

# Classify and Recognize Non Living Objects Using Image Classification Technique

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**Abstract**—These days, with the evolution of social media and new smart devices, the data collection on internet has improved with high speed. The object detection, which is a major feature of image processing, has become one of the internationally popular research fields. The branch of machine learning has been influenced by deep neural networks since last few years. Convolutional neural network (CNN), which is the sub-type of neural network, is well-suited for image related functions. That network is trained for feature extraction and transfer learning. For recognition of objects from an image using CNN is a time consuming process. So, there is a need of a kind of system which can improve the performance of CNN algorithm, so that it will make a system efficient. In the proposed system, the CNN Algorithm is used in a modified way for image classification of non-living objects. We use inception v3 model for improvement in CNN algorithm to increase efficiency.

**Keywords**—CNN, Deep learning, Inception v3, Non-living objects, Tensorflow, Transfer learning.

## I. INTRODUCTION

Object recognition can be done using a neural system that integrates aspects of human object recognition, together with classical image processing techniques. We will first look at work that has already been done in the field of object recognition and deep learning.

In Deep Learning research, CNNs are particularly applied for Computer Vision applications that involves Image Classification and Object Recognition. Non-living Object Recognition is a combination of both Object Recognition and Image Classification, as the system must detect a object in the image as well as recognize which character it belongs to. To recognize the objects, an intelligent system must be trained with larger set of images, so that it could predict the objects from its learned patterns. This approach is termed as “Supervised Learning” which requires an external dataset of images with labels to predict the label of an unseen image. This research work uses Convolutional Neural Networks (CNN) along with Transfer Learning as the intelligent algorithm to efficiently recognize objects in real-time.

## II. LITERATURE REVIEW

### 2.1 Thai Fast Food Image Classification Using Deep Learning[3]

The author proposed a prediction model for classifying Thai fast food images the model uses a deep learning process that was trained on natural images (Google Net dataset) and was fine-tuned to generate the predictive Thai fast food model. The system gives a good result of above 88 % using inception v3, which is a better classifier, the standard classifiers. Further research should include a mobile application for real-time classification. This research study examined the use of deep learning algorithms in order to address the problem of TFF classification. The method employed TFF images obtained via smartphone to comprise the data which would serve to provide the researchers with a clear representation of TFF classes. The TFF dataset consisted of differing dishes, backgrounds, and locations.

### 2.2 Convolutional Neural Network for Texture Recognition Using Transfer Learning[7]

They proposed a VGG 16 and Inception-v3 networks were trained using a texture dataset of muddied and clean cows. A novel dataset with 600 images that is similar to the actual texture dataset was introduced and used to train the networks. Transfer learning method was used to train the networks. ImageNet weights were trained using the alike dataset, then the newly trained weights were trained yet again using the actual texture dataset which had 584 images. The author used a novel CNN training method, which involved a middle training step training using transfer learning. The achieved validation accuracy was 95.5% which is considerably better than the state-of-the-art 87%. With inception v3 7 dimensionality is reduced hence as it is shown training the network with both Adam optimizer lead to higher validation accuracies with no overfitting.

### **2.3 MobileNets for Flower Classification using TensorFlow[8]**

In this paper, a classification of objects into their particular classes is always been significant tasks of machine learning. As the study of flower, categorizing particular class of flower is important subject in the field of Botany but the similarity between the diverse species of flowers, texture and color of flowers, and the dissimilarities between the same species of flowers, there still are some challenges in the recognition of flower images. Existing recent inception-v3 model of Google relatively takes more time and space for classification with high accuracy. In this paper, the author have shown experimental performance of MobileNets model on Tensor Flow platform to retrain the flower category datasets, which can greatly minimize the time and space for flower classification compromising the accuracy slightly. Their system build smaller and faster MobileNets application as flower classifier using width multiplier and resolution multiplier by trading off a rational amount of correctness to shrink size and latency.

