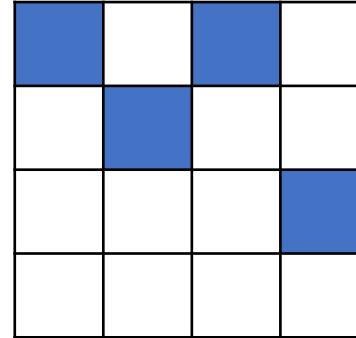
# Cross Fold-validation



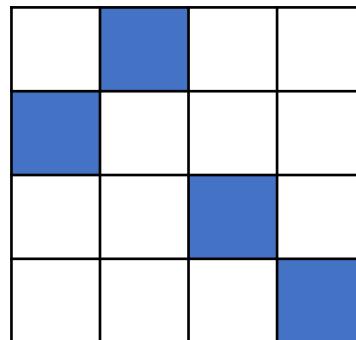
16 samples (data points)



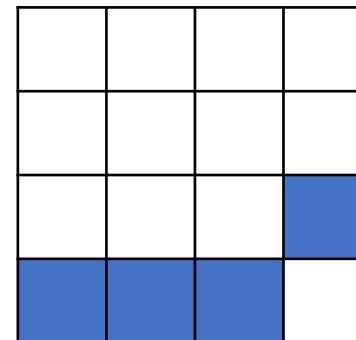
Fold 1



Fold 2



Fold 3



Fold 4

**Model 1:** Train on Fold 1 + Fold 2 + Fold 3. Test on Fold 4

**Model 2:** Train on Fold 1 + Fold 2 + Fold 4. Test on Fold 3

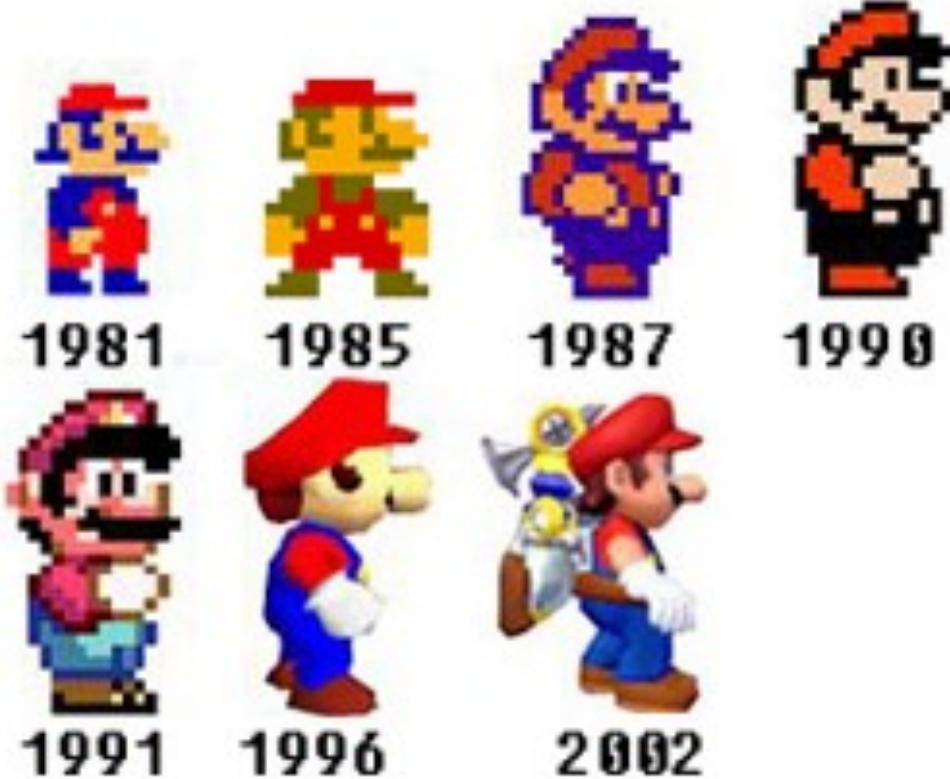
**Model 3:** Train on Fold 1 + Fold 3 + Fold 4. Test on Fold 2

