! This class has been made inactive. No posts will be allowed until an instructor reactivates the class.

note 107 views

HW6: CNNs and Transfer Learning

Your goal is to:

- Train an MNIST CNN classifier on just the digits: 1, 4, 5 and 9
- - Architecture (suggested, you may change it):
  - 1. "*conv1*": conv2d 3x3x4, stride=1, ReLU, padding = "SAME"
    2. "*conv2*": conv2d 3x3x8, stride=2, ReLU, padding = "SAME"
    3. "pool": pool 2x2
    4. "*fc1*": fc 16
    5. "*fc2*": fc 10
    6. "*softmax*": xentropy loss, fc-logits = 4 (we have 4 classes...)
  - (I suggested scope "*names*" here so it's easier to reference)
  - Optimizer: ADAM
  - 5 epochs, 10 batch size

- Use your trained model's weights on the lower 4 layers to train a classifier for the rest of MNIST (excluding 1,4,5 and 9)
  - Create new layers for the top (5 and 6)
  - Try to run as few epochs as possible to get a good classification (> 99% on test)
  - Try a session with freezing the lower layers weights, and also a session of just fine-tuning the weights.
    - Use (for speed) a constraint on the optimizer for freezing:

```
train_vars = tf.get_collection(tf.GraphKeys.TRAINABLE_VARIABLES, scope="fc2_023678|softmax_023678")
training_op = optimizer.minimize(loss, var_list=train_vars)
```

Report your:

- Test loss curve on MNIST-1459
- Test loss curve on transferred MNIST-023678:
  - with fine-tuning everything
  - with frozen layers up to fc2 (and not including)
- Final execution graph (provided code)

Bonus 1 (5pt):

- Apply dropout regularization after conv1, conv2 and fc1

Bonus 2 (5pt):

- Visualize the filter maps (activations) for conv1, conv2 and pool

Due: Tue 12/7/2017 12pm
mnist_transfer_learningskeleton.ipynb
The skeleton codes are provided and can be opened with Jupyter Notebook

Update 12/7: Blackboard submission open, closes 12pm (noon). No late fees for submitting until 12p noon.

Submission details:
Please submit your .ipynb file with the solutions.
Do not change the order of the original notebook in terms of cells.
We use the cells to automatically run and test your code (so if you add/remove a cell it breaks the numbering).
Keep the outputs of the cells, don't clear them.

Update 12/2: Due date pushed back to 12/7.

// ===== Update: Dec 6 =====
1. Make a graph of test loss curve with MATLAB on MNIST-1459
2. Make two graphs of test loss curve with MATLAB on MNIST-023678 (two conditions)
3. Final execution graph
4. Visualized filter maps for bonus 2
Put all **five** into a pdf file: result.pdf (This should take less than 20 mins to do)
Create a root folder exactly like previous homeworks FirstName_LastName_SBUID,
put your .ipynb and result.pdf under the root folder, zip it and upload it.

Put all your codes into the .ipynb file, separate file will not be processed.

#pin

hw6

Updated 26 days ago by Roy Shilkrot and Fan Wang

followup discussions *for lingering questions and comments*

Resolved Unresolved

Anonymous 1 month ago Professor,
Can you please postpone the date to 12/7,as we have exams and other deadlines for other courses.I hope you understand .
Thanks.

Brandon Cuadrado 1 month ago I agree. It is hard to fit this assignment into the next 5 days on short notice. An extension would be very helpful.

Roy Shilkrot 1 month ago If we postpone then we can't do another assignment.
I'm sure some of you may be happy about that - but keep in mind you will be missing on exciting more advanced Deep Learning models...

This exercise is very easy. All that's missing are ~10 lines of code that I already started for you (in embedded comments), and should be easy to fill-in.

If many more people feel the same - we might extend.

Brandon Cuadrado 1 month ago That is reassuring. Also, when would an additional assignment be scheduled to be due? During finals week?

Anonymous 1 month ago Hi Professor, Yes, actually we have other exams and also we have to work on the project too. Please can you extend the deadline?

