ECS659U/659A Coursework – The problem

The Problem

- CIFAR-10 classification
  - Dataset is readily available online
- Classify every image in terms of 1 out of 10 classes
- Standard task for lectures & labs
- You will build a model on the training set & evaluate it on the test set

ECS659U/659A Coursework – Your Task

- Implement a **specific** model (see later) to solve the problem
  - ➢ **If you solve it using your own model you will get no marks**
- Implement the training pipeline to train the model
- Explore techniques from weeks 5-8 and from external sources
- Goal to get the highest possible accuracy

Specific note

- This is an individual assignment
- No collaboration is allowed.
- Do not use public slack channels to ask a question.
- Contact us in private

ECS659U/659A Coursework – Deliverables

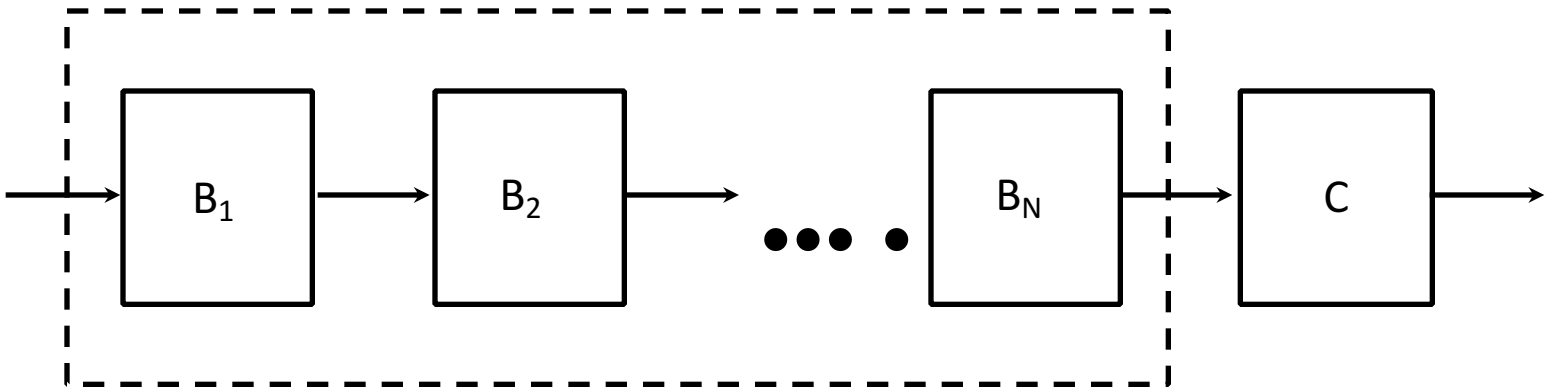
Deliverables

- They are detailed in the CW sheet.

ECS659U/659A Coursework – The Model

The Model

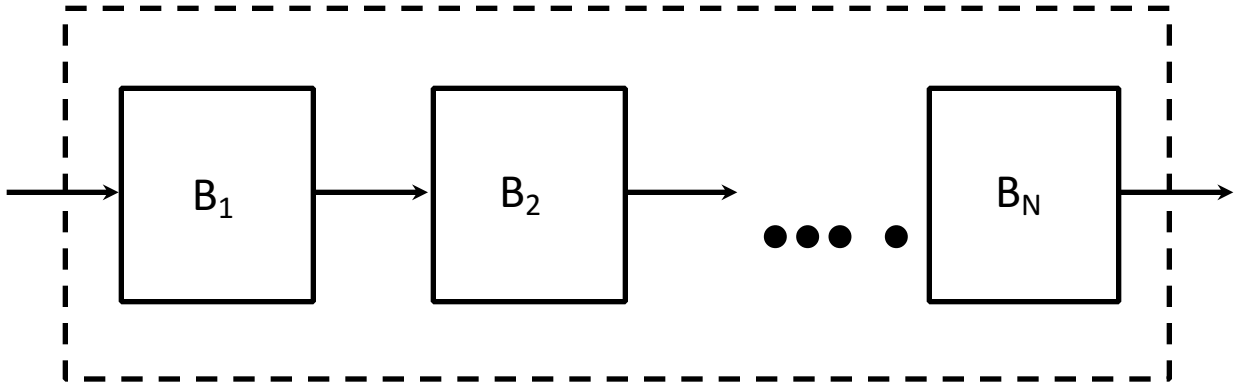
- An architecture to process images based on Convolutional Neural Networks
- Model architecture consists of Backbone $(B_1, \ldots, B_N)$ and Classifier