**Model 4:** Train on Fold 2 + Fold 3 + Fold 4. Test on Fold 1

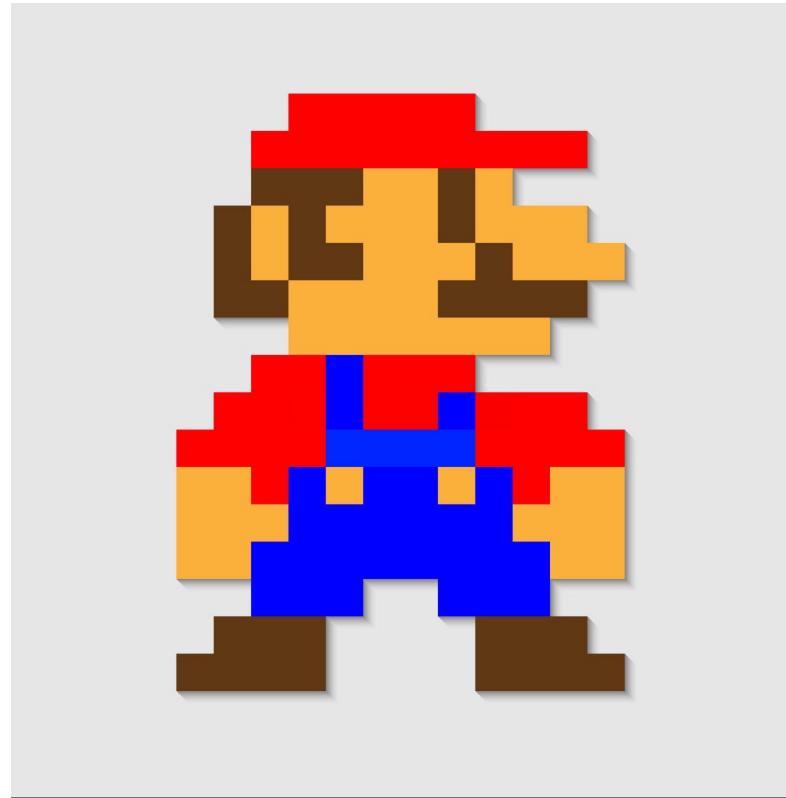
# Lab - Tabular Data

- Iris Dataset
- Wine Dataset
