

# Laboratory Activities for Week 10:

## Build Your Own Image Classification in TensorFlow

SC310005 Artificial Intelligence  
Khon Kaen Business School

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**(10 Points)** Build Your Own Image Classification in TensorFlow

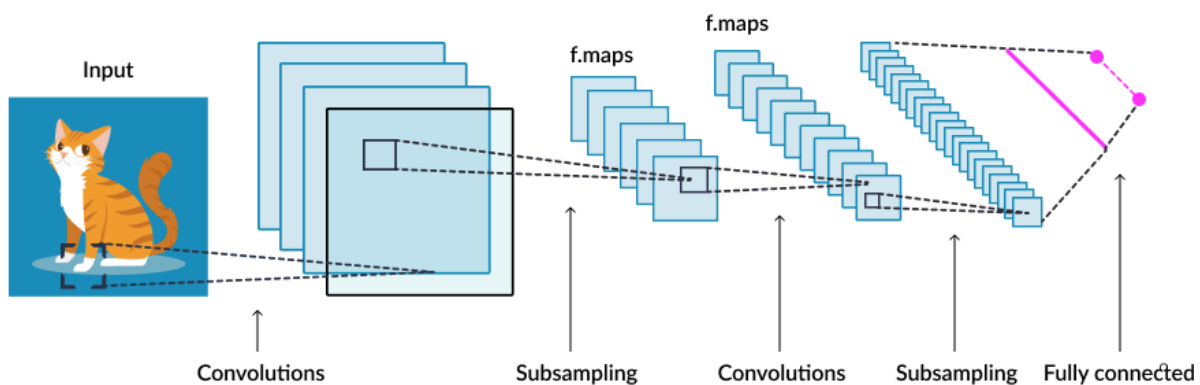
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### Dataset Overview and Objectives

In this assignment, you will be working with a dataset containing images of various objects. The objective is to build an image classification model using TensorFlow that can accurately classify these images into predefined categories. This assignment will help you understand the fundamentals of image classification, TensorFlow, and neural network architectures.

### Motivation:

Image classification is a fundamental task in computer vision with applications ranging from medical diagnosis to self-driving cars. Understanding how to build image classification models equips you with essential skills for solving real-world problems in various domains.



## Assignment Objectives:

- Understand the basics of image classification.
- Gain proficiency in building neural network models using TensorFlow.
- Learn how to preprocess image data for training neural networks.
- Explore different neural network architectures and their impact on model performance.
- Understand the importance of data augmentation and regularization techniques in improving model generalization.

## Objective:

Your objective is to build a convolutional neural network (CNN) model using TensorFlow to classify images into predefined categories. You will explore different CNN architectures, preprocess the image data, train the model, and evaluate its performance using appropriate metrics.

## Assignment Problem:

You are provided with a dataset containing images of various objects such as animals, vehicles, and household items. The task is to build a robust image classification model that can accurately classify these images into their respective categories. You can modify the architecture, parameters, or any other aspect of the model to improve its performance.

## Task for Students:

- ☐ **Data Collection:** Explore the dataset to understand its structure, size, and the distribution of different classes.
- ☐ **Data Preprocessing:** Preprocess the image data by resizing, normalizing, and augmenting images to enhance the model's ability to generalize.
- ☐ **Model Building:** Experiment with different CNN architectures such as VGG, ResNet, EfficientNet, or your custom architecture. Adjust the number of layers, filter sizes, and other hyperparameters to optimize model performance.
- ☐ **Model Training:** Train your model using the preprocessed image data. Monitor the training process and tune the model as needed to improve its performance.
- ☐ **Model Evaluation:** Evaluate the trained model on a separate validation or test set using appropriate evaluation metrics such as accuracy, precision, recall, and F1-score.

## Data Dictionary:

**Image:** The input data consists of images of various objects.

**Labels:** Each image is associated with a label indicating the category it belongs to (e.g., cat, dog, car, airplane).

**Note:** You are encouraged to explore additional techniques such as transfer learning, fine-tuning, or regularization to improve the model's performance and enhance your understanding of deep learning concepts.

This assignment will provide you with valuable hands-on experience in building and training image classification models using TensorFlow, preparing you for more advanced applications in computer vision and deep learning.

