

Phase 5

IBM CLOUD APPLICATION DEVELOPMENT

Image Recognition with IBM Cloud Visual Recognition

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Project Documentation & Submission :

Project objective:

Image recognition refers to technologies that identify places, logos, people, objects, buildings, and several other variables in digital images. It may be very easy for humans like you and me to recognise different images, such as images of animals. We can easily recognise the image of a cat and differentiate it from an image of a horse. But it may not be so simple for a computer.

A digital image is an image composed of picture elements, also known as pixels, each with finite, discrete quantities of numeric representation for its intensity or grey level. So the computer sees an image as numerical values of these pixels and in order to recognise a certain image, it has to recognise the patterns and regularities in this numerical data.

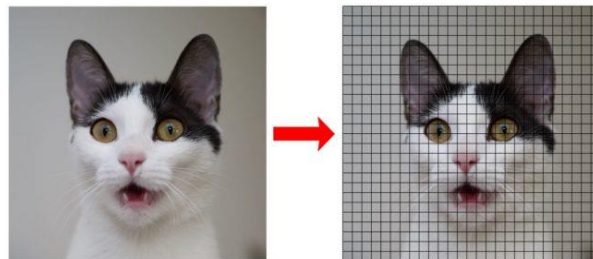


Image recognition should not be confused with object detection. In object detection, we analyse an image and find different objects in the image while image recognition deals with recognising the images and classifying them into various categories.

Design Thinking Process :

The design thinking process typically involves five steps: empathy, define, ideate, prototype, and test.

1. Empathy:

- Understand the needs of potential users and their pain points related to image recognition.
- Gather insights from target users, domain experts, and other stakeholders.

2. Define:

- Clearly define the problem you aim to solve with image recognition.
- Create user personas and user stories to outline specific user requirements.

3. Ideate:

- Brainstorm ideas for image recognition solutions.
- Encourage a cross-functional team to generate creative concepts.
- Consider innovative algorithms, data sources, and approaches to image recognition.

4. Prototype:

- Build low-fidelity prototypes of the image recognition system.
- Test various image processing and recognition techniques.
- Gather feedback from users and iterate on the prototypes.

5. Test:

- Test the prototypes with real users to assess usability and performance.
- Gather qualitative and quantitative data on how well the system identifies images.
- Refine the system based on user feedback.

Development Phases :

1. Data Collection and Preparation:

- Gather a diverse and representative dataset of images related to the problem you want to solve.
- Annotate the data with labels or tags, indicating what's in each image.

- Clean and preprocess the data, ensuring it's consistent and of high quality.

2.Model Selection and Training:

- Choose an appropriate image recognition model. Common choices include CNNs, deep neural networks, or pre-trained models like VGG, ResNet, or Inception.
- Train the model on your dataset, adjusting its parameters to learn the patterns and relationships in the images.

3.Validation and Testing:

- Split the dataset into training and testing sets to evaluate the model's performance.
- Use metrics like accuracy, precision, recall, and F1-score to assess how well the model recognizes images.

4. Monitoring and Maintenance:

- Continuously monitor the performance of the deployed image recognition system.
- Make updates and improvements as needed to adapt to changing data distributions or user needs.

5.User Feedback and Iteration:

- Gather user feedback to identify areas for improvement in the image recognition system.
- Use feedback to make iterative enhancements, including refining the model and user interface.

Platform Layout :

Ken Jennings, Watson, and Brad Rutter in their Jeopardy! exhibition match Watson's basic working principle is to parse keywords in a clue while searching for related terms as responses.

This gives Watson some advantages and disadvantages compared with human Jeopardy! players. Watson has deficiencies in understanding the contexts of the clues.

Watson can read, analyze, and learn from natural language which gives it the ability to make human-like decisions. As a result, human players

usually generate responses faster than Watson, especially to short clues. Watson's programming prevents it from using the popular tactic of buzzing before it is sure of its response.

However, Watson has consistently better reaction time on the buzzer once it has generated a response, and is immune to human players' psychological tactics, such as jumping between categories on every clue.

Features:

1. Image Preprocessing:

Techniques to enhance the quality of images, remove noise, and prepare them for accurate recognition.

