Laboratory Activities for Week 11:
Build Your Own Deep Learning Architecture

SC310005 Artificial Intelligence
Khon Kaen Business School

https://github.com/kaopanboonyuen/SC310005_ArtificialIntelligence_2023s1

(10 Points) Build Your Own Deep Learning Architecture

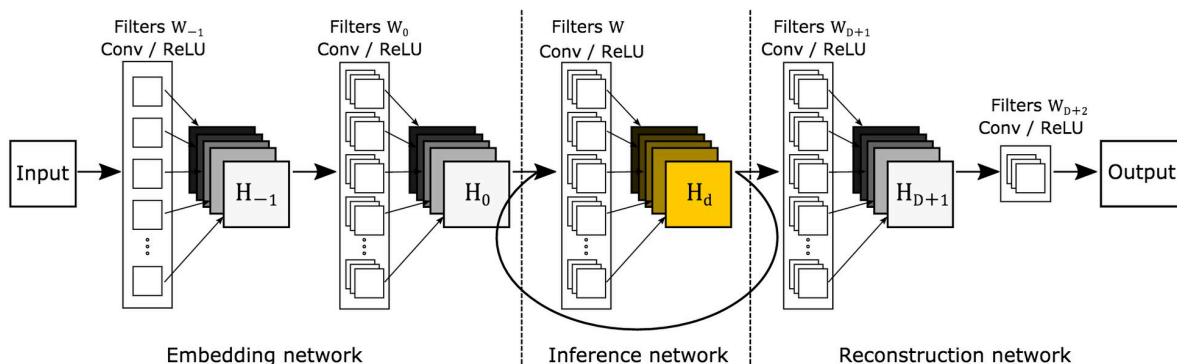
Motivation:
Deep learning architectures play a crucial role in solving various complex tasks such as image classification, object detection, and natural language processing. Understanding how to design and implement your own deep learning architecture is essential for mastering machine learning techniques and developing innovative solutions.

Assignment Objectives:
- Gain hands-on experience in designing deep learning architectures.
- Understand the importance of selecting appropriate layers, activation functions, and parameters.
- Learn how to optimize network architectures for specific tasks.
- Develop problem-solving skills and critical thinking in machine learning.

Objective:
The objective of this assignment is to design and implement your own deep-learning architecture for a given task or dataset. By creating custom neural network architectures, you will gain insights into the design principles and optimization strategies involved in building efficient models.

Before proceeding with the assignment, please note the following:

Feel free to adjust the **number of epochs and other parameters** as needed.

However, it is required that you use Early Stopping with the original settings from the provided

Colab Notebook.

Homework 1: **Create deep learning architecture from the provided table**

Assignment Specifications:

Given the following table describing a deep learning architecture, design and implement the corresponding neural network using TensorFlow2.

Block	Layer Type	Filters	Kernel Size	Activation Function	Padding	Pooling (Size/Strides)
1	Convolutional	64	(5, 5)	ReLU	Same	Max Pooling (2x2/2x2)
	Convolutional	64	(4, 4)	ReLU	Same	
	Convolutional	64	(3, 3)	ReLU	Same	
2	Convolutional	128	(7, 7)	Swish	Same	Max Pooling (2x2/2x2)
3	Convolutional	256	(3, 3)	ELU	Same	Max Pooling (2x2/2x2)
4	Convolutional	512	(5, 5)	Tanh	Same	Max Pooling (2x2/2x2)
	Convolutional	512	(5, 5)	Tanh	Same	

5	Convolutional	512	(3, 3)	Tanh	Same	Max Pooling (2x2/1x1)
	Convolutional	512	(3, 3)	Tanh	Same	
	Convolutional	512	(3, 3)	Tanh	Same	
6	Convolutional	512	(3, 3)	ReLU	Same	Max Pooling (2x2/2x2)
	Convolutional	512	(5, 5)	ReLU	Same	
	Convolutional	512	(3, 3)	Tanh	Same	
Flatten	-	-	-	-	-	-
Fully Connected	Dense	2048	-	ReLU	-	-
	Dense	1024	-	ReLU	-	-
	Dense	512	-	ReLU	-	-
Output	Dense	Depends on the number of classes	-	Softmax	-	-

Submission Requirements:

- ☐ Provide the code implementation of the deep learning architecture.
- ☐ Include a brief explanation of the architectural design choices.
- ☐ Train and evaluate the model on an appropriate dataset.
- ☐ Report the model's performance metrics.

Assignment Specifications:

☐ Design and implement your custom deep learning architecture for a given classification or regression task.

Submission Requirements:

☐ Provide the code implementation of your custom deep learning architecture.
☐ Explain the rationale behind your architectural design decisions.
☐ Train and evaluate the model on a suitable dataset.
☐ Compare and analyze the performance of your model with existing architectures.