Blue text on a black background

Description automatically generated

**המחלקה להנדסת חשמל ואלקטרוניקה**

**מערכות לומדות ולמידה עמוקה (31245)**

**Lab 8 report**

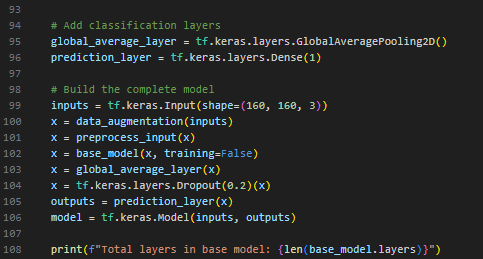
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| --- | --- |
| פרנסיס עבוד |  |

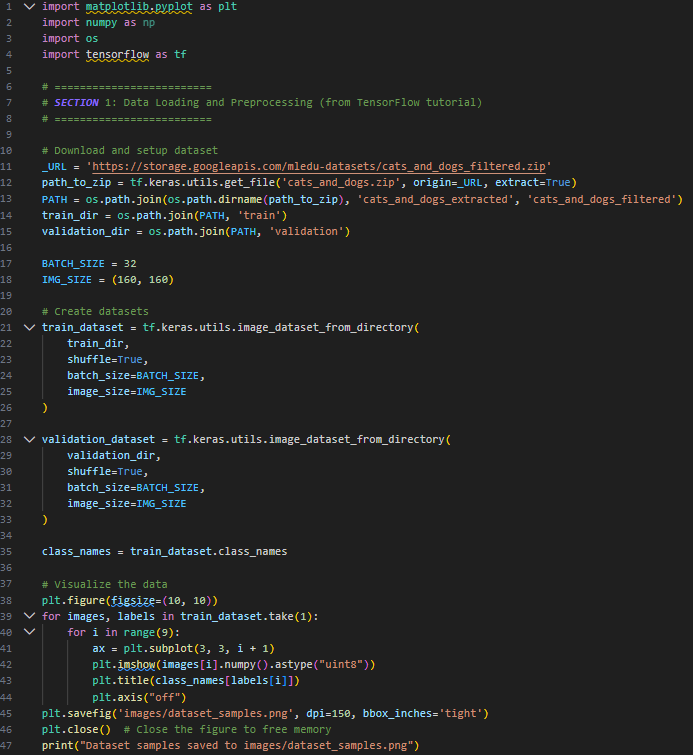
**Prepared for: Dr. Amer Adler**

**Date: 13/06/2025**

**EX.1:**

Load the following example into Colab: “Transfer learning with a pretrained ConvNet”: <https://www.tensorflow.org/tutorials/images/transfer_learning>

**A screen shot of a computer program

AI-generated content may be incorrect.Code:**

**Output:**

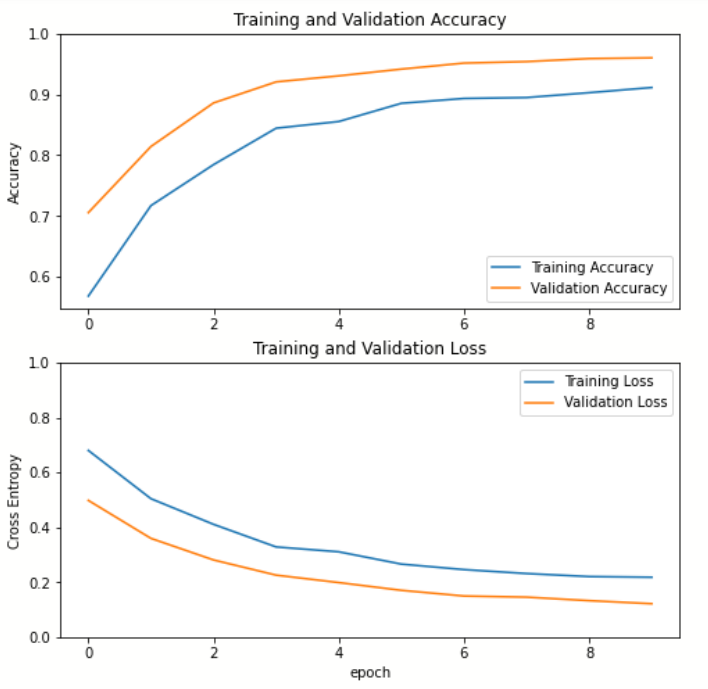
* **Dataset sample:**

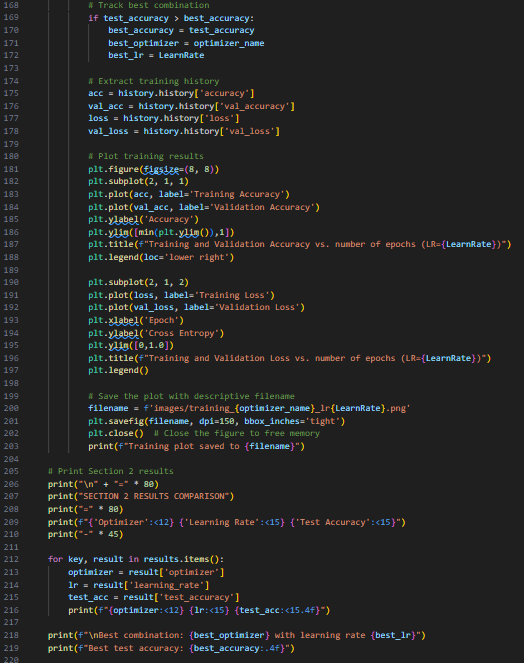
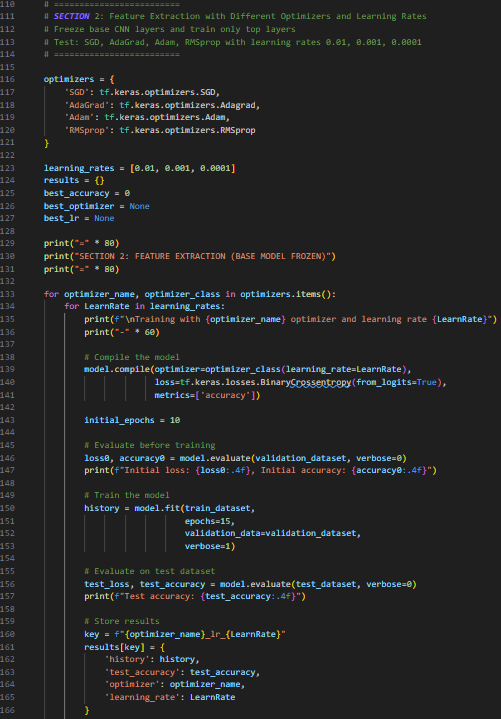
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* **Data augmentation:**

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**Ex.2:**

Freeze the base CNN layers (MobileNetV2 with 154 layers), and train only the top layers. Provide a loss graph and accuracy graph (vs. epoch number) for 3 different learning rates: 0.01, 0.001, 0.0001 and using SGD, AdaGrad, Adam and RMSprop optimizers. Which learning rate & optimizer provided the best test-set accuracy results?