2. Image Segmentation:

Dividing an image into different regions or segments to understand the spatial distribution of objects or features.

3. Image Classification:

Categorizing an image into predefined classes or categories, such as recognizing whether an image contains a cat or a dog.

4. Image Annotation:

Adding descriptive labels or metadata to images to provide context and information.

5. Accuracy and Performance:

Evaluating the accuracy and speed of image recognition algorithms, which are essential for practical applications.

6. Real-time Processing:

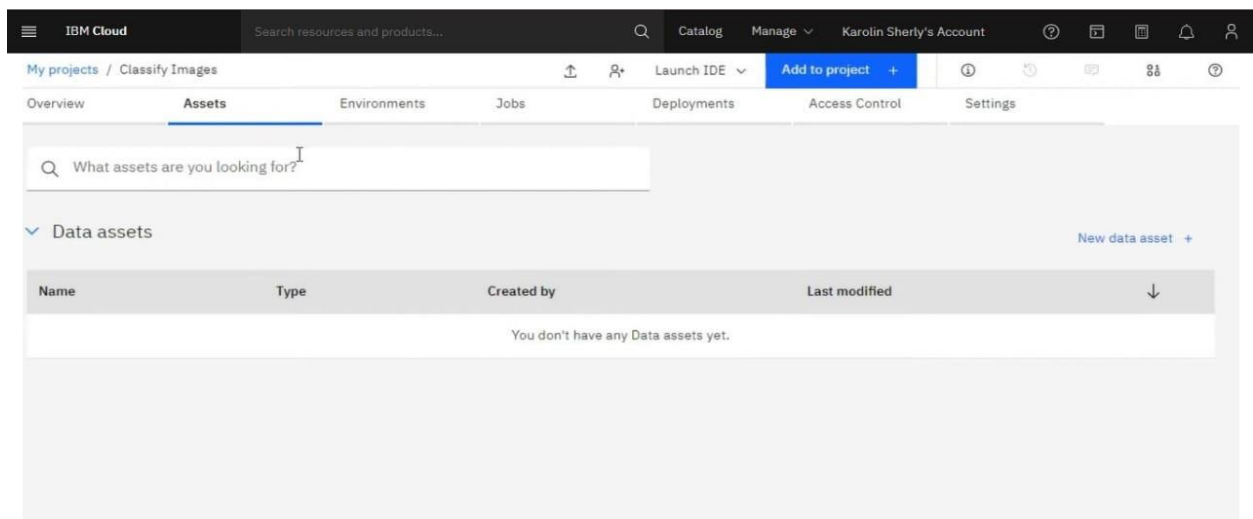
The ability to process images in real-time, which is crucial for applications like autonomous vehicles and surveillance systems.

