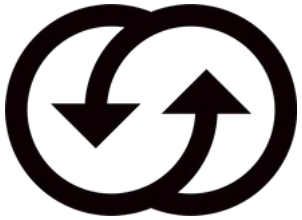
AI Color Recognition and Smart Application of Waste Sorting

LOOK

Contents



01

Lesson Introduction

Lesson Introduction

Question

01

Boys and girls, which of these two bins looks nicer to you?

02

If we throw rubbish in the wrong place, what problems could it cause?

Question

01

How can we help the rubbish find its home?

02

What kinds of rubbish are there?

Answer

01

Waste Sorting

02

Hazardous waste; Food/Kitchen waste

Recyclable waste (Recyclables)

Other waste (Residual/General waste)

02

Knowledge Explanation

Primary Colors

The primary colors refer to the three basic colors of light—Red, Green and Blue. They cannot be obtained by mixing other colors, but when added together in different proportions they can produce almost all visible colors.

Color and Image

Color: Focuses on extracting color information from an image by analyzing pixel color attributes (e.g., hue, saturation, and value/brightness) to identify specific color ranges. Examples include distinguishing a red ball from a blue ball or detecting the color of a traffic light.

Color and Image

Image: Focuses on the overall visual content, including object shapes, textures, structures, and semantic categories (e.g., recognizing vehicles, faces, or text). Examples include distinguishing cats from dogs or identifying product packaging.

AI Waste Sorting

AI is like a smart brain that can learn and recognize many things. In waste sorting, AI can determine a trash item’s category by identifying features such as its color and shape.

AI Waste Sorting Process

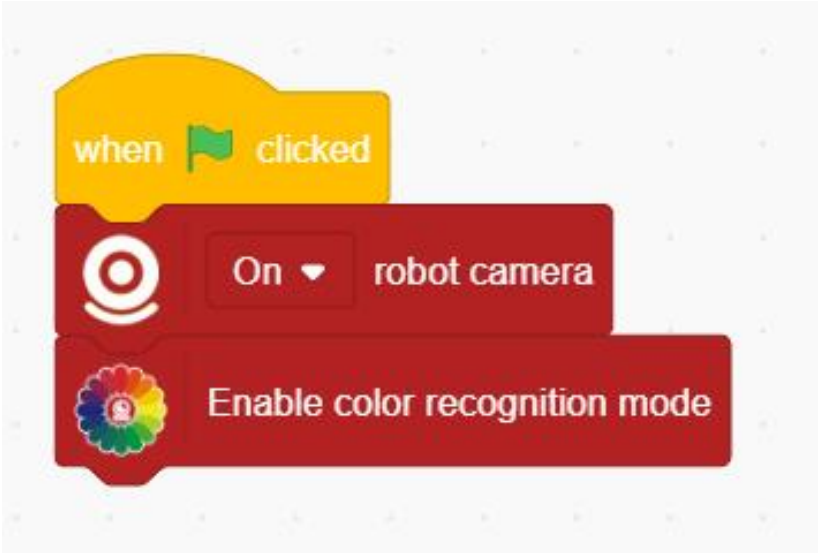
First, people teach AI the features of different types of trash—for example, red for hazardous waste and blue for recyclables. When a piece of trash appears, the AI “observes” it like a detective and then assigns it to the corresponding category.

03

Hands-on Practice

Hands-on Practice

01

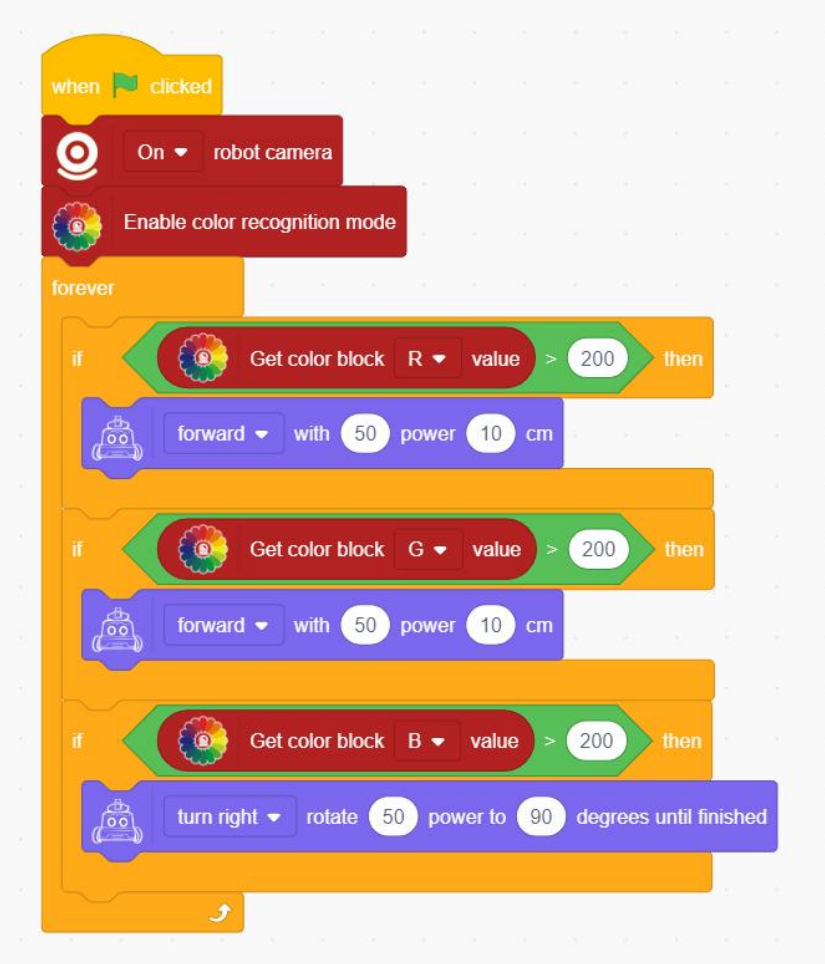


Getting to know the Start module

Prepare: camera, color recognition.

Hands-on Practice

02



We need to tell the robot what action to take when it sees a certain color — just like giving it commands.

Challenge Activity

Students are divided into groups of 4–5. Each group selects one student to hold the color cards (who must not look at the car or the field throughout), while the other students stand at the field to provide remote guidance.

Challenge Activity

The card holder should follow the teammates' instructions and present different color cards to the computer's camera in sequence for the robot to recognize. The robot will respond based on the color. Using the robot's reactions and the floor markings, work together to deliver the 'trash' (color cards) to the correct zone and finally reach the finish line.

04

Summary & Extension

Questions

01

Which sensors did we use in this lesson?

02

Which actuators did we use?

Answer

01

Camera（sensor）

02

Motor（actuator）

Questions

03

What other roles can AI play in protecting the environment?

04

What are the benefits of waste sorting? In what ways can we use AI to make waste sorting more efficient?

Answer

03

AI can monitor air quality, control pollutant emissions, and optimize waste treatment processes.

04

Benefits of waste sorting: conserving resources, reducing pollution, and protecting the environment.

THANK YOU