- UCI Heart Disease

# Image - Pixel

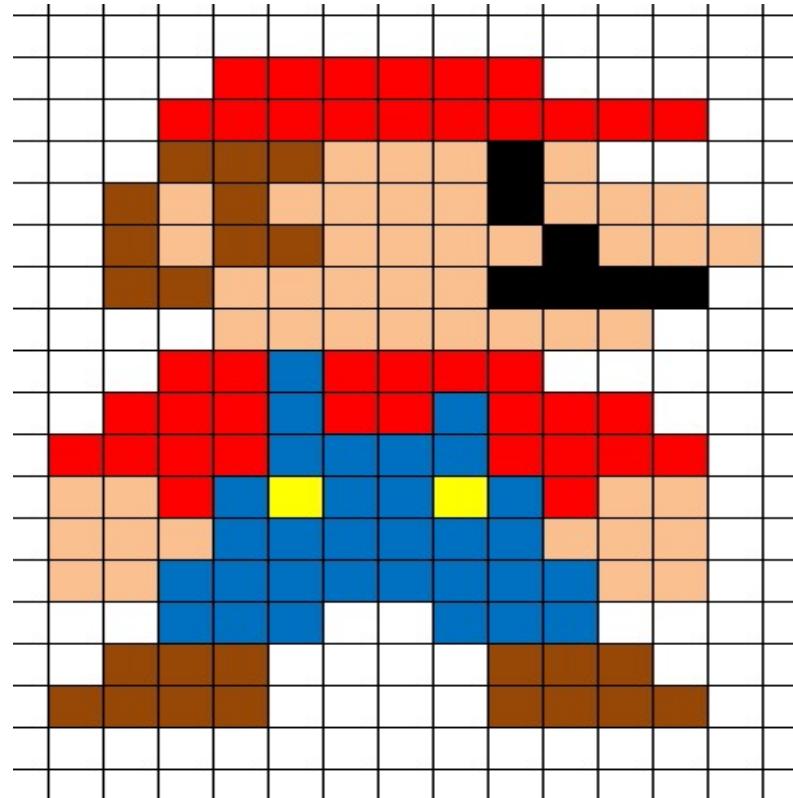


# Image - Pixel

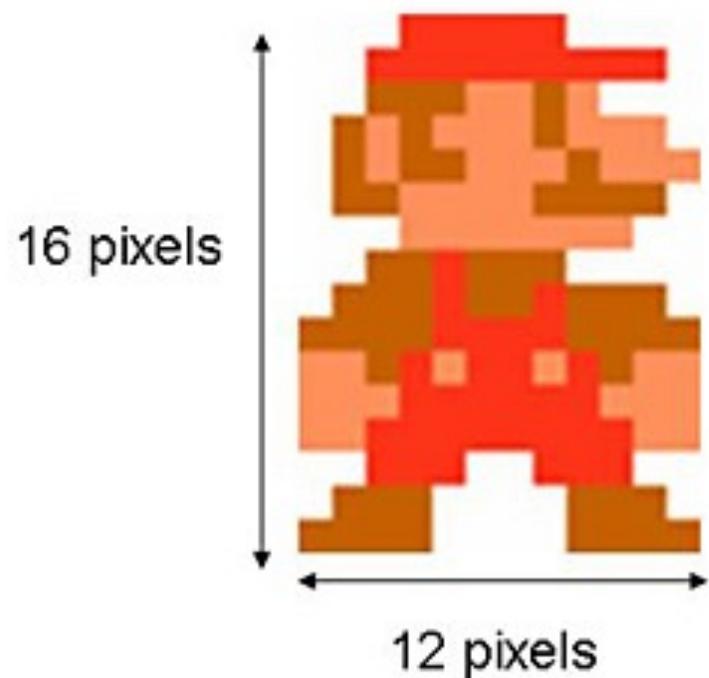


# Image - Pixel