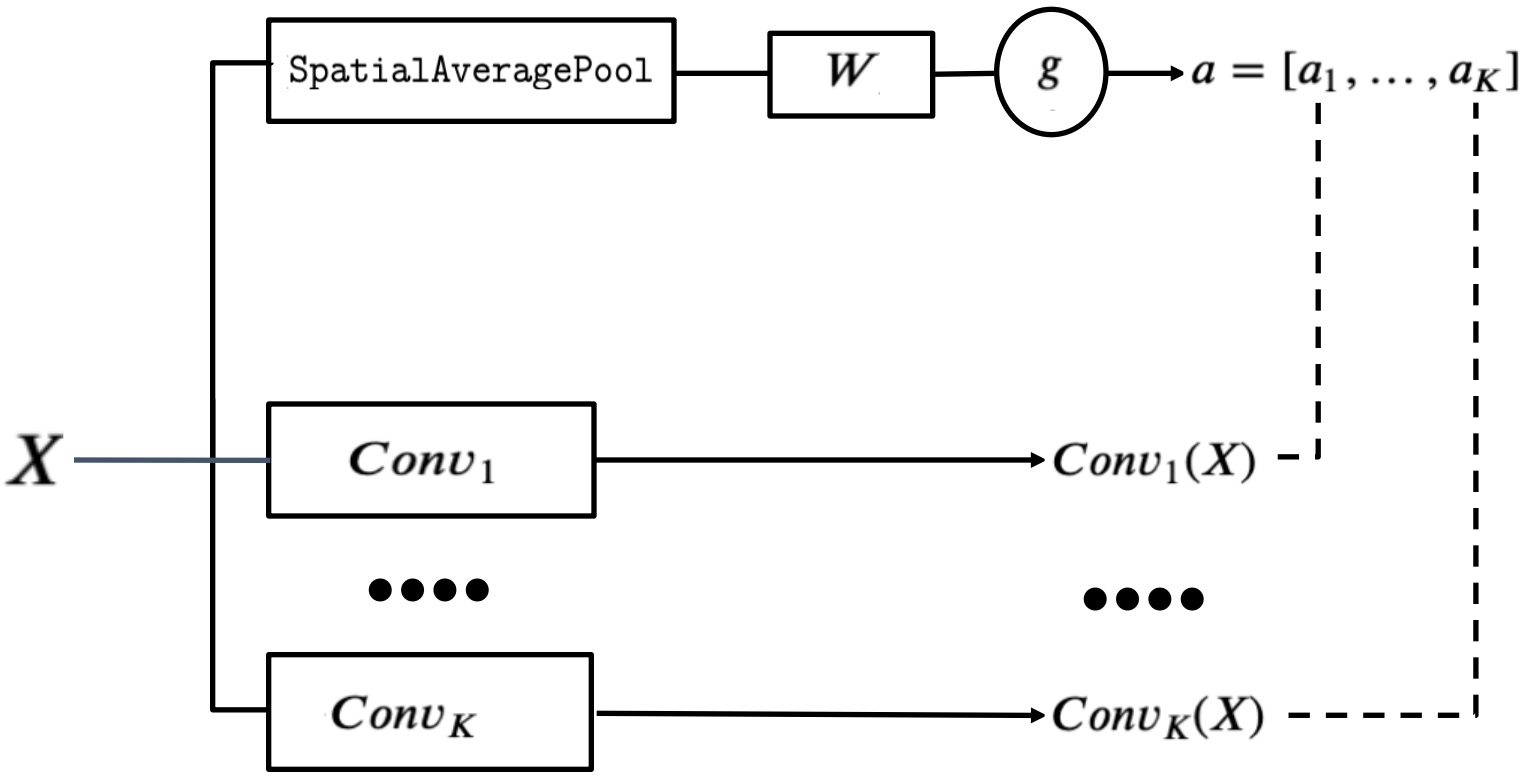
ECS659U/659A Coursework – The Backbone

The Backbone

- Consists of N Blocks. The basic (minimum) implementation for each block consists of:
  - 1 Linear/MLP layer predicting a vector $a = [a_1, \ldots, a_K]$ with K elements from input tensor X:
    - $a = g(\texttt{SpatialAveragePool}(X)W)$, where g is a non-linear activation function
    - $\texttt{SpatialAveragePool}(X)$ calculates the spatial average **per channel** returning a vector of d channels
  - K Conv layers which are combined using a to produce a single output: $O = a_1 Conv_1(X) + \cdots + a_K Conv_K(X)$
- Other components can be added based on Weeks 5-8!!



ECS659U/659A Coursework – The Block

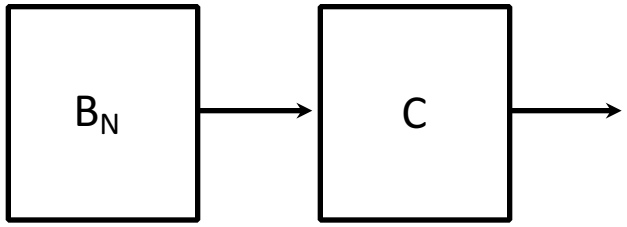


$$O = a_1 Conv_1(X) + \cdots + a_K Conv_K(X)$$

ECS659U/659A Coursework – The Classifier

The Classifier

- Takes as input the output of the last block
- It computes a mean feature $f = \texttt{SpatialAveragePool}(O_N)$, O_N here is the output of the N_{th} block
- It passes f to a classifier
  - can be a softmax regression classifier, or an MLP
  - check also weeks 5-8



ECS659U/659A Coursework – Assessment

1. Read dataset and create dataloaders
2. Create the model: 40%.
3. Create the loss and optimizer: 5%.
4. Write the training script to train the model. Provide in the report: 30%

    - the curves for the evolution of loss
    - the curves for the evolution of training and validation (test) accuracies.
    - all training details including hyper-parameters used.

1. Final model accuracy on **CIFAR-10 Validation Set**:

    - acc >90% : 20%
    - 85 < acc < 90% : 15%
    - 80 < acc< 85% : 10%
    - 70 < acc< 80% : 5%
    - acc < 70% : 0%

- Please use the coursework guidelines to create the model.
- **If you use your own architecture (or some other model) you will get no marks for Task 2, i.e. -40 marks!**