Course Analysis for DD2424 - 2017

Josephine Sullivan

1 Course overview

The basic numbers and details for the course:

Administration details

Course Name: Deep Learning in Data Science
Course Code: DD2424
Course Credits: 7.5 hp
Distribution of credit: Homework assignments (4.5 hp),
Exam (Project + Oral or Take-home written exam) (3hp)
Dates of Course: March 2017 - June 2017

Personnel

Course Leaders: Josephine Sullivan
Teaching Assistants: Marcel Binz, Yang Zhong, Joonatan Määttäri,
Taras-Svitozar Kucherenko, Jiexiong Tang

Teaching hours within the course

# of lectures: 11 × 2 hour lectures
# of help sessions: 6 × 4 hour sessions

Student numbers and their performance

# of registered students: 258
# of students taking exam: 220
# of students passing exam: 209
# of students have completed course: 159
2 Goals of the course

The course’s objectives are to

- Explain and detail the most common architecture networks used in deep learning and how they are applied to different input data.
- Give a coherent and consistent exposition of the back-propagation algorithm so that the students can understand and reproduce how it can be mechanically applied to a wide array of network architectures.
- Introduce to students the common ways to train and regularize networks.
- Give the students a sufficiently broad and deep knowledge (and practical experience with DL) to enable student to learn more about the area independently by reading the literature.

3 Material created

This was the first year for this course. Therefore I had to decide on the syllabus and focus of the course. My syllabus mainly followed that of the Stanford course CS231n: Convolutional Neural Networks for Visual Recognition. However, I made my own slides and extended the amount of technical detail included especially with regard to describing the back-propagation algorithm applied to networks of different types (requiring the extension of the chain rule to vectors and matrices). This required thinking carefully about notation and making it consistent across the course. In total I created 10 new lectures and one guest lecture was given by Hossein Azizpour.

I also created 4 programming assignments. These required the students to write code from scratch to build, train and test networks of increasing complexity. The instructions I gave were relatively explicit and the lecture notes mostly contained all the required

4 Summary of my high level thoughts on the course

I was happy with how the course went considering it was the first edition of the course. I think also overall most of the students taking the course were pleased with its content and the material presented in the lectures. The students, in
general, appreciated the combination of the theory and the practical know-how covered in the course and the opportunity they got

- in the homework assignments to get their hands dirty and implement algorithms from scratch and
- in the project to exploit the existing high-performance software packages to apply deep learning to non-tutorial problems.

My main aim was to get students to understand the mathematical detail of training neural networks using the back-propagation algorithm and to give them sufficient knowledge of deep learning so it would be feasible for them to read and understand research papers in the field. So I was particularly happy with this quote from the student survey “I’m now capable of following and understanding advancements in the field. A lot happening very frequently!”.

5 Teaching

The teaching in the course consisted of traditional lectures in tandem with help sessions manned by the TAs.

6 Assessment in the course

To pass the course the students had to

- complete the programming assignments and upload a report on each assignment and then either
- complete a project, write a report on it and make an oral presentation/examination of their project or
- pass a final take-home written exam.

The students’ programming assignments were reviewed by the TAs and myself and were graded as pass/fail. The projects reports and oral presentations were graded from A-F and this grading was performed by me.

The largest burden of the course was the grading of the projects (>50) and making the grading consistent. More on this later.
7 Reading list

The official textbook for the course is *Deep Learning* by Ian Goodfellow, Yoshua Bengio and Aaron Courville. The textbook is more of a complement to the course as the much of the material is self contained. Fortunately the book is freely available online.

8 Requirements

There are no formal pre-requisites, beyond that the students have taken 45 credits in mathematics or informatics, for the course but we should explicitly recommend the students to have taken the course: *Machine Learning* DD2431 beforehand. More on this later in this document.

9 Actual course content

The schedule is available at the KTH Social webpage for DD2424 2017 and shows the exact topics covered by the course.