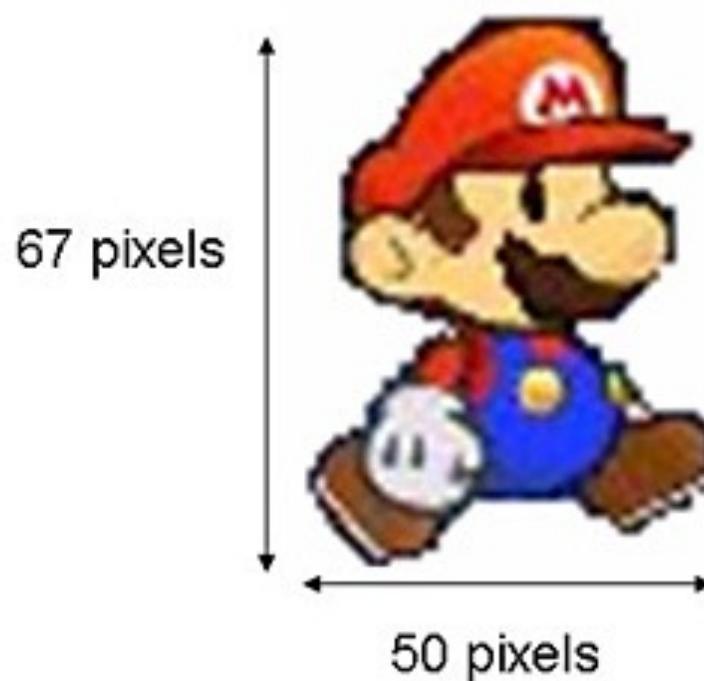
16 x 16 pixels



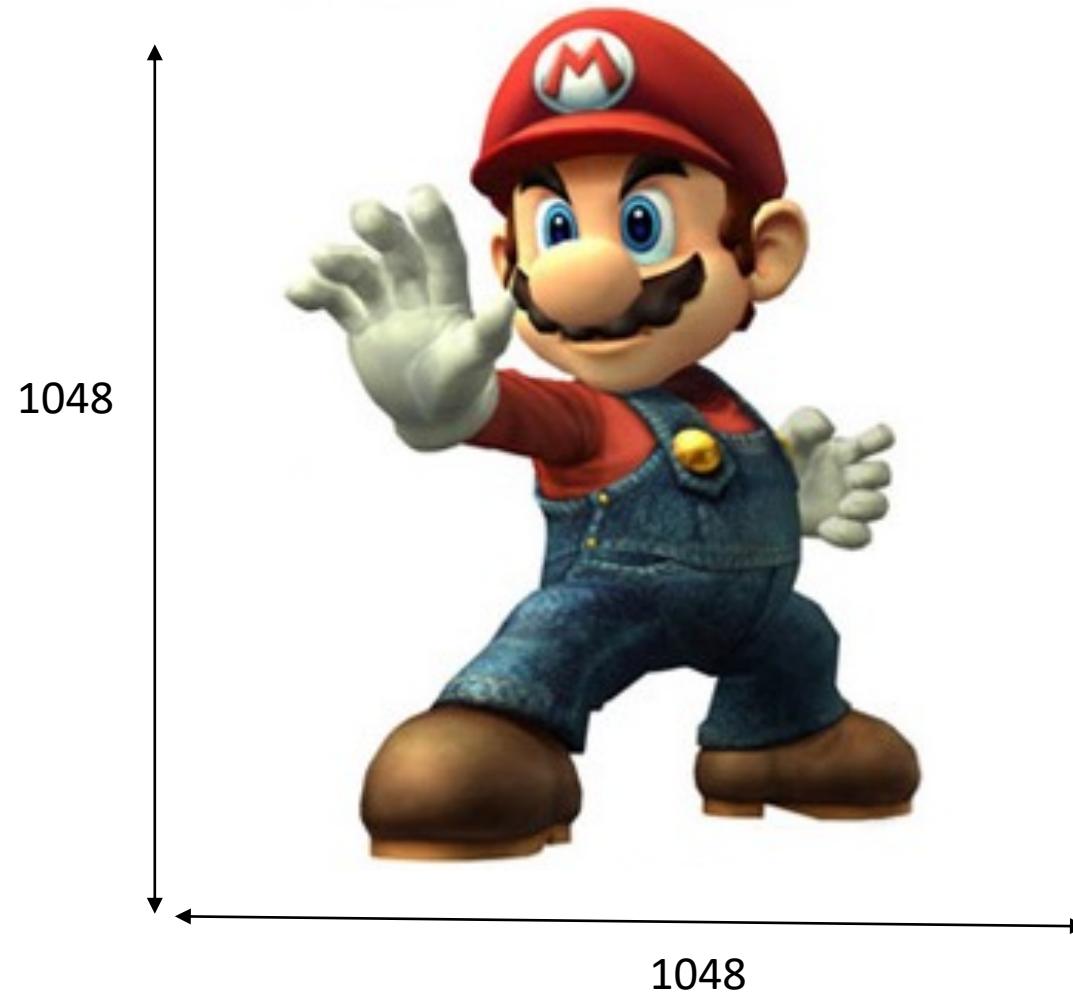
# Image - Pixel



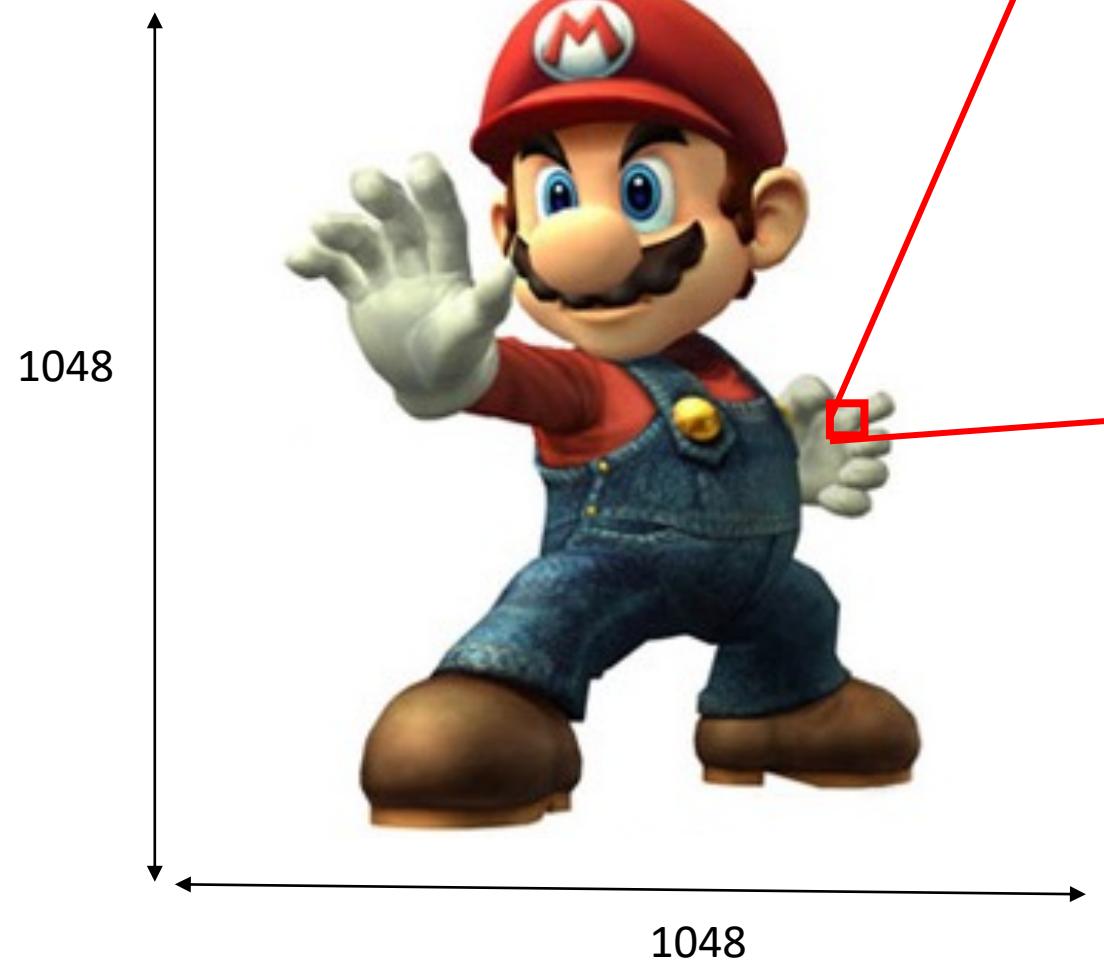
