Optical Character Recognition

Can you read the license number on the number plate of the car?

Yes, it is IN R 8103. But how can a computer get this number from the image?

The computer uses *Optical Character Recognition* to identify text from images. But how do they do it? We'll learn about it in this lesson!

Topic Covered in the Lesson

1. Optical character recognition
2. Handwritten text recognition
3. Printed text recognition
4. Application of text recognition

Key Learning Outcomes

At the end of the lesson, you will be able to:

1. Understand what optical character recognition (OCR) is.
2. How OCR works.
3. Application of OCR.
4. Use the AI blocks in PictoBlox to recognize the following types of text from the image:
    1. Handwritten text
    2. Printed text

5. Make an AI project in PictoBlox that detects the name of the receiver of a gift from the image and sends it to the receiver. Just so you know, Amazon also uses the same to automate its delivery system.
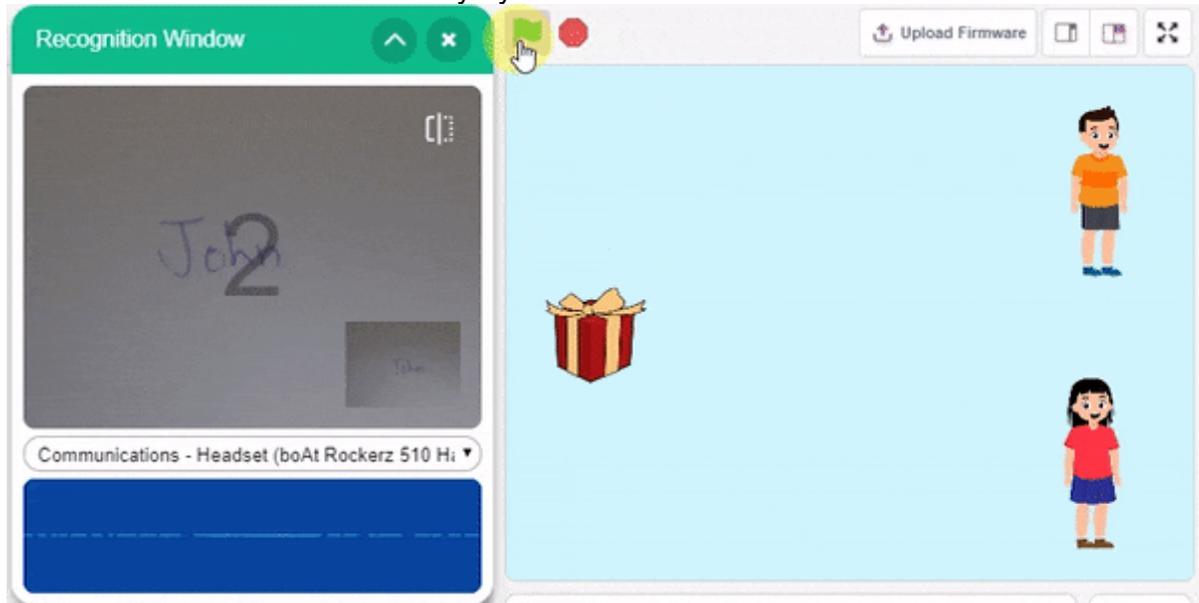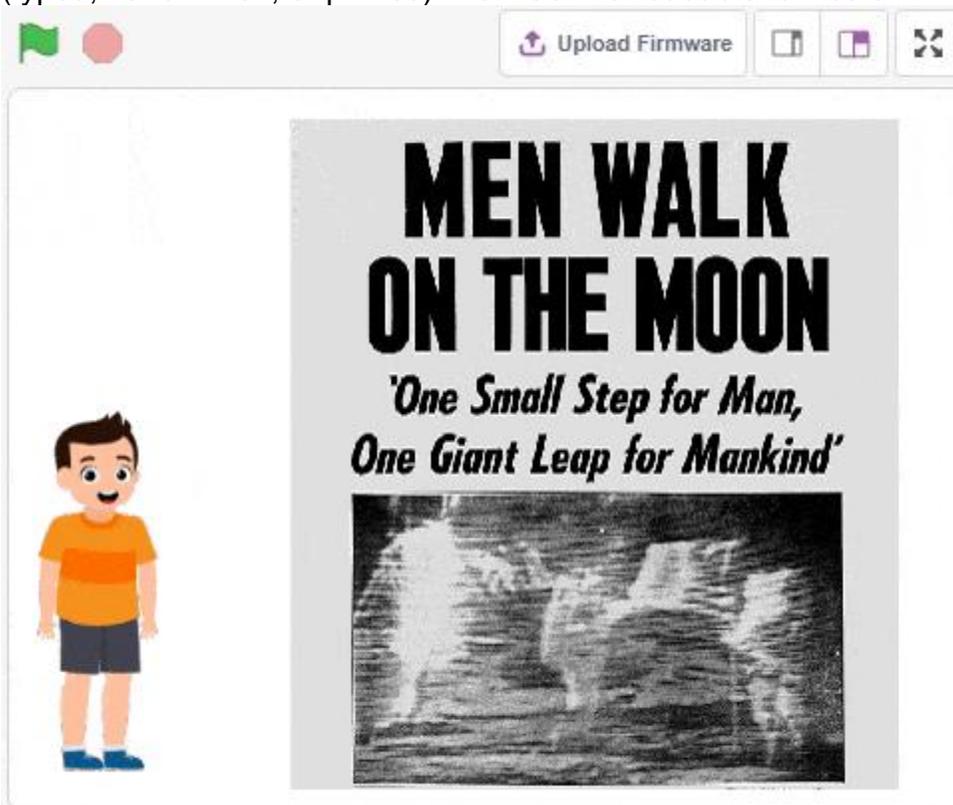