10 Planned changes for next year

10.1 Aspects of the course that should be improved

Make my assumptions of the students’ prerequisite knowledge clearer

Obviously, there was a large number of students taking the course so it was a balancing act to present a sufficient amount of background material to make the course somewhat self-contained and not to get bogged down in repeating concepts that many of the students had already been exposed to. I opted to more or less implicitly assume that the students had taken the Machine Learning course. From talking to the students and reading the survey, it is apparent that this was not true for everyone. However, I do not want to get stuck in teaching basic ML concepts in this course. Therefore I should make it clearer in the course description that while it is not officially necessary to have taken the ML course to participate in the course, I will assume the students have some background knowledge in Machine Learning. Students who do not have this background knowledge should then be given pointers to some reading material that will allow them to catch up on the basics.
Incorporate Convolutional Networks into the programming assignments

As it was the first year of the course much of my time was devoted to creating the material for the course (10 lectures and 4 programming assignments). From my own viewpoint assignment 3 was a bit disappointing. It was fiddly for the students to implement and the pay-off, as regards final accuracy, on the Cifar10 dataset was underwhelming. The original plan was to have implemented a Convolutional Network in this assignment but my initial attempts to design an assignment in this direction resulted in code that was too computationally demanding for the average computing resources available to the students. Therefore I abandoned this idea and replaced it with the batch normalization assignment. This decision, though necessary on a practical level, was disappointing for me and the students as alot of the course is devoted to explaining Convolutional Networks and how for many applications they are superior to fully connected networks. However, they received no hands-on evidence of this from their assignments!

Make students more aware that the help sessions are not just for the project

Far fewer students attended the project help sessions than anticipated. I told students that they could also use the sessions to get help with their programming assignments. However, I don’t think this information filtered through to all the students. So next time around I must make it clearer that if a student is stuck on an assignment they can get help at the project help sessions.

Make grading criteria of the project more transparent and applied more consistently

The other major area for improvement is in the grading of the project. Before the course I did not think through the grading criteria clearly enough and this resulted in some slight grading inconsistencies and opaqueness for the students. There were 53 projects submitted covering very different topics so it was hard to make direct comparisons. Also I took on the grading of the projects on my shoulders solely and this was too much work and because of the sheer number of projects it was hard to be completely consistent in grading. This is an issue I would definitely like to address.

More timely correction of the programming assignments

Feedback on the programming assignments was relatively slow and this was a function of several issues

- the large numbers of students taking the course,
- it being the first edition of the course and material was being created on the fly and thus I was always a little behind getting the assignments out and then getting the scoring sheets to the TAs,
- I got relatively ill (required surgery) in week 2 of the course and this compounded the previous issue.

Hopefully the latter two issues will not be factors in 2018 and I think without
these issues then with slightly better organization of the TAs then timely grading of the projects should not be a problem.

**Make students aware of the level of difficulty of the written exam**
Making written exams for this topic is quite hard as you can only compute relatively simple pen-paper examples before things get out of hand. I did not do a good job for preparing the students for the level of difficulty of the written exam. I think that perhaps I may re-brand the written exam as a problem set in combination with paper reading/reporting and give students a longer time period to complete. At least though in the next version they will have the previous versions of the exam for reference. The time spent on this should be somewhat commensurate with the time the students spent on the project.

**Help students with the availability of GPUs**
Many of the students had problems with PDC. Some of it was self inflicted as they started on the large scale computations of their project too late and then encountered long queues on PDC’s machines before their computations even began because of the high demand created by this course and other courses running at the same time.

### 10.2 Summary of planned improvements

Here is a list of the planned improvements for the next year’s course:

- Investigate if it would be possible to design a somewhat computationally feasible way to implement Convolutional Neural Networks on the Cifar10 dataset within the programming assignments.