# Image - Pixel



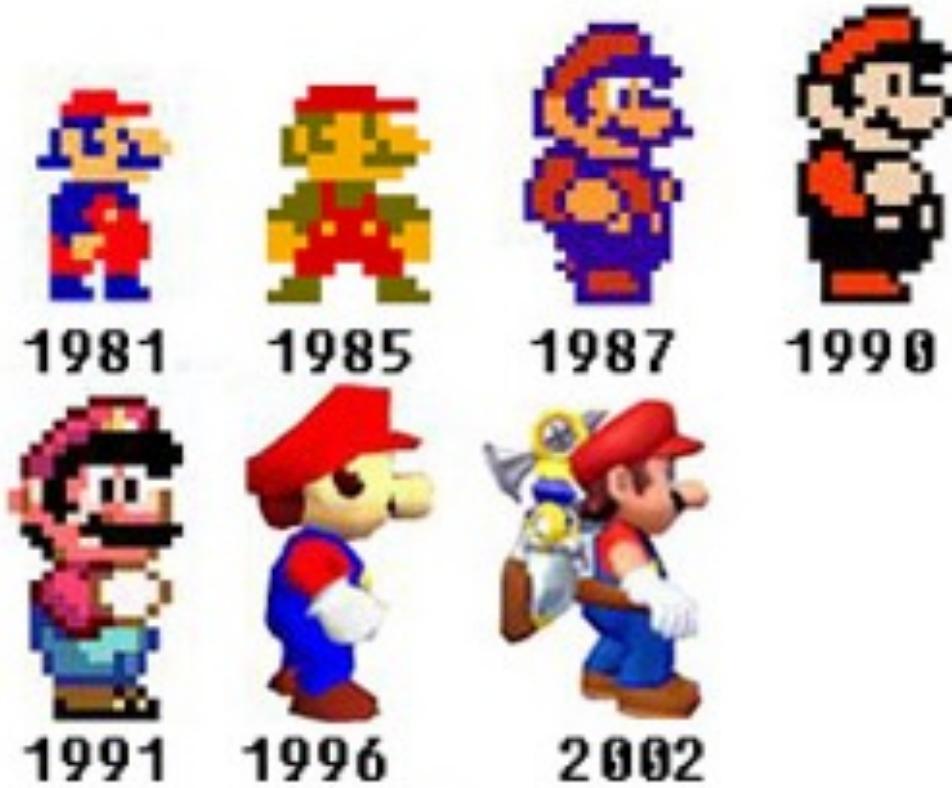
# Image - Pixel



# Image - Pixel

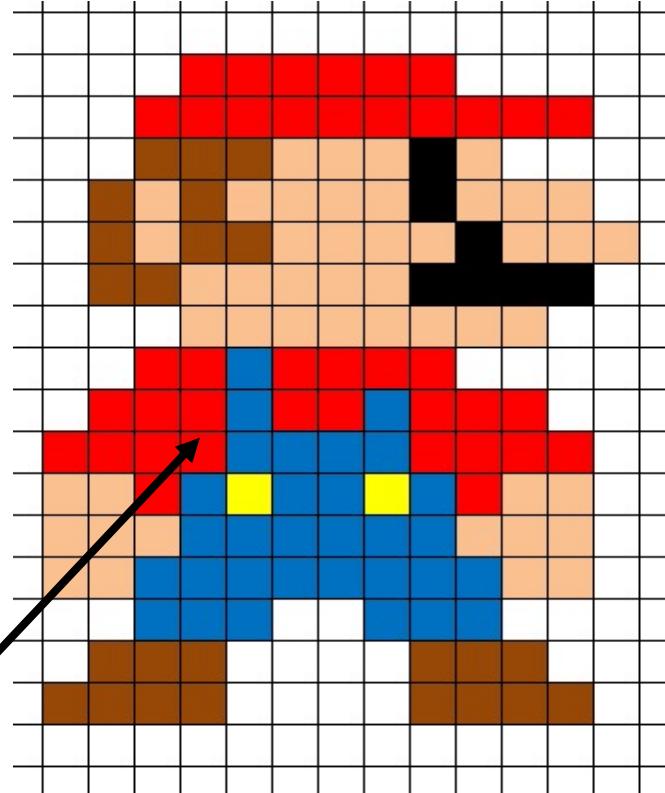
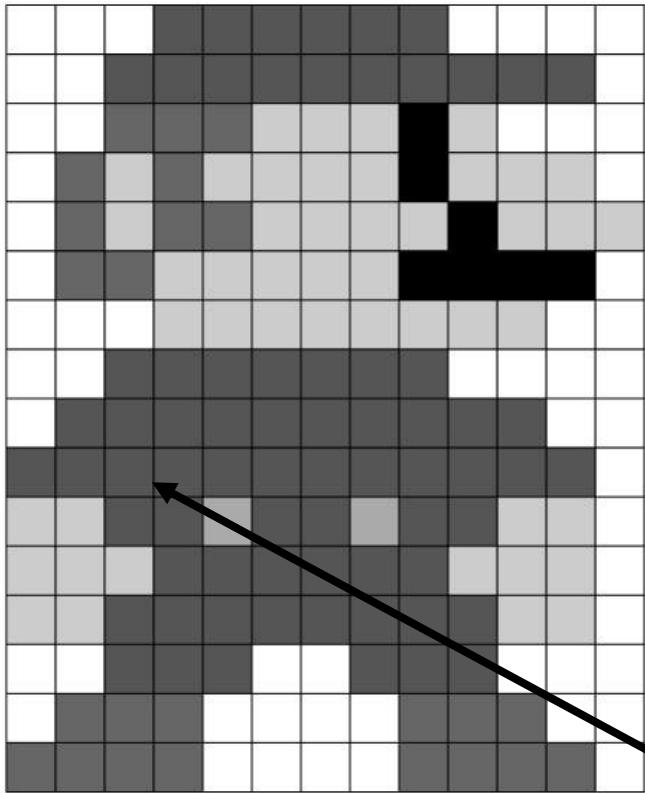