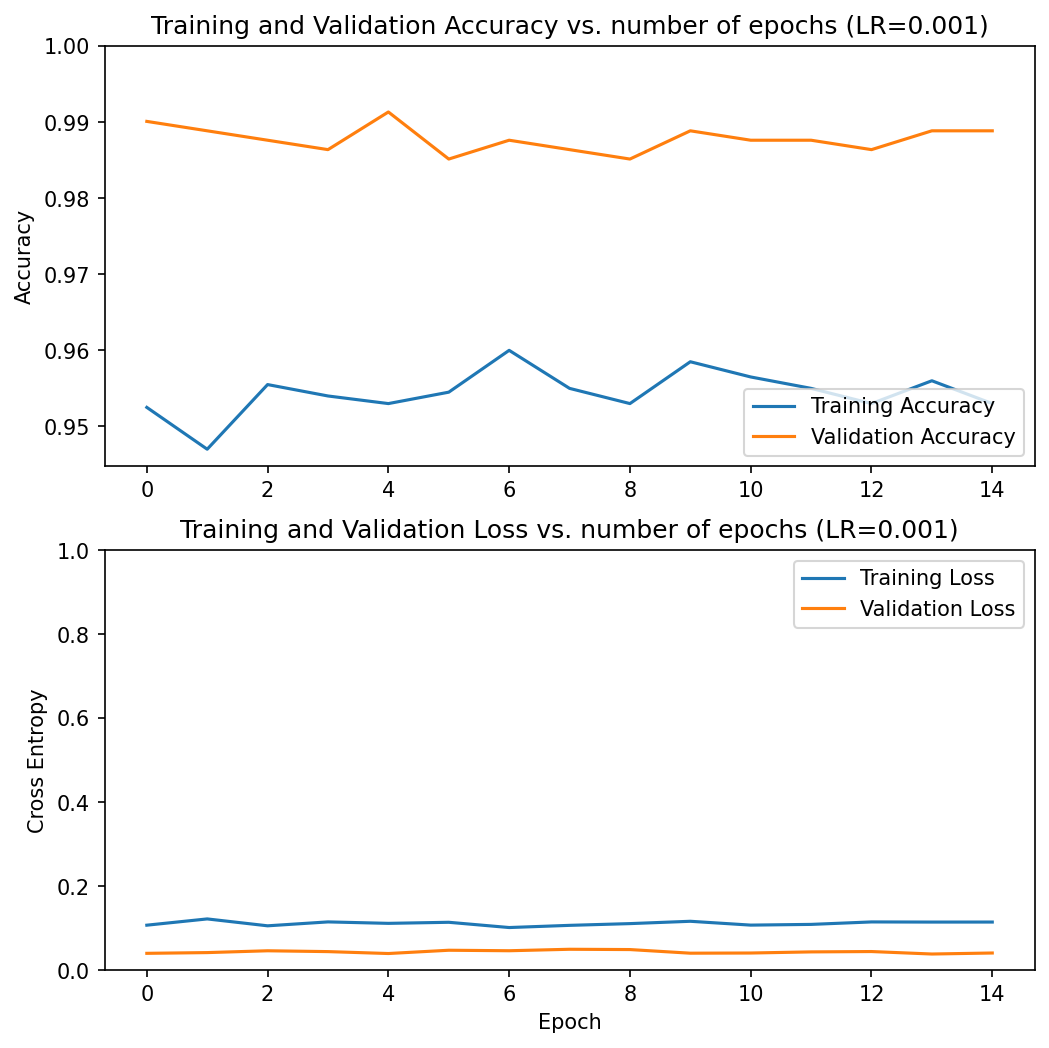
**Code:**

**Output:**

* **SGD:**
* **Learning rate set to 0.01:**

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* **Learning rate set to 0.001:**