Let's begin!

Recognizing Text from Image

What is OCR?

OCR stands for Optical Character Recognition. It is a widespread technology used to recognize text inside images, such as scanned documents and photos.

OCR technology is used to convert virtually any kind of image containing written text (typed, handwritten, or printed) into machine-readable text data.


OCR Technology became popular in the early 1990s while attempting to digitize historic newspapers. Since then, the technology has undergone several improvements. Nowadays, solutions deliver near to perfect OCR accuracy.

How Does OCR Work?

The following computer vision approach is used to identify text inside the image:
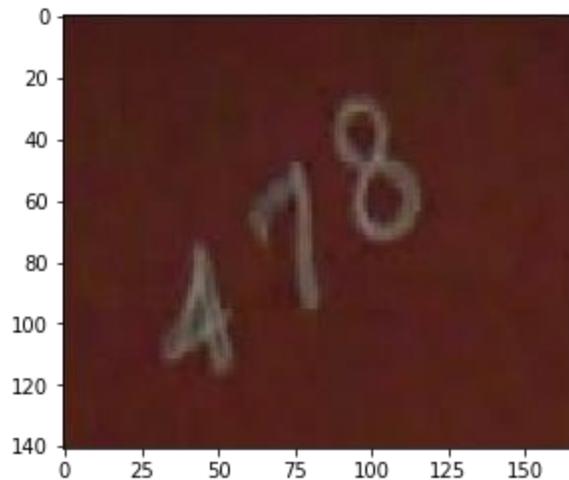
1. Apply filters to make the characters stand out from the background.
2. Apply contour detection to recognize the characters one by one.
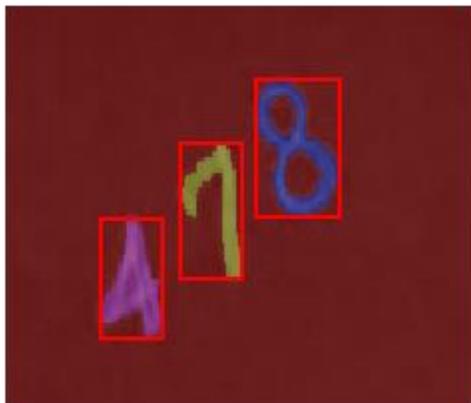
3. Apply image classification to identify the characters.
4. Merge the characters to make words and sentences.

Applications of OCR

Following are a few applications of OCR in different industries:

Converting Historic Books or Book Images into PDF

OCR is widely used to convert historic books into editable documents like PDFs. The structured nature of printed documents makes it much easier to analyze them.

Security: License Plates

Another common use case of OCR is license plate recognition. This requires to detect the license plate and then recognize its characters. The plate's shape is relatively constant so people use simple reshaping methods before actually recognizing the digits. Here are some examples from the web:

