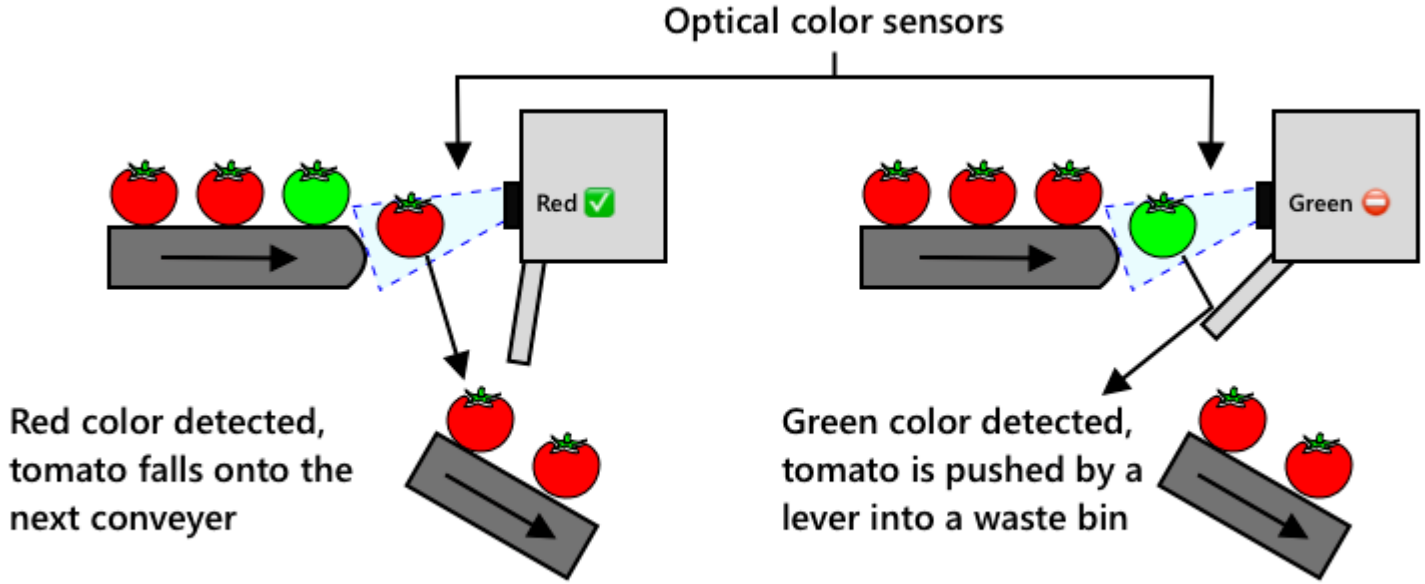
Image Classification

Example/Use Case: Food Production

- Artificial Intelligence & Machine Learning help automate produce sorting.
- ML models can recognize ripe vs. unripe, good vs. bad fruit.
- Used in **IoT devices**, factories, and warehouses.
- Our Objective today:
  - Use image classification for food sorting.
  - Train, Test, and Retrain an image classifier.

AI, ML, and IoT in Agri Tech

- Automation in Agri Tech
  - Reduces labour costs.
  - Already have machinery harvests faster but
  - Lacks sorting ability
- Evolution of Produce Sorting



Manual
Workers inspect produce

Optical
Colour Based detection

AI Based Sorting
Detect subtle differences(disease, buising

Image Classification using Machine Learning

- How ML works:
  - Traditional programming: Algorithm + Data = Output.
  - ML: Data + Output → Trained Model, which can predict new results.