# Image - Resolution



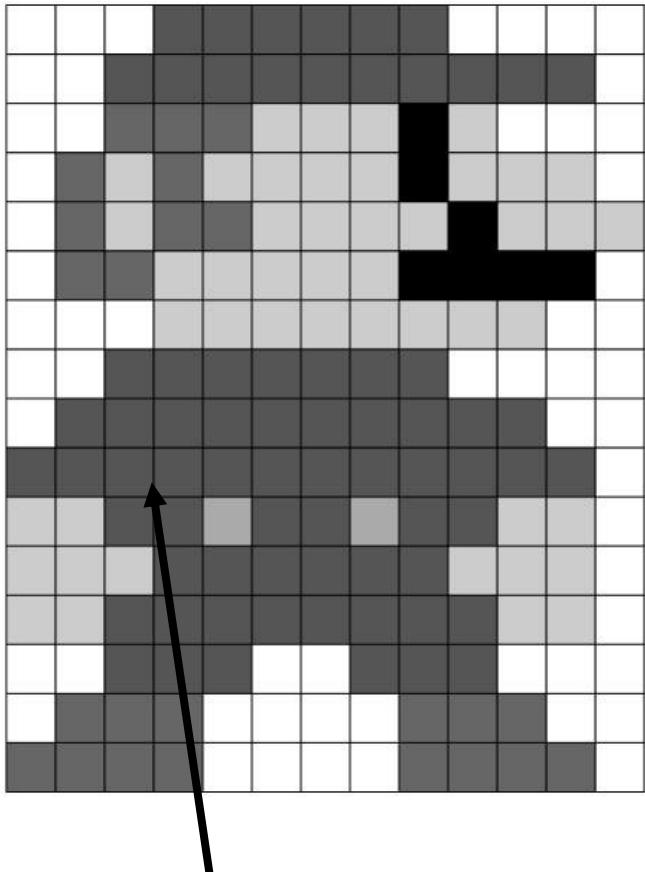
2008

# Image - Channel

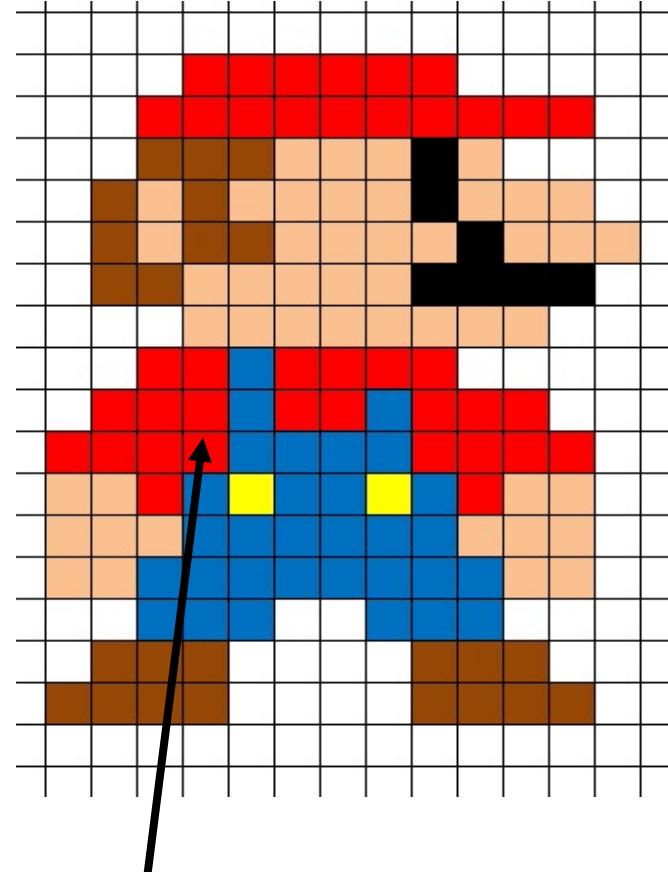


? Bytes

# Image - Channel

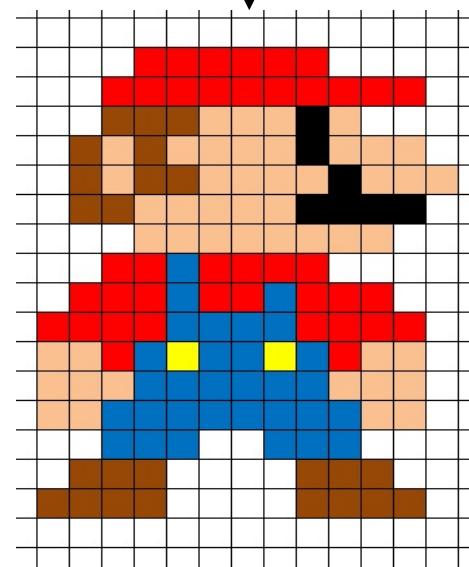
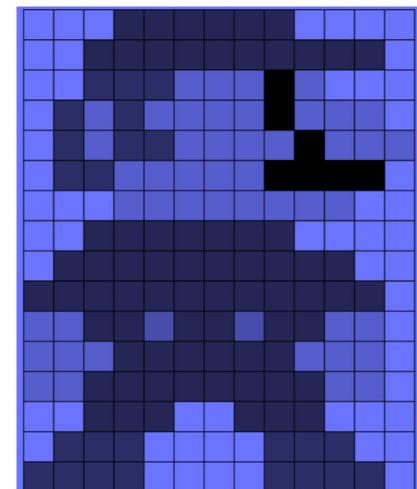
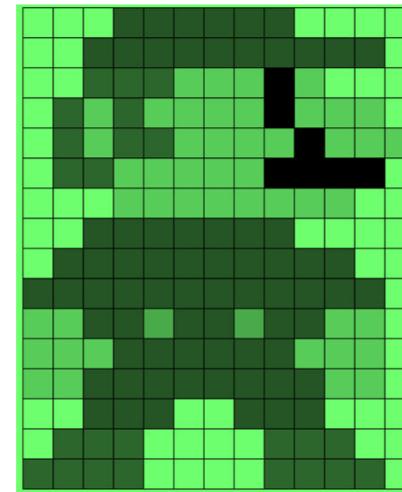
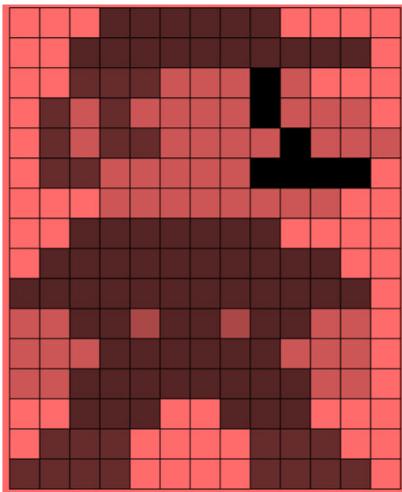