Postage

ORC is also widely used in detecting key information from post letters like Pincode, addresses, etc. Usually, the post letters are designed in a way that makes it easy for the computer to get the relevant information from a particular part of the image.
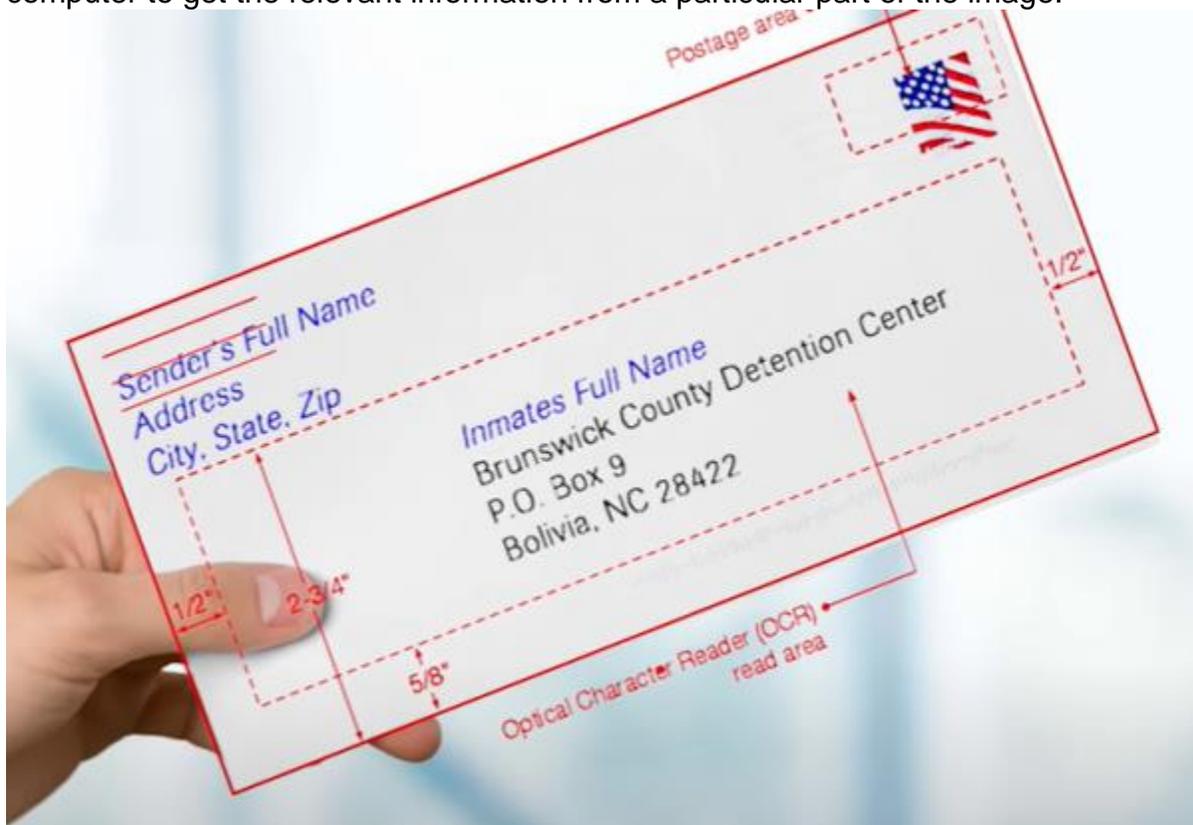
Now, let's have a look at how to detect text in PictoBlox.

OCR Blocks in PictoBlox

OCR Blocks in PictoBlox

The *Artificial Intelligence* extension in PictoBlox has blocks dedicated to OCR. Let's first add the extension in our project:

1. Create a new project in PictoBlox.
2. Select evive as your board from the Board tab in the menu bar.
3. Next, click the *Add Extension* button and add the *Artificial Intelligence* extension.

Artificial Intelligence
Speech, Text & Face Recognition

Now, let's have a look at the blocks:

Text Recognition Blocks

For text recognition, we'll use the same blocks that we used in computer vision. You have to select the type of text you want to recognize in the image. The two types of text that the block can recognize are:

