

# Real world object detection

## Using Deep Learning





# Introduction—

Real-time object detection using deep learning is a cutting-edge technology that allows for the **automatic identification and localization of objects in images or video streams in real-time**. This technology has numerous applications, such as in **security, autonomous vehicles, and robotics, to name a few**.

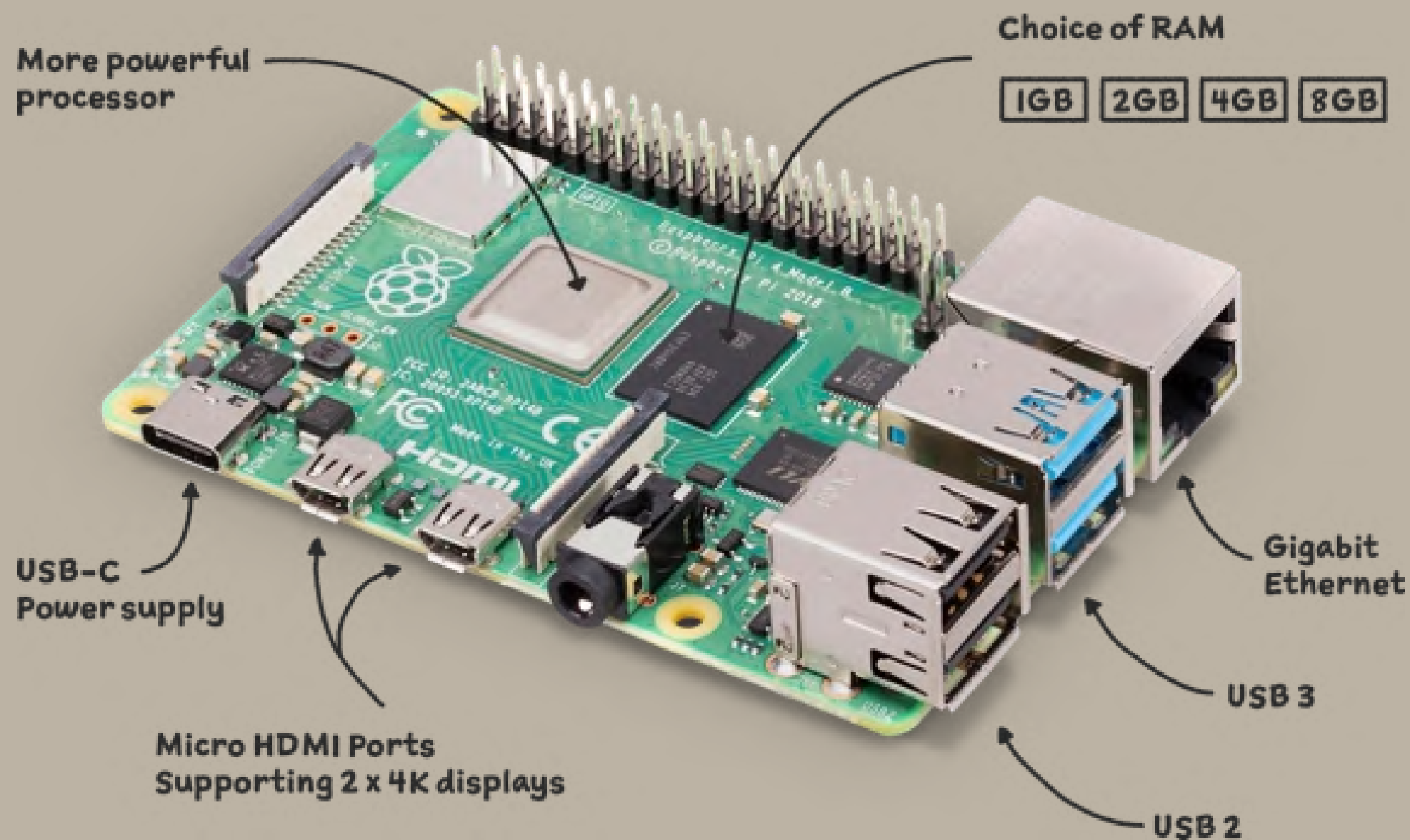
Deep learning algorithms such as **Convolutional Neural Networks (CNNs)** are at the core of real-time object detection systems. These algorithms are **trained on large datasets of annotated images to learn features and patterns that enable them to accurately detect objects in new images or video frames**.

Real-time object detection systems **work by processing the incoming video stream or images in real-time, analyzing each frame to identify objects present in the scene, and then drawing bounding boxes around them**. These bounding boxes provide information about the object's location and size in the image or video frame.

The speed and accuracy of real-time object detection systems are critical for their successful deployment. Therefore, there has been a lot of research and development in this area, with the aim of improving the performance of deep learning algorithms and optimizing the system architecture to achieve real-time performance.



# Raspberry Pi 4



—>The Raspberry Pi is a **low cost, popular and affordable single-board computer**. It is a **credit card-sized computer** that comes with a set of input/output pins and can be connected to a variety of peripherals such as monitors, keyboards, and cameras.

—>The Raspberry Pi was developed by the **Raspberry Pi Foundation**, a UK-based charity organization that **aims to promote the study of computer science and related subjects**.