Anonymous 1 month ago Hello Professor,
We have a final Exam on that Day and another one in 2 days following that. Requesting to please postpone the Date to anytime over 7th to 10th.

Regards

Anonymous 1 month ago Please don't postpose the assignment as the next assignment would then fall into the 2nd week of Dec which is very much packed for everyone.

Anonymous 1 month ago I deny to the just previous comment. Where is it leading to ?
Even if this assignment is not postponed, the next assignment will fall in the second week. The Finals are lined up and everyone is packed up from 6th to 18th.

Anonymous 1 month ago It would have been nice to work on advanced deep learning models. But considering time constraints, its best that hw6 deadline be postponed and hw7 be taken off. Many of us are planning for project instead of exam which is equivalent to 2 assignments. Students are free to use advanced deep learning techniques in their projects if they want. I agree that there might be just 10 lines of code. For those 10 lines of code, one must know the concepts of deep learning, tensorflow, etc. For a beginner like myself, its a big task. Hence, I feel it will be best to postpone.

Anonymous 1 month ago For those of us how are not doing projects, we would like to learn more using assignments alone.

So A good idea would be to give HW7 as optional (extra credit or something)

Anonymous 1 month ago “Those of us”. - this cannot be considered :)
Its a class for everyone ,not a majority of “those of us” I guess.Everyone is interested to learn,but its just the week would be packed,and other courses also have exams,projects.

Anonymous 1 month ago +1,

Please extend the deadline, CNN is completely new for some students, so we need some time to figure out the process and also we have our final exam on 5th of December.

Anonymous 1 month ago Yes, a good option would be to have deadline HW6 postponed and HW7 made optional for extra credit. We've a final on 5th, plus project submissions on 6th and 7th(which would come in between the HW7 deadline)

Resolved Unresolved

Anonymous 1 month ago “Those of us”. - this cannot be considered :)
Its a class for everyone ,not a majority of “those of us” I guess.Everyone is interested to learn,but its just the week would be packed,and other courses also have exams,projects.

Anonymous 1 month ago So I guess HW7 as optional would be the perfect thing :)

Anonymous 1 month ago Optional +1

Resolved Unresolved

Anonymous 1 month ago
Hi Professor,
Would it be possible to postpone this submission until Thursday But make HW7 available on Tuesday?

Anonymous 1 month ago +1.

This seems to be a good option.

Anonymous 1 month ago +1

Anonymous 1 month ago +1

Resolved Unresolved

Anonymous 1 month ago
Instead, of discussing whether to have the next assignment or not, if people would discuss the current assignment, it can be done well before the deadline

Anonymous 1 month ago Please either contribute to the discussion, or just let others discuss. Snarky comments never helped solve an issue. Students are discussing because it is important.

Anonymity doesn't give us the right to be disrespectful to others.

Anonymous 1 month ago wow

Resolved Unresolved

Anonymous 1 month ago
Hey,
Can someone please explain what is the meaning of the: 3x3x4 in the below line:
"conv2d 3x3x4, stride=1, ReLU, padding = "SAME""

Anonymous 1 month ago 4 kernels/filters of size 3x3

Anonymous 1 month ago ok thanks :)

Resolved Unresolved

Anonymous 1 month ago Hi Prof,
Any update on the deadline ? Is it the same or would you consider postponing due to so many other clashing events including a final exam ?

Anonymous 1 month ago +1

Resolved Unresolved

Anonymous 1 month ago I think for people who are doing projects these two assignments should be optional. What do you guys think ?

Resolved Unresolved

Roy Shilkrot 1 month ago
I've pushed back the due date on this assignment to 12/7, to reflect our tardiness with sending the assignment out.

There may or may not be another assignment - however it will be extra credit, optional. Mostly for people not doing projects, looking to make up points, or want to dig (even) deeper into deep neural networks.

Also - please keep the discussion clean and respectful.
We don't have the capacity to moderate this forum, so don't take advantage of that or the fact you can post anonymously.