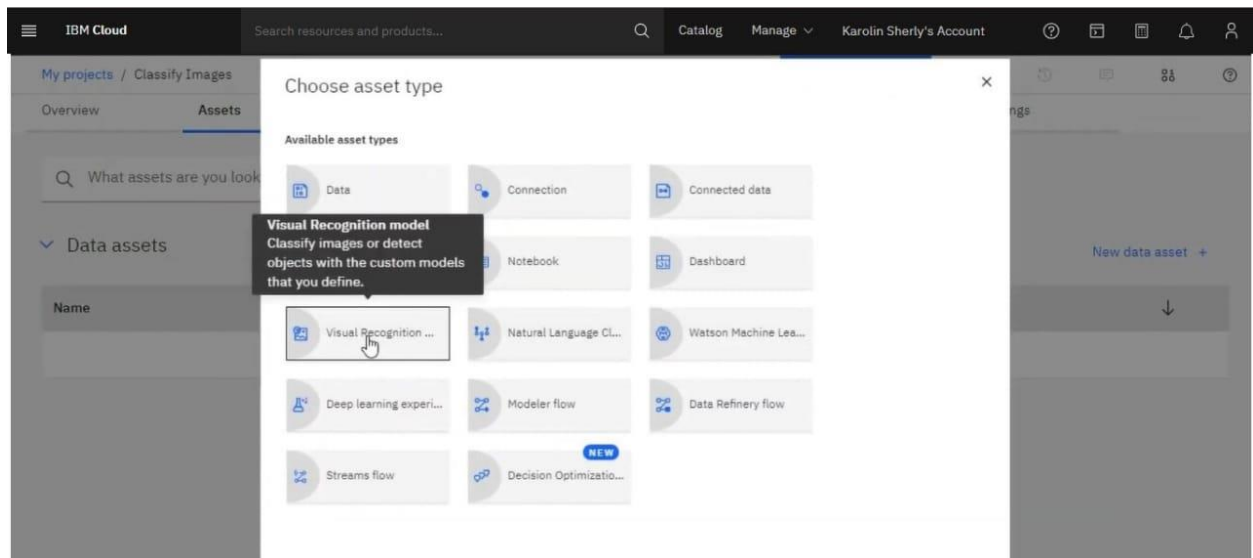
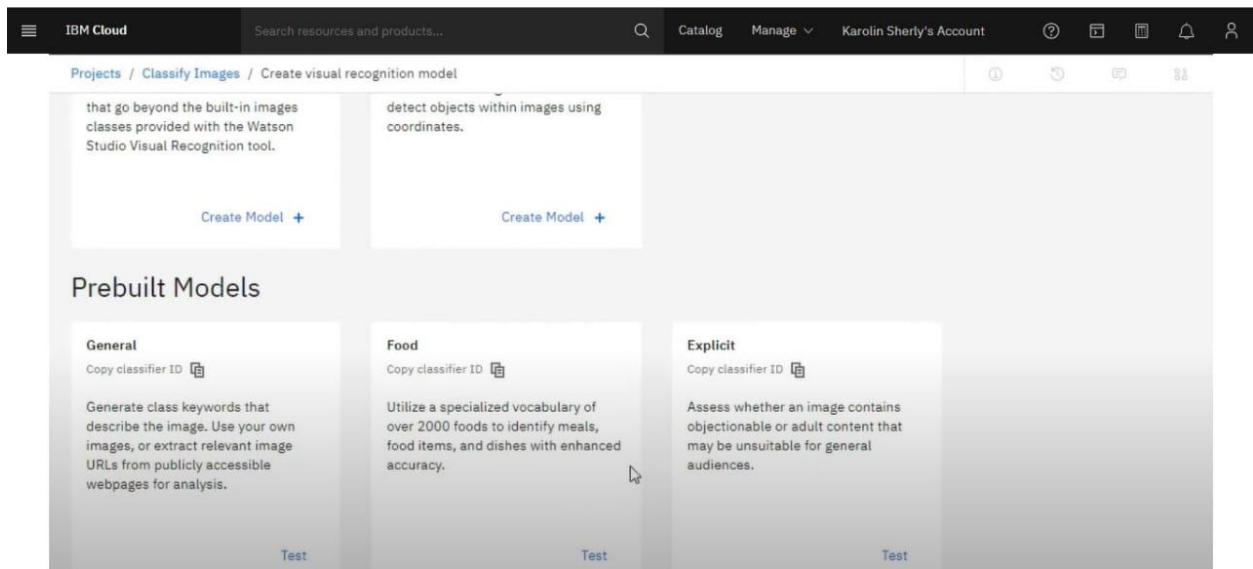
Technical Implementation :

Image recognition with IBM Cloud typically involves the use of Watson Visual Recognition, a service provided by IBM. Here are some high-level technical implementation details for image recognition using IBM Cloud Visualization:

- 1.Data Collection:** Gather a dataset of images relevant to your task. The quality and diversity of your dataset are crucial for training a robust model.
- 2.IBM Cloud Account:** Sign up for an IBM Cloud account and create a Watson Visual Recognition service instance.
- 3.Testing and Evaluation:** Test your model on a set of validation or test images to assess its performance.Fine-tune the model if necessary by retraining with additional data or adjusting parameters.
- 4.Deployment:** Deploy your application to your desired platform (e.g., web server, mobile app, or IoT device).Integrate the model to perform real-time image recognition.

Include screenshots or images of the platform's user interface:





🔍 ⌚ 💬 ⚙️ ⓘ

Loading...