- More transparent and consistent grading of the course projects. Here the plan is to include both myself and the TAs in the grading of the projects. Both myself and a subset of the TAs should attend at the project presentations and then give independent gradings of the written and oral presentations of the projects. Thus hopefully the average grades should be more consistent than the grades given by each individual. Create a grading sheet similar to those used for reviewing papers and make these available to the students beforehand.

- Re-branding of the take-home written exam as a graded take-home assignment and making its level of difficulty clearer. I would like the students who decide on this option to spend time on the written exam that is at least somewhat comparable to the project students.

- Investigate the possibility of using other GPU computing resources than PDC. One possibility is to apply for a *Google Cloud Platform Education Grant* which provides Google’s cloud services free of charge for students taking a particular course. I have applied for the grant and am awaiting
for a response. Otherwise there is the option of students getting free cloud computing hours from Amazon via the *Student Developer Pack* at GitHub. Hopefully, this initiative will continue until the course begins.

- Expand the number of lectures to include several more topics that will give the students a wider perspective of the field. These lectures will be given by Hossein Azizpour.
On average, how many hours/week did you work with the course (including scheduled hours)?

- > 41 timmar/vecka: 0 (0.0%)
- 39-41 timmar/vecka: 0 (0.0%)
- 36-38 timmar/vecka: 1 (2.2%)
- 33-35 timmar/vecka: 0 (0.0%)
- 30-32 timmar/vecka: 1 (2.2%)
- 27-29 timmar/vecka: 3 (6.7%)
- 24-26 timmar/vecka: 3 (6.7%)
- 21-23 timmar/vecka: 2 (4.4%)
- 18-20 timmar/vecka: 8 (13.3%)
- 15-17 timmar/vecka: 6 (13.3%)
- 12-14 timmar/vecka: 7 (13.3%)
- 9-11 timmar/vecka: 9 (20.0%)
- 6-8 timmar/vecka: 4 (8.9%)
- 3-5 timmar/vecka: 2 (4.4%)
- 0-2 timmar/vecka: 1 (2.2%)

Number of respondents
<table>
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<tr>
<th>Comments (I worked: 0-2 timmar/vecka)</th>
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<tr>
<td>It's also possible to work a lot more if doing a Project</td>
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<th>Comments (I worked: 9-11 timmar/vecka)</th>
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<tr>
<td>I can't remember</td>
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<tr>
<td>Highly focused on the weeks when the labs had to be submitted, overall a perfect work load!</td>
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<tr>
<td>Don't really remember since this was a while ago, but approximate time load:</td>
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<tr>
<td>- Attended all scheduled lectures</td>
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<tr>
<td>- Each lab took 1-2 days to complete (including bonus)</td>
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<td>- Spent 50+ hours on project</td>
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<th>Comments (I worked: 12-14 timmar/vecka)</th>
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<tr>
<td>The final labs took quite some time.</td>
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<tr>
<td>I don't really remember, this is very much a guess. Could be 6, could be 20.</td>
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<th>Comments (I worked: 15-17 timmar/vecka)</th>
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<tr>
<td>The workload was fair.</td>
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<th>Comments (I worked: 18-20 timmar/vecka)</th>
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<tr>
<td>I read a lot of additional papers :)</td>
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<th>Comments (I worked: 21-23 timmar/vecka)</th>
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<tr>
<td>Difficult to think of an accurate value since it's been so long since taking the course.</td>
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<th>Comments (I worked: 27-29 timmar/vecka)</th>
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<tr>
<td>High workload but interesting content</td>
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<td>The assignment from beginning is challenging but would be much easier afterwards.</td>
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The polar diagrams below show the average response to the LEQ statements for different groups of respondents (only valid responses are included). The scale that is used in the diagrams is defined by:

1 = No, I strongly disagree with the statement
4 = I am neutral to the statement
7 = Yes, I strongly agree with the statement

Note! A group has to include at least 3 respondents in order to appear in a diagram.
KTH Learning Experience Questionnaire v3.1.3