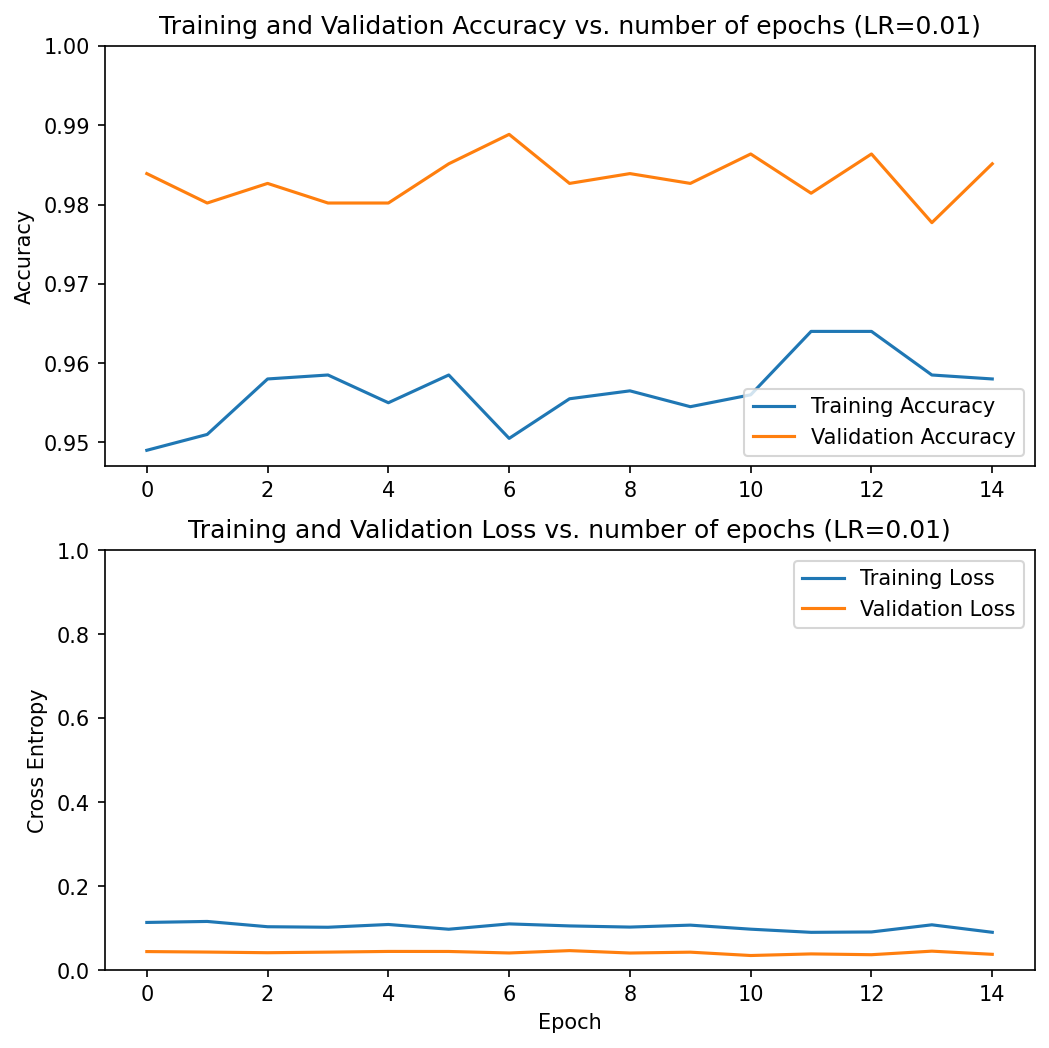


* **Learning rate set to 0.0001:**

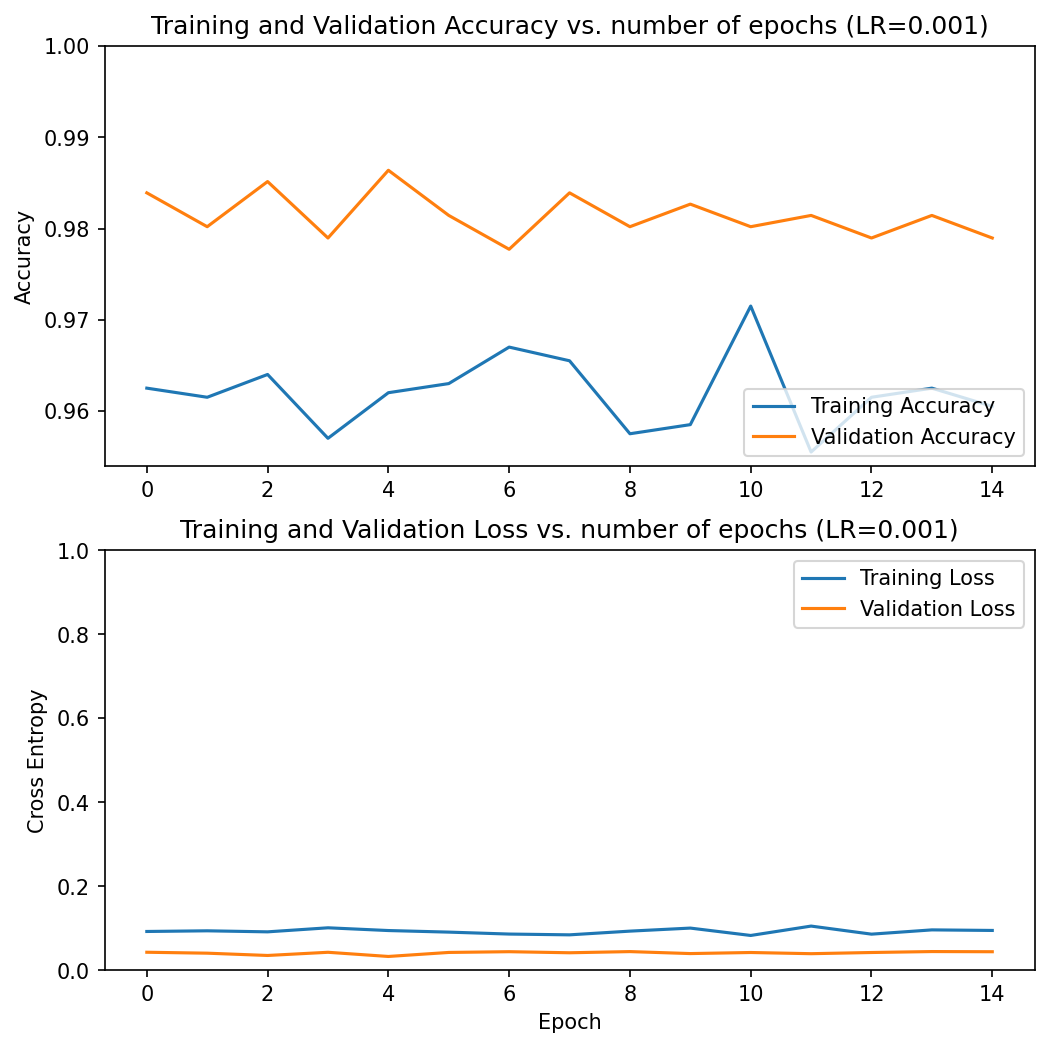
A graph of a training and validation accuracy