Edit and Retrain ⓘ

Overview **Test** Implementation

Summary

🔍 Search Summary

Classes

🔍 Search Classes

CLASS	NUMBER OF EXAMPLES

Projects / Classify Images / Loading...

🔍 ⌚ 💬 ⚙️ ⓘ

General

Associated Service : watson-vision-combined-zc

Overview **Test** Implementation

Filter

Threshold

0.0

0 ● 1

Classes

Drop image files here to let the classifier analyze them or [browse](#) to select files.

Projects / Classify Images / Loading...

General

Associated Service : watson-vision-combined-zc

Overview

Test

Implementation

Filter

Threshold0.0

01

Classes


☐ alabaster color

☐ animal

☐ balanced diet (food)

☐ bird

☐ blue color



person0.69


blue color0.63

emerald color0.58

President of the United States0.55

official0.53

Labourite0.50



coal black color0.78

person0.50

President of the United States0.50

ultramarine color0.46

Projects / Classify Images / Loading...

01

Classes

☐ alabaster color

☐ animal

☐ balanced diet (food)

☐ bedroom

☐ bird

☐ bland diet (food)

☐ blue color

☐ building

☐ canine

☐ carnivore

☐ clothing


☐ coal black color

☒ computer

☐ computer monitor


☐ day care center

☐ diet (food)



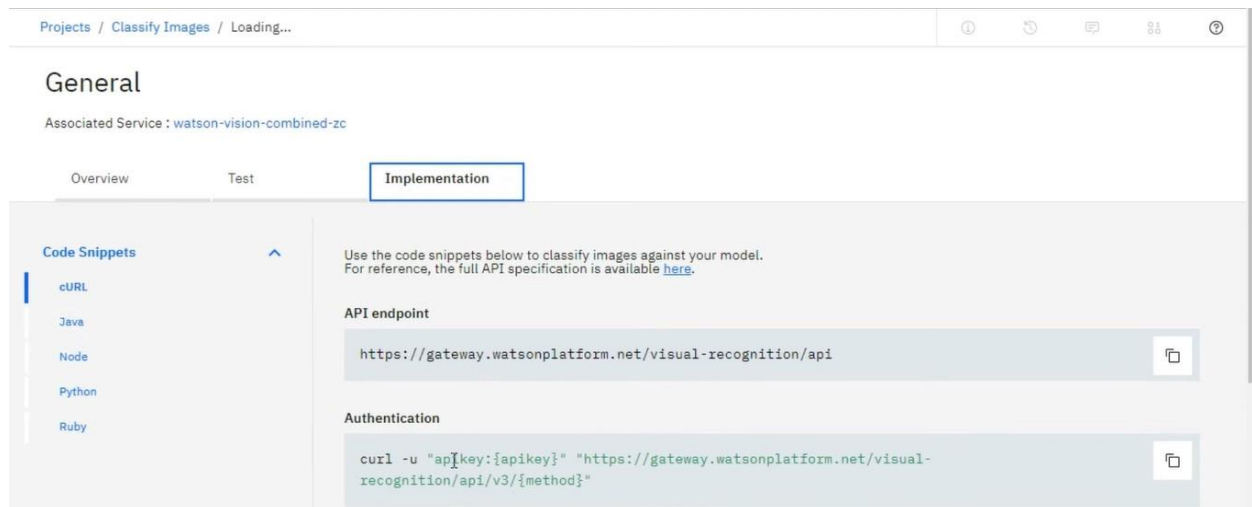
electronic device0.82

video display0.81



coal black color1.00

computer0.97



Future Implementation:

Now it generate only captions for the recognized images. In future, we have to develop the image recognition process to recognize the image and generate the content about the particular image.

Conclusion:

In conclusion, IBM Watson Visual Recognition is a powerful tool for image recognition and analysis. It utilizes advanced machine learning algorithms to identify and classify objects, scenes, and even specific details within images. Its ability to recognize and tag images can be invaluable in a wide range of applications, from content moderation and security to visual search and accessibility. Furthermore, the platform's ease of use and customizability make it a valuable asset for businesses and developers seeking to incorporate image recognition into their products and services. As technology continues to advance, IBM Watson Visual Recognition remains a relevant and competitive solution in the field of image recognition.