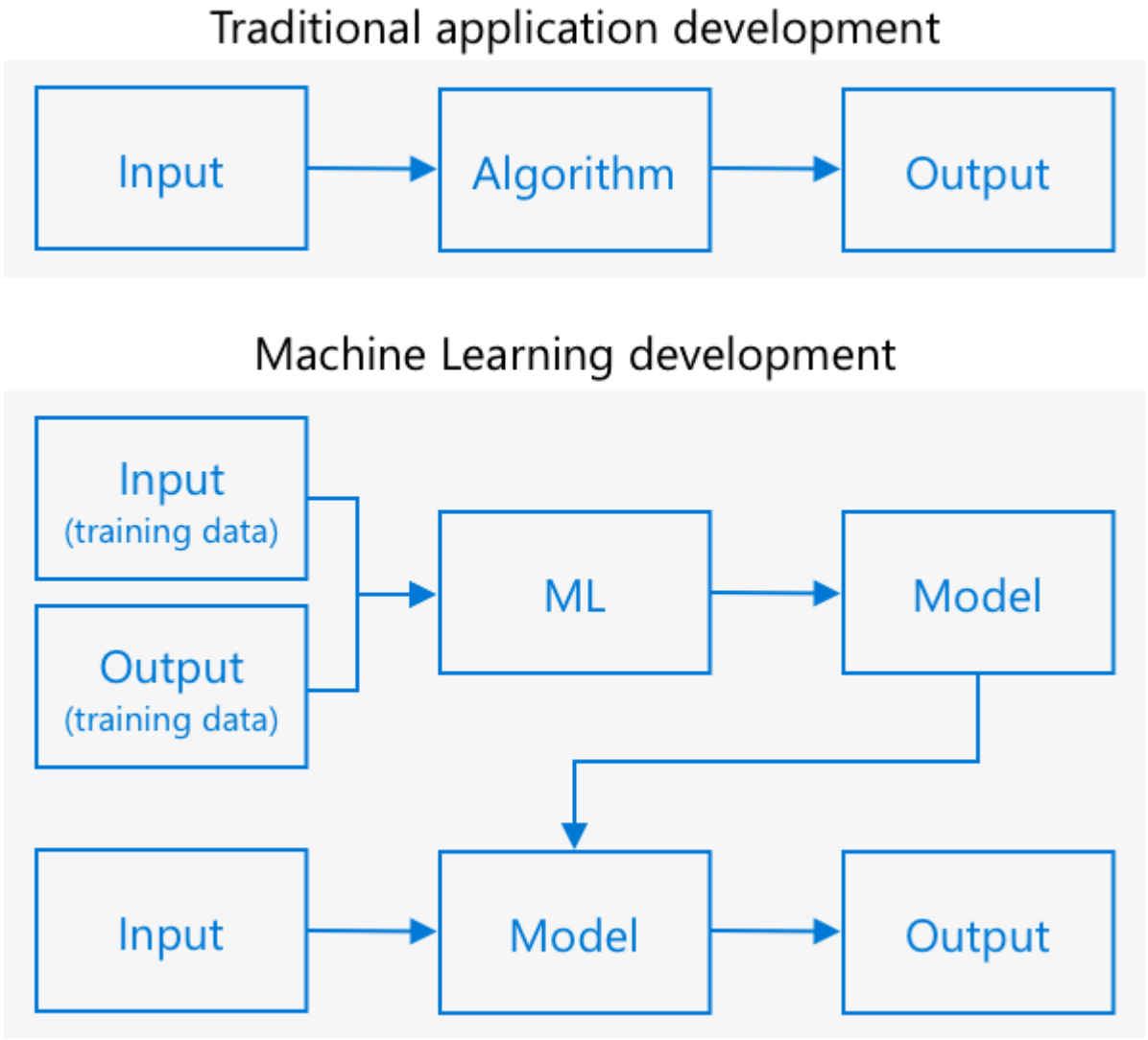
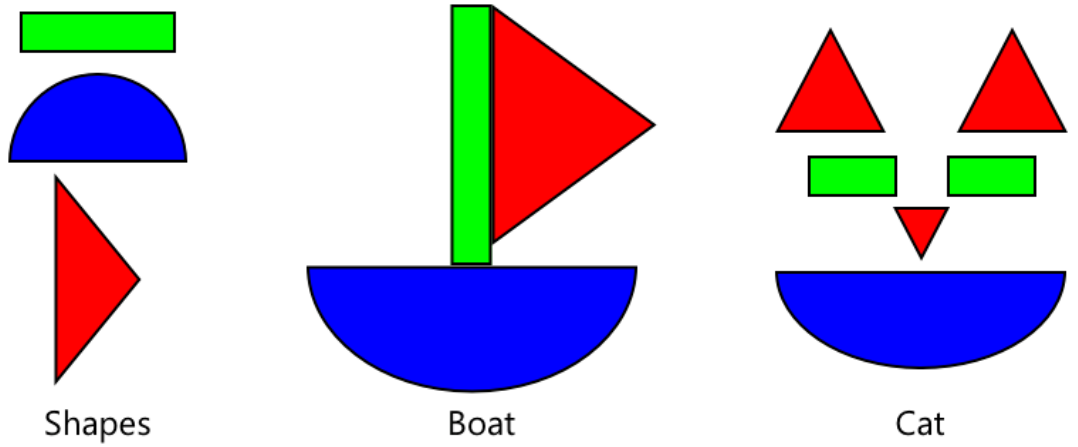


Image Classification – Bananas!

- Example: Bananas!
  - Trained on images of **ripe & unripe bananas**.
  - Predicts **probabilities** instead of a strict yes/no answer.
- Key terms:
  - **Training:** Learning from labelled data.
  - **Model:** The trained ML algorithm.
  - **Predictions:** Model-generated results.

Training an Image Classifier

- Uses a **pre-trained model** to classify new images with **fewer examples**.
- Uses **Transfer Learning** is where you transfer the learning from an existing ML model to a new model based off new data
- **Saves computation** – models already recognise shapes & textures.
- **Requires fewer images** – trains with 30+ images instead of millions.
- **Example**: Recognising a sailboat from basic shapes.



Microsoft Custom Vision

- A **cloud-based AI tool** for training image classifiers.
- Uses a small number of images to build accurate models.
- How it works:
    1. Upload & tag images (e.g., "ripe" or "unripe")
    2. Train the model
    3. Test & refine the model
    4. Deploy via API or SDK

AI & ML Tools

- MS Cognitive Services on Azure include:
  - Custom Vision, speech recognition, and language tools