AI-generated content may be incorrect.****

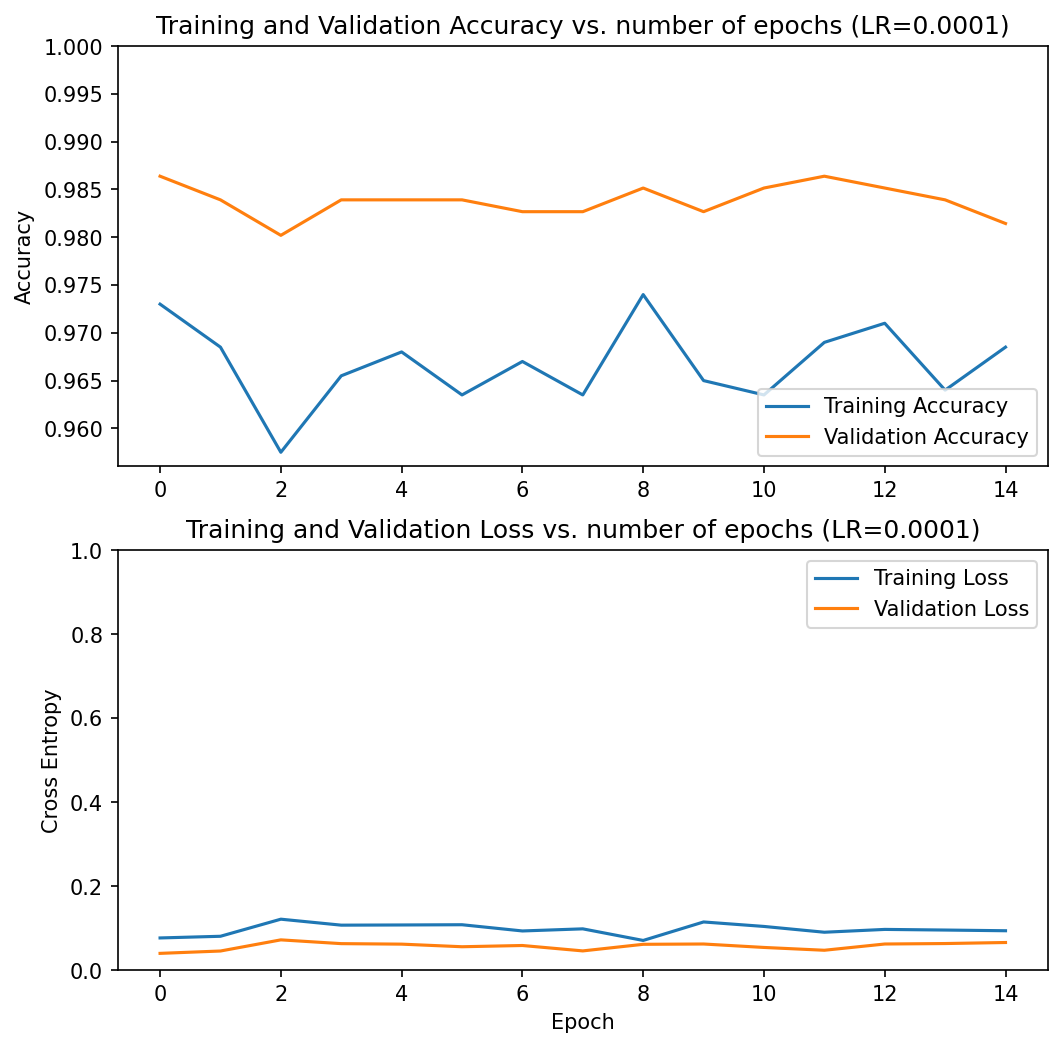
* **AdaGrad:**
* **Learning rate set to 0.01:**

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* **Learning rate set to 0.001:**