Renu Rani 1 month ago Thanks, Professor!

Can you please remove the option "**Anonymous to everyone**", so that a person will think before posting any thoughtless comment?

In other courses also, we have only "Anonymous to Classmates" option.

Thanks

Anonymous 1 month ago +1

Resolved Unresolved

Han Le 27 days ago
Dear TA/Prof.

Can you update the submission requirement/grading criteria? The homework is due soon!

Resolved Unresolved

Han Le 26 days ago
Dear TA/Prof.,

What about the bonus part for the Dropout, do we need to include it in the .ipynb file or submit a separate file?

How about the report? Is it pdf?

How about the submission folder structure?

Fan Wang 26 days ago See the latest update

Timothy Zhang 26 days ago "1. Make a graph of test loss curve with MATLAB on MNIST-1459
2. Make a graph of test loss curve with MATLAB on MNIST-023678"

Do you mean Matplotlib? Can we use Tensorboard to plot the curves?

Han Le 26 days ago Thanks Fan for the update. Is it required to use Matlab to plot the curve while simple matplotlib will do?

In addition, is the dropout part included directly into the submission because when using dropout, the accuracy will drop below 99% and you will not see the result for the standard part without dropout.

Xuan Li 26 days ago I think you can tune the drop rate a little.

Resolved Unresolved

Anonymous 26 days ago
Should the test accuracy before freezing be >99 or after freezing ?

Xuan Li 26 days ago I think it's before. After freezing, accuracy should drop significantly because the below layers may not suitable for the new task, they should continue to be tuned. But the tuning is based on the transferred parameters, which will accelerate the convergence.

Anonymous 26 days ago ok Thanks:)
What should be the ideal accuracy after freezing? till what point do we have to fine tune the below layers?

Timothy Zhang 26 days ago I got 97.24 frozen test accuracy. I would assume it is possible to get 99%+ if you get lucky in the random parameter search.

Anonymous 26 days ago ok Thanks:)

Anonymous 26 days ago What parameters to try tweaking? Is it the number of units?

Resolved Unresolved

Anonymous 26 days ago
For how many epochs do we have to plot the test curve? I am assuming that we are plotting loss vs the number of epochs?

Fan Wang 26 days ago Correct, use as many epochs as you need until it stabilizes.

Anonymous 26 days ago Okay. Thanks.

Anonymous 26 days ago By stabilizes, you mean when we get the maximum accuracy right? Because in most cases what is happening is if you increase the number of epochs the accuracy tends to increase for a while and then starts dropping because of overfitting.

Resolved Unresolved

Anonymous 26 days ago
Are we supposed to improve the accuracy (change the architecture etc.) of the CNN when it's frozen/not-frozen in part-2?

Anonymous 26 days ago +1. Especially in the frozen part. I'm getting an accuracy of 70%. Is that what is expected?

Anonymous 26 days ago Does .ipynb code need to have full code (Graph Definition+Training/Testing) for Frozen and Unfrozen transfer learning both? If that is so, how to get away without adding more cells? I can generate both outputs one by one uncommenting/commenting (toggling) following lines of code

```
# try to freeze everything but fc2, softmax
# train_vars = tf.get_collection(tf.GraphKeys.TRAINABLE_VARIABLES, scope="fc2_023678|softmax_023678")
# training_op = optimizer.minimize(loss, var_list=train_vars)
training_op = optimizer.minimize(loss)
```

So is it ok to submit .ipynb file that way. Report pdf will have plots for both frozen and unfrozen experiments.

Thanks

Anonymous 26 days ago Are we not supposed to report test accuracies? Only loss curve?

Resolved Unresolved

Anonymous 26 days ago
How do we have to show the output after dropout regularization? do we need to plot some graph and put it in the pdf results file? or just keep the code in the .ipynb file?

Resolved Unresolved

Anonymous 26 days ago Where do we upload on the blackboard? I don't see any link for submission of HW6

Souranil 26 days ago +1 I don't see the link either. Is the deadline still 12p 12/7 ?