Meaningfulness - emotional level

Stimulating tasks
1. I worked with interesting issues (a)

Exploration and own experience
2. I explored parts of the subject on my own (a)
3. I was able to learn by trying out my own ideas (b)

Challenge
4. The course was challenging in a stimulating way (c)

Belonging
5. I felt togetherness with others on the course (d)
6. The atmosphere on the course was open and inclusive (d)

Comprehensibility - cognitive level

Clear goals and organization
7. The intended learning outcomes helped me to understand what I was expected to achieve (e)
8. I understood how the course was organized and what I was expected to do (e)

Understanding of subject matter
9. I understood what the teachers were talking about (f)
10. I was able to learn from concrete examples that I could relate to (g)
11. Understanding of key concepts had high priority (h)
Constructive alignment

12. The course activities helped me to achieve the intended learning outcomes efficiently (i)
13. I understood what I was expected to learn in order to obtain a certain grade (i)

Feedback and security

14. I received regular feedback that helped me to see my progress (j)
15. I could practice and receive feedback without being graded (j)
16. The assessment on the course was fair and honest (k)

Manageability - instrumental level

Sufficient background knowledge

17. My background knowledge was sufficient to follow the course (f)

Time to reflect

18. I regularly spent time to reflect on what I learned (l)

Variation and choices

19. I was able to learn in a way that suited me (m)
20. I had opportunities to choose what to do (m)

Collaboration

21. I was able to learn by collaborating and discussing with others (n)

Support

22. I was able to get support if I needed it (c)
Learning factors from the literature that LEQ intends to examine

We tend to learn most effectively (in ways that make a sustained, substantial, and positive influence on the way we think, reflect, act or feel) when:

a) We are trying to answer questions, solve problems or acquire skills that we find interesting, intriguing or important

b) We can speculate, try out ideas (intellectually or practically) and learn from experience, even before we know much about the subject

c) We are able to do so in a challenging yet supportive environment

d) We feel that we are part of a community and believe that other people have faith in our ability to learn

e) We understand the meaning of the intended learning outcomes, how the environment is organized and what is expected of us

f) We have sufficient background knowledge to manage the present learning situation

g) We can learn inductively by moving from specific examples and experiences to general principles, rather than the other way around

h) We are challenged to develop a proper understanding of key concepts and successively create a coherent whole of the content

i) We believe that the work we are expected to do will help us to reach the intended learning outcomes

j) We can try, fail, and receive feedback in advance of and separate from any summative judgment of our efforts

k) We believe that our work will be considered fairly and honestly

l) We have sufficient time to learn and devote the time necessary to do so
m) We believe that we are in control of our own learning, not manipulated

n) We can work collaboratively with other learners struggling with the same problems

**Literature**


Comments
(I am: Internationell masterstudent)
Well, I'm a Swedish student doing the international master's program in Machine Learning. Don't know where to best fit that in. :)

Comments (I am: Svensk student i årskurs 4-5)
bachelor in engineering physics, master in machine learning
Computer Science Master Student

GENERAL QUESTIONS
What was the best aspect of the course?

A lot of freedom in the final project
I really liked the kind of continuous design of the assignments (one was expected to build the next one on top of the previous). Especially funny were those leaderboard boards and bonus points parts. Also the freedom given to us in a final project was amazing!

Content aside, the lenient deadlines and the ability to choose between an exam or a project were aspects that I liked about this course. I'm a slow worker and I want to truly understand down to the smallest detail what I'm doing, that's often not possible in courses with strict deadlines. In this course I was able to finish my assignments, research topics surrounding the assignments, implement solutions not really required by the assignment and so forth without feeling the pressure of missing out on credits (högskelepoäng).

I must of course credit this to the assistants and the examiner, for being willing to correct assignments even during the summer. Thank you!
Lots of freedom with the projects and labs, it was always possible to go further if one wanted to!