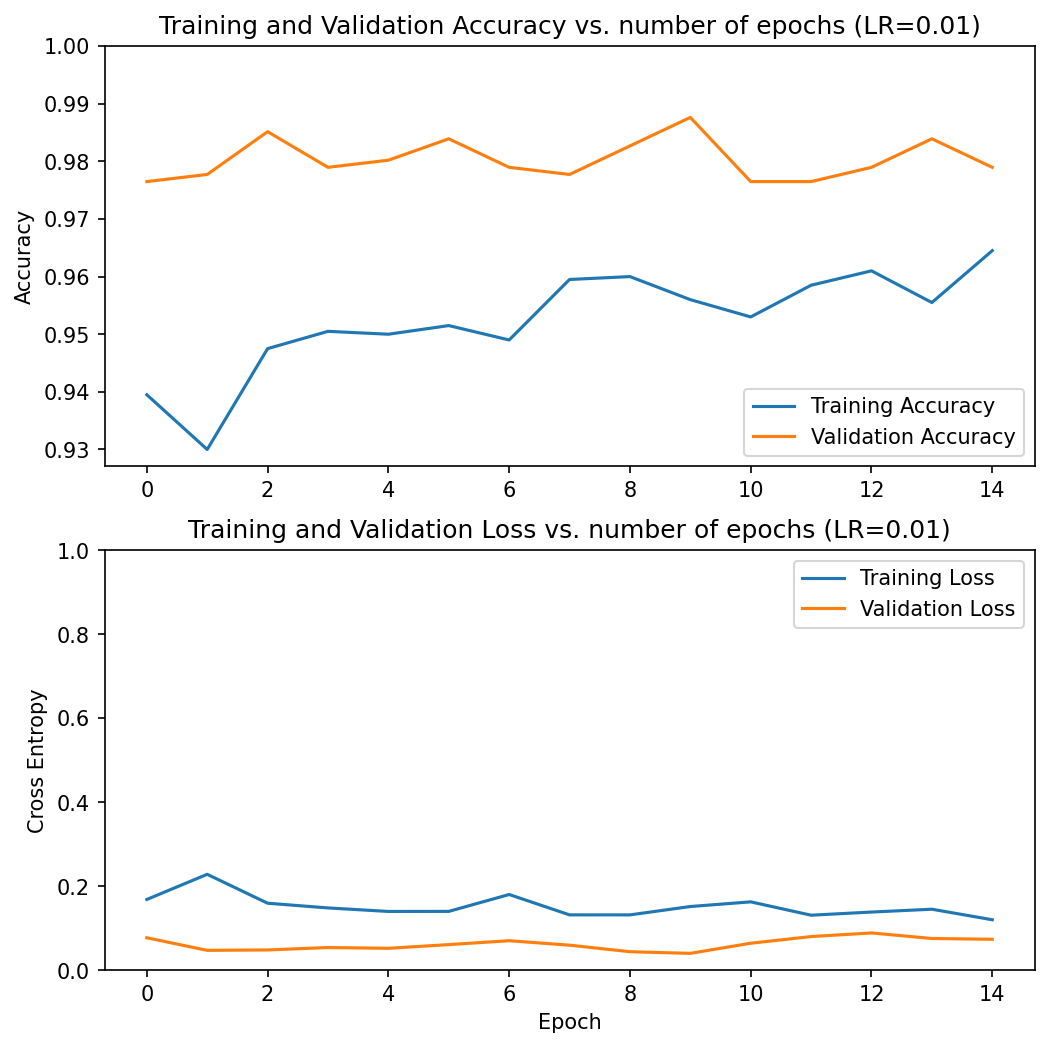


* **Learning rate set to 0.0001:**

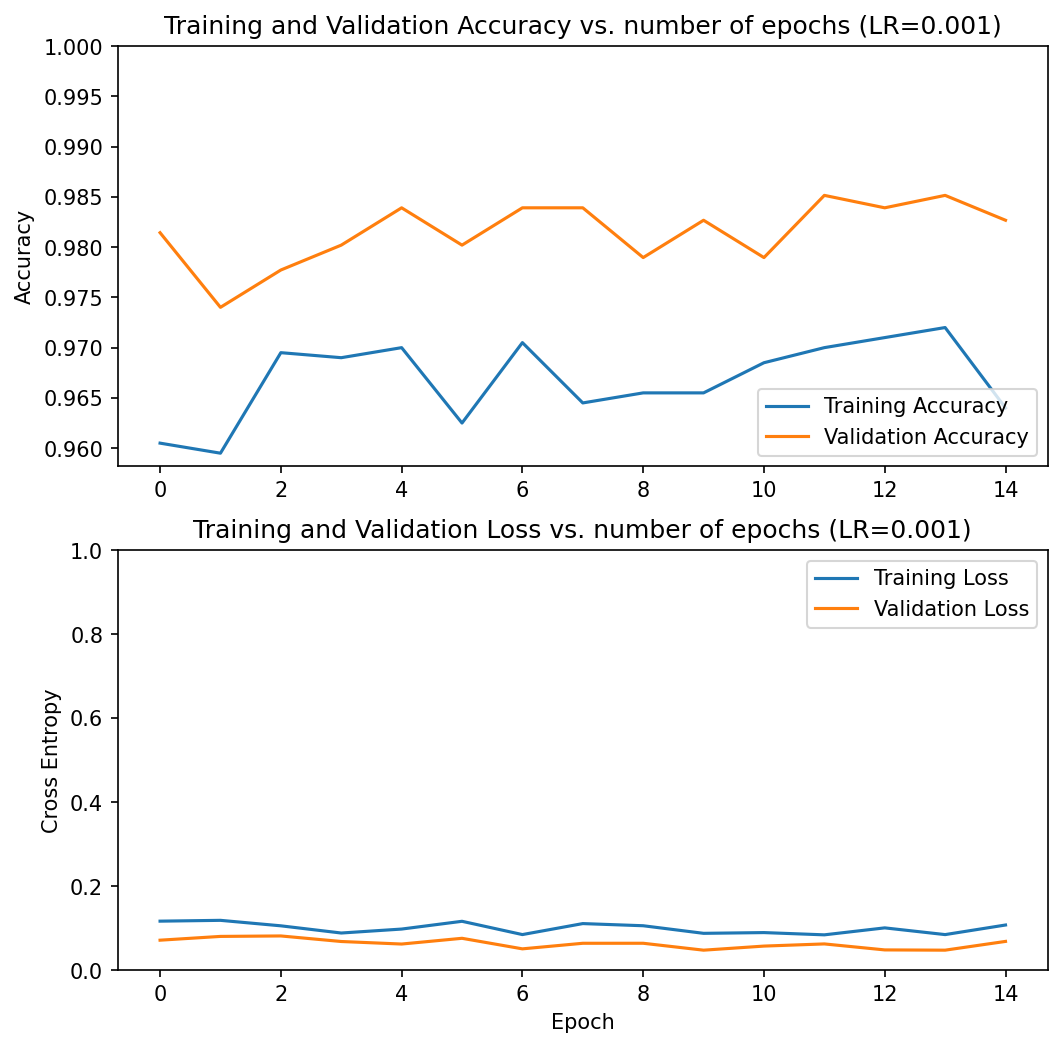


* **Adam:**
* **Learning rate set to 0.01:**

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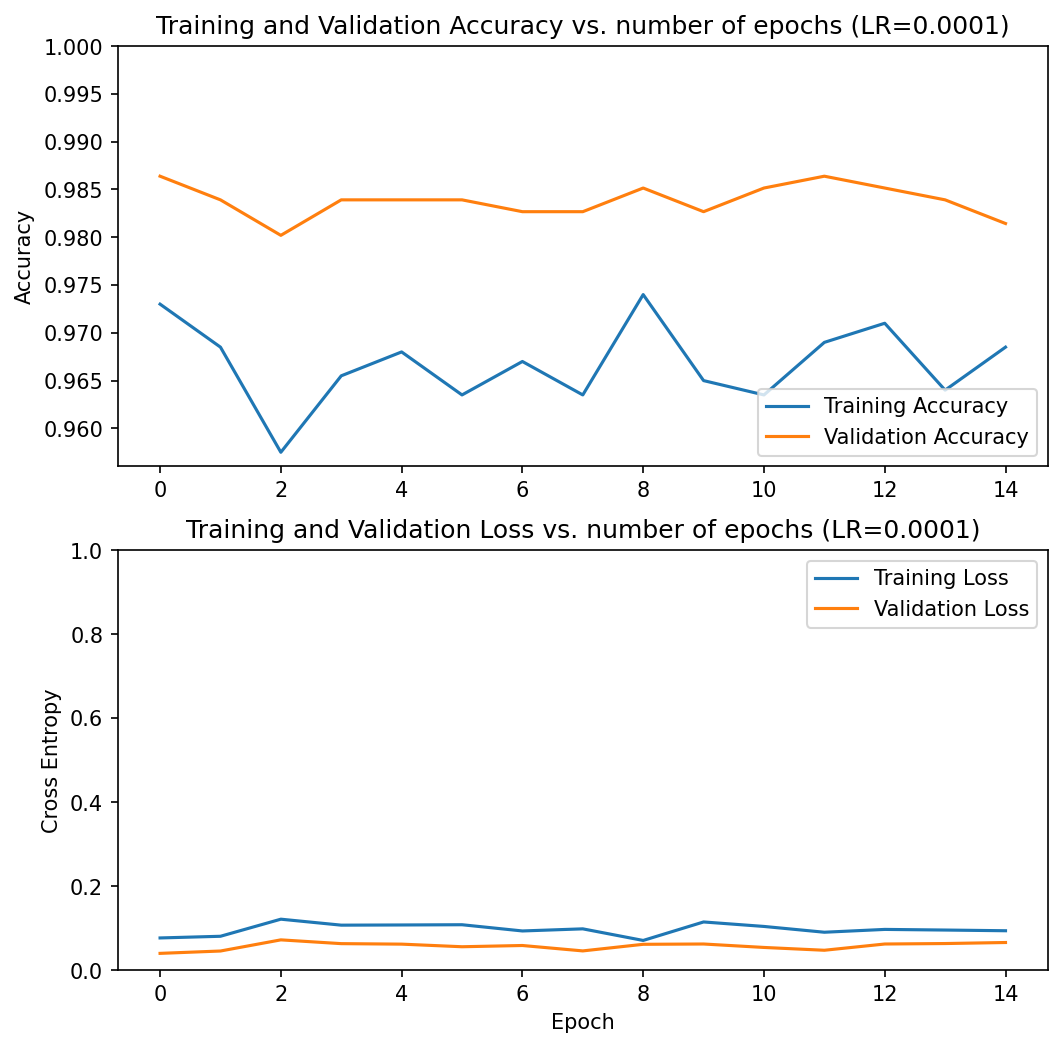
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* **Learning rate set to 0.001:**