1. Handwritten text
2. Printed text
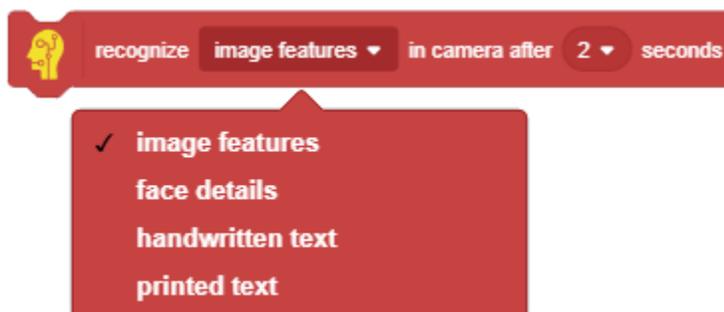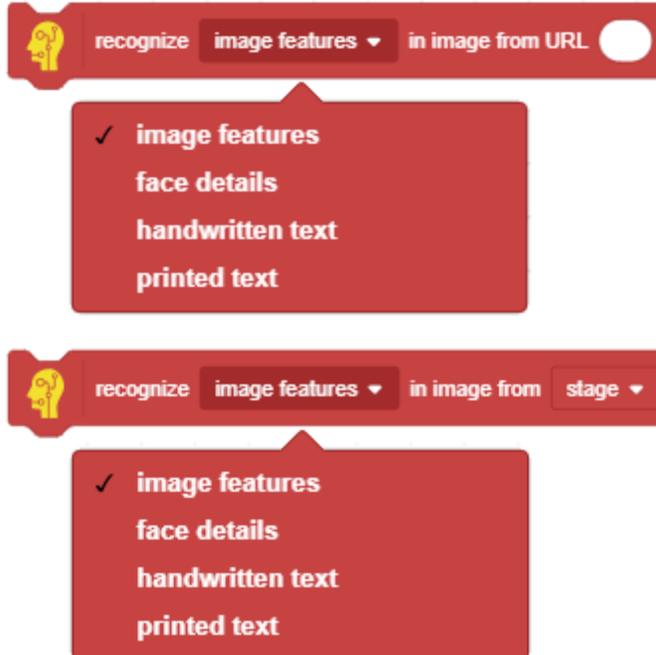
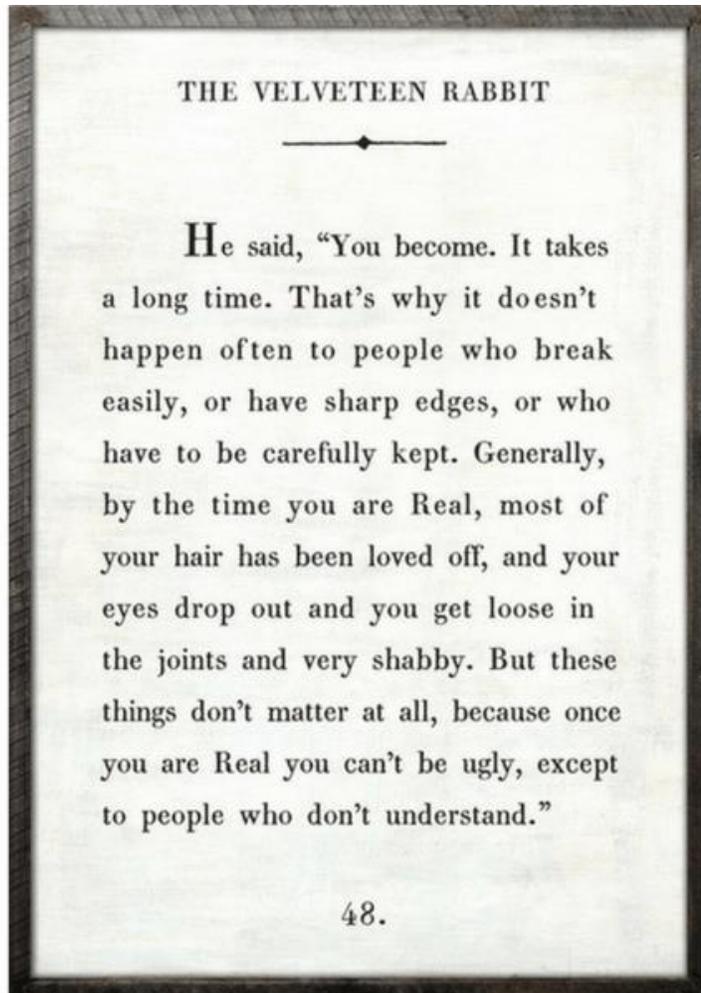You can input the image in the following ways:

1. Camera feed
2. URL – online link of the image
3. From the stage, backdrop, or costume

Recognizing Printed Text

Once you have analyzed the image for printed text, you can use a printed text result block to get the recognized text from the image in a string format.

printed text result

THE VELVETEEN RABBIT

He said, "You become. It takes a long time. That's why it doesn't happen often to people who break easily, or have sharp edges, or who have to be carefully kept. Generally, by the time you are Real, most of your hair has been loved off, and your eyes drop out and you get loose in the joints and very shabby. But these things don't matter at all, because once you are Real you can't be ugly, except to people who don't understand."

48.

E.g., if you input the image above in one of the recognize blocks, the recognized text will be as follows:

printed text result

'I'llE VELVETEEN RABBIT He said, "You become. It takes a long time. That's why it doesn't happen often to people who break easily, or have sharp edges, or who have to be carefully kept. Generally, by the time you are Real, most Of your hair has been loved off, and your eyes drop out and you get loose in the joints and very shabby. But these things don't matter at all, because once you are Real you can't be ugly, except to people who don't understand." 48.

Recognizing Handwritten Text

Once you have analyzed the images for handwritten text, you can use a handwritten text result block to get the recognized text from the image in a string format.

E.g., if you input the image above in one of the recognize blocks, the recognized text will be as follows. You can extract the city and Pincode easily with simple string manipulation.

michele 1025 W. LINE AVENUE APT . 2 B
CHICAGO, IL 60610

Limitations of OCR

The accuracy of text recognition operations depends on the quality of the images. The following factors may lead to an inaccurate reading:

- Blurry images
- Handwritten or cursive text
- Artistic font styles

- Small text size
- Complex backgrounds, shadows, glare over text, or perspective distortion
- Oversized or missing capital letters at the beginnings of words
- Subscript, superscript, or strikethrough text

In the next, topic we'll use these blocks to make a fun PictoBlox project!

(END)