### **2.4 Flower Species Recognition System using Convolution Neural Networks and Transfer Learning[4]**

The author have proposed a Deep learning approach using Convolutional Neural Networks (CNN) is used to recognize flower species with high accuracy. Feature extraction of images of flowers is performed using a Transfer Learning approach. A machine learning classifier like Logistic Regression or Random Forest is used on top of it to yield a higher accuracy rate. To get higher accuracy we have to construct a larger database with not only flower images, but also with leaves, fruits, bark etc. The proposed work is a quicker way to train a Convolutional Neural Network (CNN) with a smaller dataset and limited computational resource such as CPU. As there are millions of flower class around the world, this system could easily be adapted by training more number of flower species images to recognize different species around the world.

### **2.5 Object Recognition in Images using Convolutional Neural Network[6]**

They have proposed Object detection in remote sensing images has long been studied, but it remains challenging due to the diversity of objects and the complexity of backgrounds. In this letter, the author proposed an object detection method using convolutional neural networks (CNNs) in a coarse-to-fine manner. Coarse candidate regions that may contain objects are proposed in the coarse step, while in the fine step, fine candidate regions are cropped from coarse candidate regions, and are classified as objects or backgrounds. The author design a concise and efficient framework that can propose fewer candidate regions and extract more discriminative features. The framework consists of 2 eight-layer of CNNs that are well designed and powerful. Image samples are required to use CNNs to detect inshore ships, each of which should contain only one ship. But, the conventional image cropping method cannot generate such samples. To solve this problem, the author present an orientation-free image cropping method that can generate trapezium rather than rectangle samples, making inshore ship detection by CNN feasible. Experimental results on Google Earth images show that the proposed method outperforms existing state-of-the-art methods.

**TABLE 1**  
**ANALYSIS TABLE:**

Sr.No.	Title of paper	Technique	Advantages	Conclusion
1.	Thai Fast Food Image Classification Using Deep Learning[3]	<ul style="list-style-type: none"> <li>• Deep learning process</li> <li>• CNN</li> <li>• Google net dataset</li> </ul>	Increase the recognition accuracy by a greater amount.	This paper focus on mainly classify the Thai fast food using CNN and Google net dataset.
2.	Convolutional Neural Network for Texture Recognition Using Transfer Learning[7]	<ul style="list-style-type: none"> <li>• CNN</li> <li>• VGG-16</li> </ul>	Accuracy of textures is improved.	In this paper, the architecture of CNN and its layers are explained.
3.	MobileNets for Flower Classification using TensorFlow[8]	<ul style="list-style-type: none"> <li>• CNN</li> <li>• MobileNet</li> </ul>	Smaller and faster than other models	In this paper, MobileNet model is explained
4.	Flower Species Recognition System using Convolution Neural Networks and Transfer Learning[4]	<ul style="list-style-type: none"> <li>• Inception-v3</li> <li>• Xception</li> <li>• OverFeat</li> </ul>	Increase the recognition accuracy by a greater amount.	This paper focus to identify the flower species using deep CNN and it give best accuracy.
5.	Object Recognition in Images using Convolutional Neural Network[6]	<ul style="list-style-type: none"> <li>• Deep Neural Network</li> <li>• CNN</li> </ul>	Created the model in limited computing system.	In this paper, DNN is explained in detail.

### III. METHODOLOGY

The objective of the methodology is to classify the non-living object .The method depicted consists of four processes: (1) Input image; (2) Pre-processing; (3) Deep learning; and (4) classification.

Inception-v3 model is comprised of a large number of hidden layers including inception layers (ensemble of convolutional and pooling layers cascaded then concatenated). The inception layers have been shown to lead to significant improvement in learning capability of the network when trained with huge database such as the Imagenet. note that softmax layers is another name for activation layers as described earlier in the paper and the dropout means random deletion of a specific ratio of inputs and passing the rest to the next layers In transfer learning, when you build a new model to classify your original dataset, you reuse the feature extraction part and re-train the classification part with your dataset. Since you don't have to train the feature extraction part (which is the most difficult part of the model), you can train the model with less computational resources as well as training time.

Tensorflow is more uncomplicated than elegant. For data, the common MNIST dataset can be used. The architecture of model may include two Inception modules and one fully connected hidden layer before our output layer. You'll definitely have to use your GPU to run the code, or else it will take hours to days to train. If you don't have a GPU, you can verify to see if your model works by using just a couple hundred training steps. Depending on your computer, you might get a resource exhaust error and