—>The Raspberry Pi has several models, each with different specifications, but they all share some common features such as a **CPU, RAM, USB ports, HDMI output, Ethernet port, and GPIO (General Purpose Input/Output) pins**. The GPIO pins allow the Raspberry Pi to interact with other **electronic devices such as sensors, motors, and LEDs**.

# Why Deep Learning—

Object detection using deep learning provides a **fast and accurate means to predict the location of an object in an image**. Deep learning is a powerful machine learning technique in which the object detector automatically learns image features required for detection tasks. Also it **takes its own parameters**.

# TensorFlow Lite—

TensorFlow Lite is a **free and open-source software library for machine learning and artificial intelligence**. It can be used across a range of tasks but has a **particular focus on training and inference of deep neural networks**.

# VNC Viewer—

**Virtual Network Computing** is a tool for **accessing your Raspberry Pi graphical desktop remotely**. Setting up VNC is really easy but it usually only gives you access from another computer that is on the same network as your Raspberry Pi.



# Explanation—

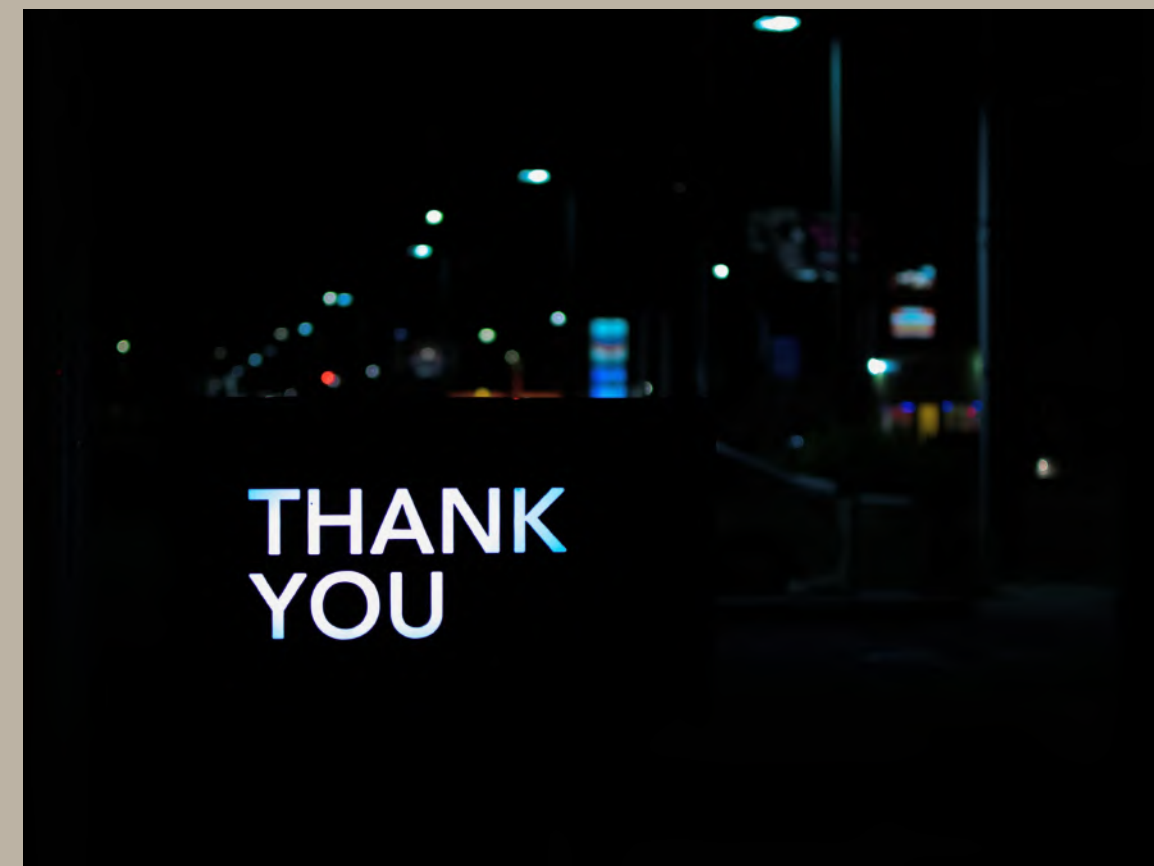
This is a Python script that performs **object detection using a pre-trained TensorFlow Lite model**. The script accepts several command-line arguments, such as the location of the model, the name of the label map file, and the minimum confidence threshold for displaying detected objects.

The script also imports several Python packages, including **OpenCV (cv2)**, **NumPy (np)**, **argparse**, and **pyttsx3**. **OpenCV is used for capturing and processing video frames**, while **NumPy is used for working with numerical data**. **The argparse package is used for parsing command-line arguments**, and **pyttsx3 is used for text-to-speech synthesis**.

The script defines a class called **VideoStream**, which is used for **capturing frames from a webcam or other video input device**. The class includes methods for starting and stopping the camera, as well as for reading the most recent frame.

The script also uses **TensorFlow Lite to load the pre-trained model and label map file, and to perform object detection on each frame of the video stream**. The detected objects are displayed in a window, along with their corresponding labels and confidence scores. If the `--edgetpu` flag is set, the script uses the Coral

# Thank You





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