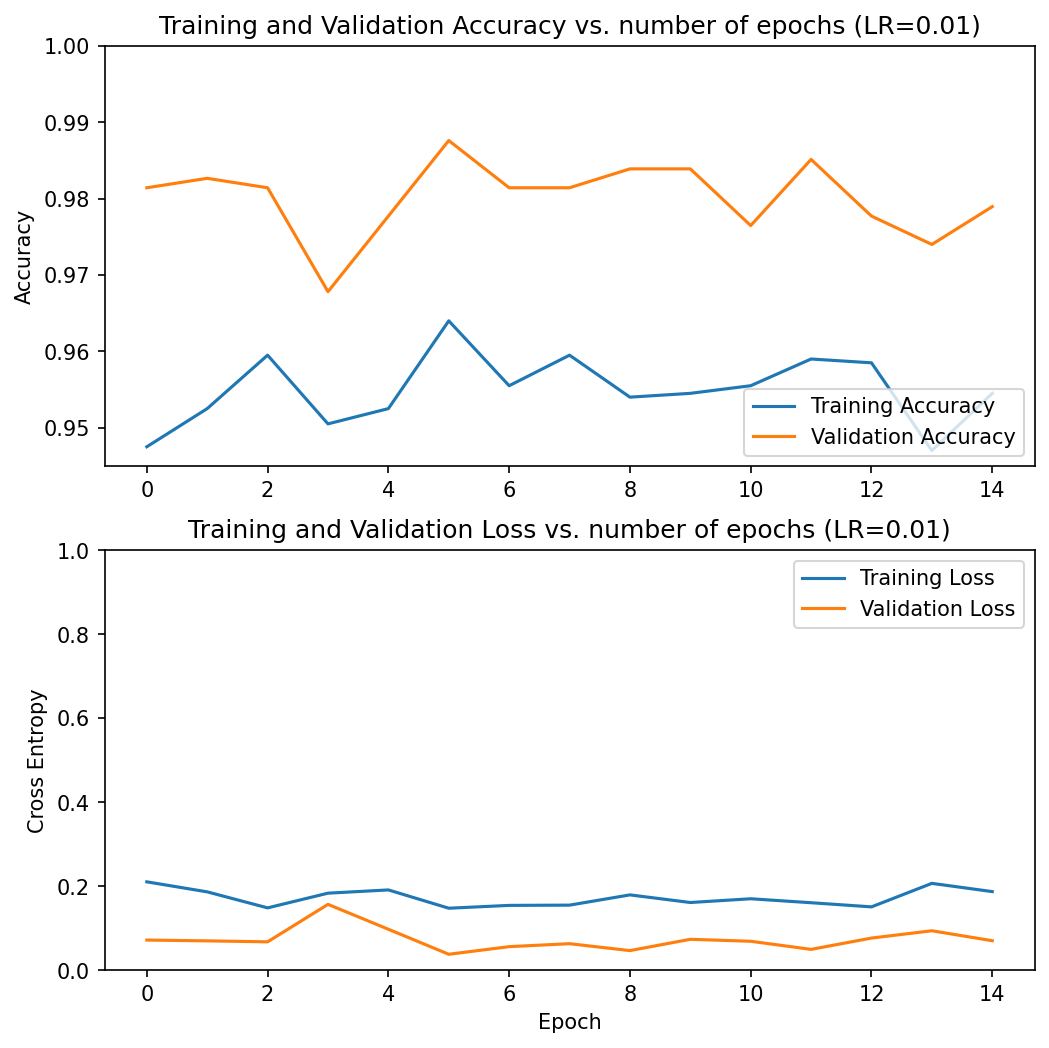
* **Learning rate set to 0.0001:**





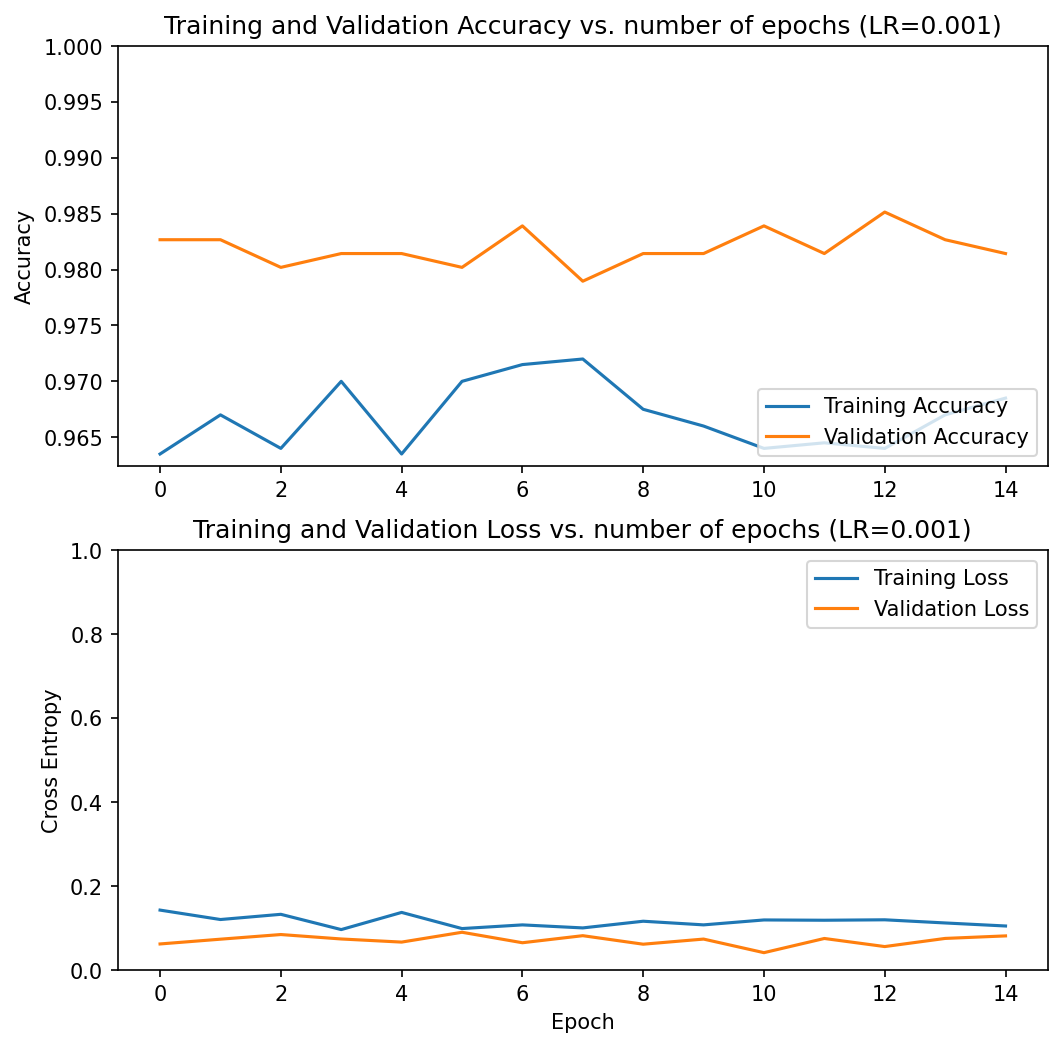
* **RMSprop:**
* **Learning rate set to 0.01:**