1 Bytes

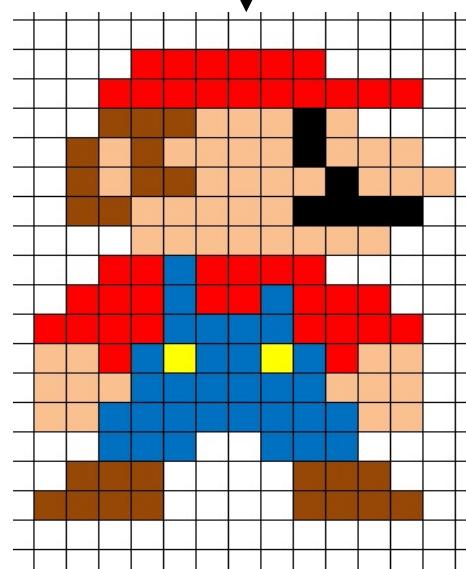
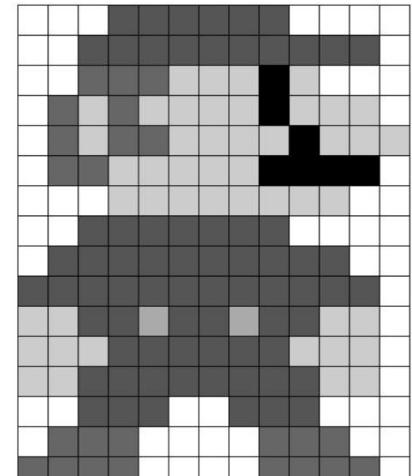
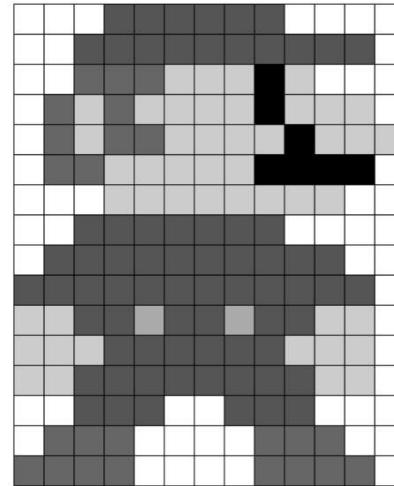
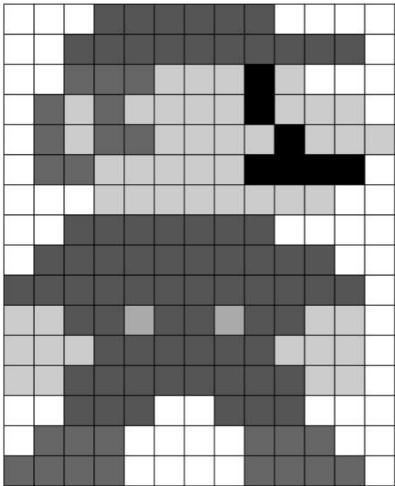