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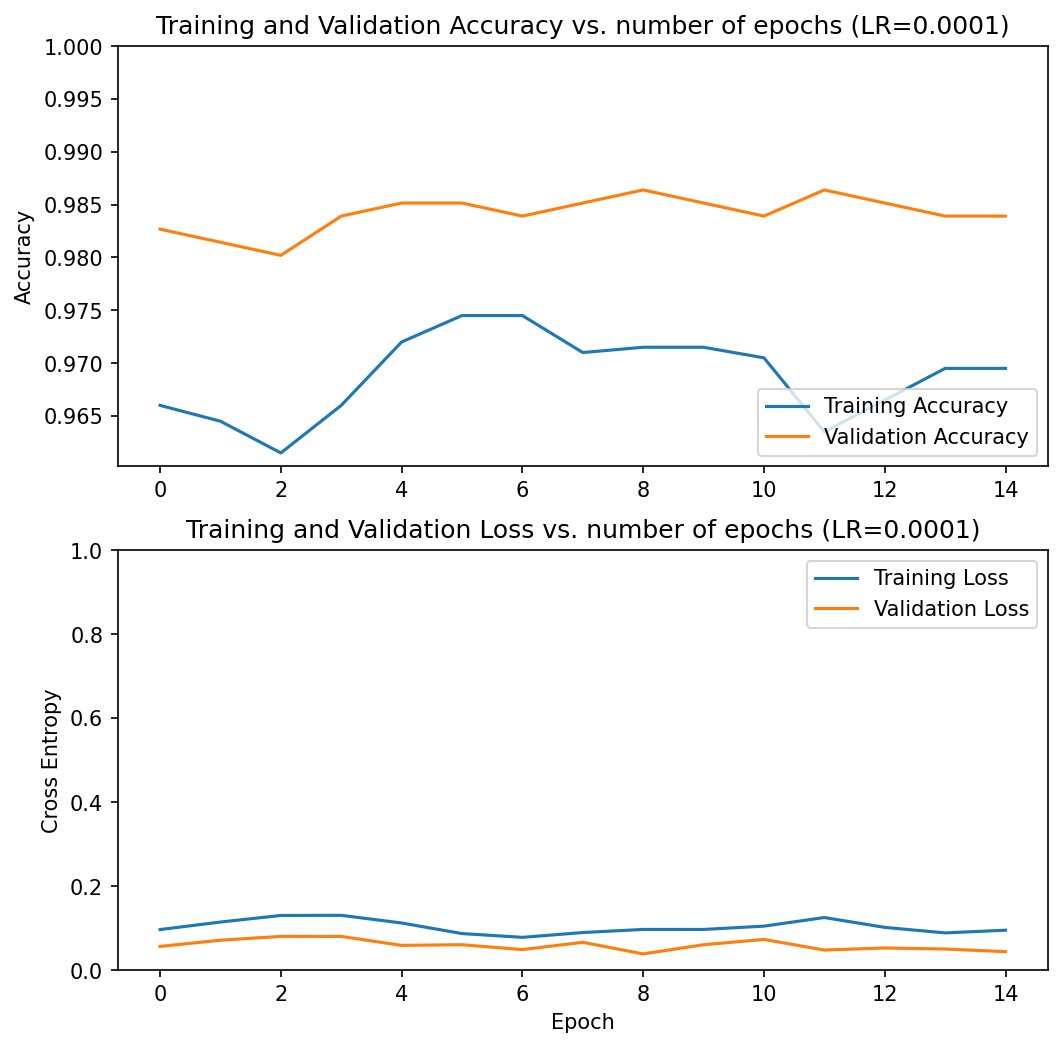
* **Learning rate set to 0.001:**