3 Bytes

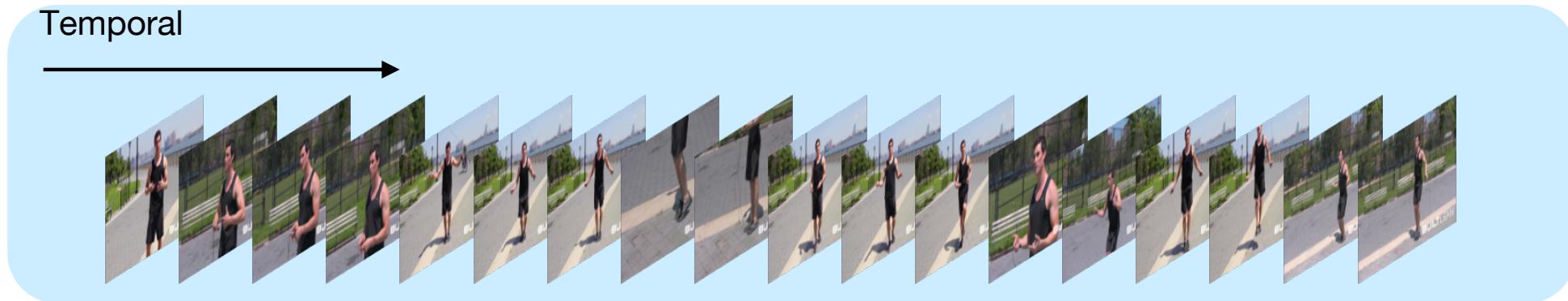
# Image - Channel



# Image - Channel

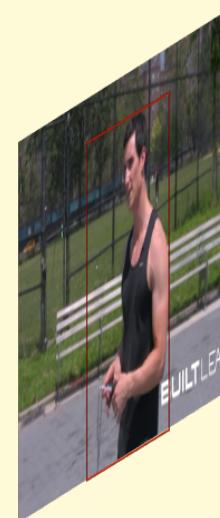


# Video – a sequence of frames

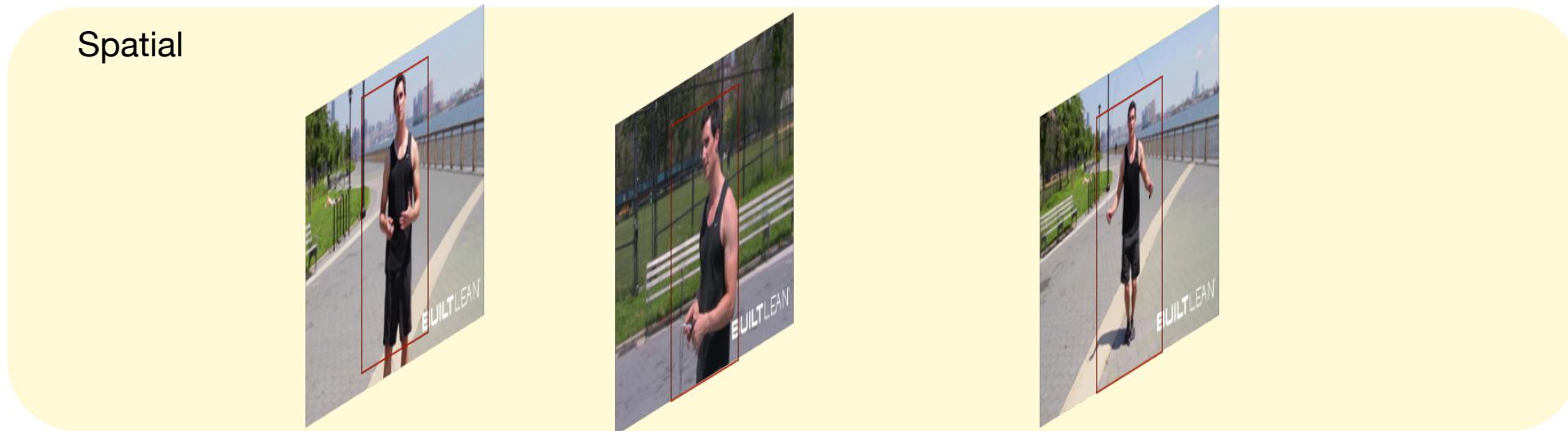


# Video – a sequence of frames

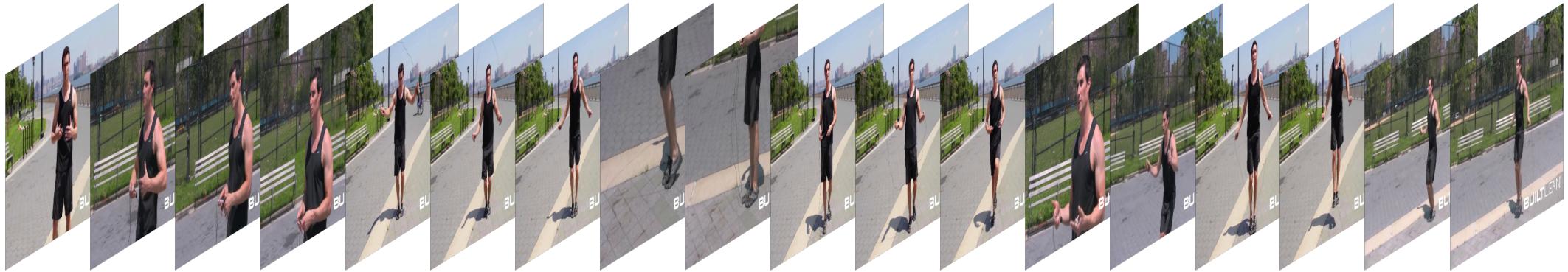
Spatial



# Video – a sequence of frames



# Video – a sequence of frames



Frame by Frame



Set of N frame  
Snippet