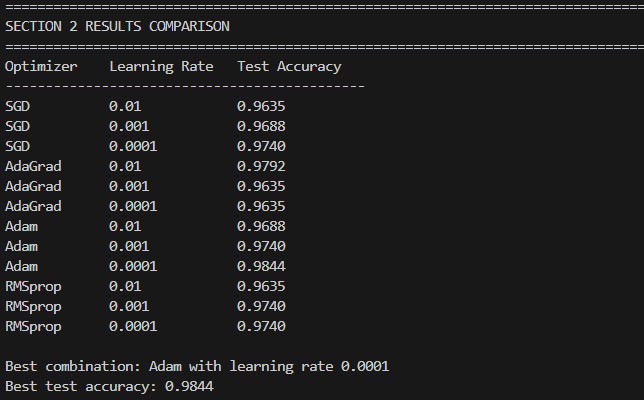


* **Learning rate set to 0.0001:**



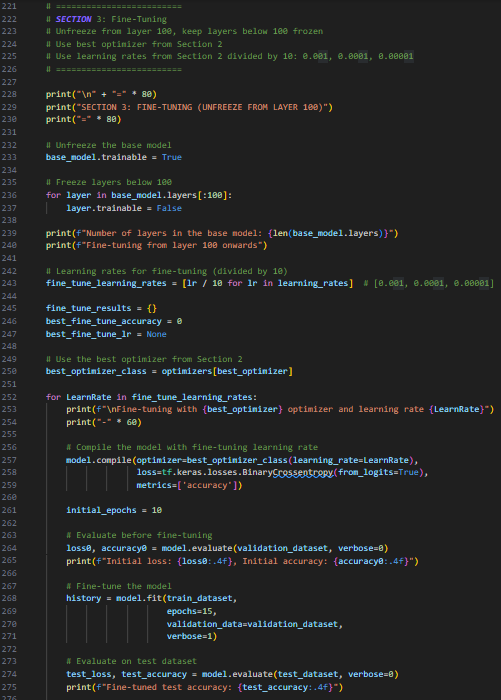
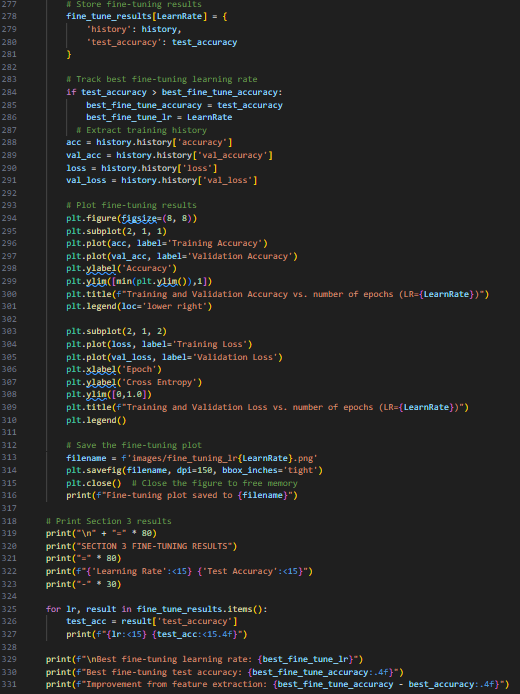


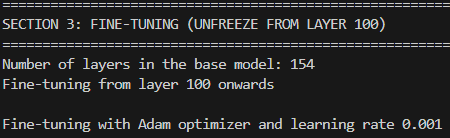
**RESULTS COMPARISON**



**Ex.3:**

Perform fine-tuning of the base network (starting from layer 100, while layers below 100 are frozen) and the inference layers, using the best optimizer from section 2. Use the learning rates from section 2, after division by 10. Which learning rate provided the best test-set accuracy results?

**Code:**

**Output:**

* **Learning rate set to 0.001:**

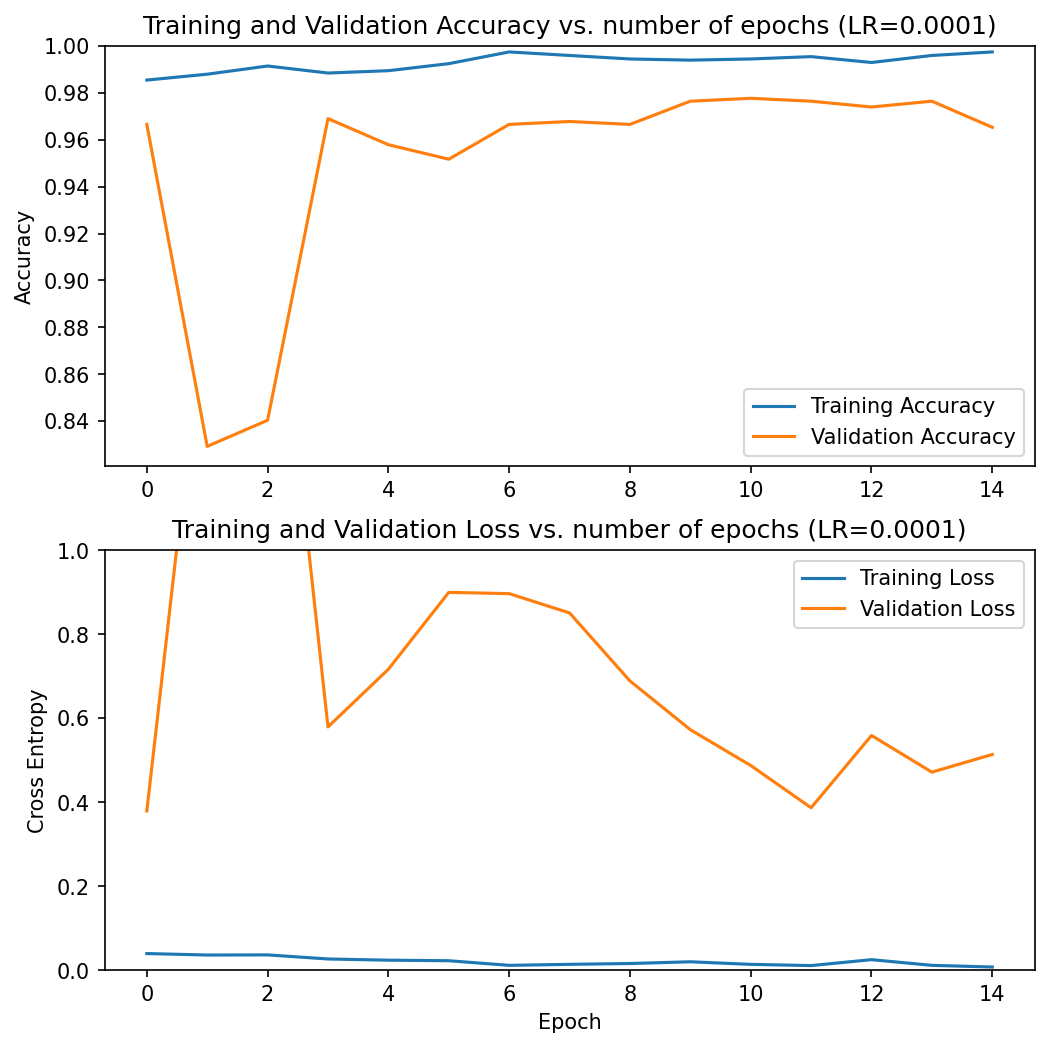


**A graph of training and validation loss

AI-generated content may be incorrect.**

* **Learning rate set to 0.0001:**

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* **Learning rate set to 0.00001:**

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A graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.**FINE-TUNING RESULTS**

**FINAL SUMMARY**

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