The last project was a nice way of examination.
It was a great course!
I like that it was pretty technical, derivation of gradients, etc.
The assignments were very beneficial in my opinion, since we had to do our own implementation.

Assignments and the project, I learned the most from the project
Having a project so that you had an opportunity to try to do deep learning "for real".
The assignments were great, especially the bonus parts where you got to explore a lot of things on your own. I felt like I gained a lot of intuition for what techniques work in which cases.
Understanding through implementation and evaluation of fundamental concepts.
The topics are well selected and very interesting, lecturer provides a wide range of references which helps understanding and further research.

Really cool topic
Doing the project was a really rewarding and learning experience. Learned a lot on how to build a CNN and how to pre-process data for deep learning.
The labs were nicely structured, although perhaps a bit repetitive which on the other hand might be a good thing when building up towards more complex labs.
Deep mathematical focus
The teaching is different in advanced courses, and in a good way! Josephine was engaged and knowledgable (sic?)

Using recent technologies (i.e. tensorflow) on real data (medical images), and using the core principles of neural networks to understand them.
New material covered. Wide range of deep learning methods.
The teacher, without a doubt.
I'm now capable of following and understanding advancements in the field. A lot happening very frequently!

The lab instruction is clear and intuitive, we can choose what subject to do for our project.
Learning all fundamentals for deep learning and practicing implementations.
I was able to put the concepts into practice and "learn by doing" during the assignments and the project.

It was fun to be able to use some of the math that I have learned in a modern way.
the building up the deep nets from the scratch i.e. from 1 layer. This way I was able to gain a holistic approach on how to deal with most of problems that may occur.
How well the labs were outformed so that you learn a lot. Alos the project was very benefical! Looks like I am going to do my master thesis in a similar study.

The labs were really interesting. Would have liked to do something with convolutional networks though. Josephine felt really enthusiastic and very knowledgable. The lectures were interesting but sometimes it felt like there were a bit too much focus on the formulas of backpropagation and it became hard to follow. I would rather have listened to more explanations of different key concepts than staring at a formula for 2 lectures.
It was a great course, the lectures where nice, the labs were nice and the project too.
The illustration of the neural network, especially multiple layer stacked to generate significant outcome such as outputting image description after analysis on the images.

The structure of the course itself, i.e. getting practical assignments to learn different concepts and techniques and finally being able to put that newly received knowledge into practical use in the project. Also, the project itself was very interesting letting us choose what we want to do and write a scientific report about the process/results.
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<tr>
<th>What would you suggest to improve? (I worked: 6-8 timmar/vecka)</th>
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<tr>
<td>PDC access and a guide to setup TensorFlow on a GPU. I'd add an assignment on CNNs, since we talked a lot about them, but didn't have any chance to create something ourselves as a part of the assignment.</td>
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<tr>
<td>I would suggest forming a list of relevant scientific papers for people that want to learn more about the topic. I dug around on my own a lot, and found an incredible amount of interesting papers. Let students know there will be waiting time when computing on PDC's machines. I think it was good as it was. Earlier feedback. The labs were really useful, but got a bit redundant at the end (I think especially the third lab). Perhaps one of them could be replaced with CNN. Slightly clearer motivation for why we did the labs. Even though the course was already dense with assignments during the period, I would love to have one assignment on convolutional networks.</td>
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<td>Force everybody to do the project not exam, maybe use tensorflow earlier in the course. I wish we had some lab help sessions to avoid getting stuck on the final two labs. And perhaps a bit less time spent on derivation and more on how to use deep learning methods to solve real problems and when not to use deep learning. It would be nice to receive feedback earlier on the assignments. Provides more coding support if possible and please stress the requisites on programming.</td>
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<tr>
<td>Better information about exam. The course is really fun the way it is. Some of the details in the lectures on how certain operations could be implemented were sometimes a bit hard to follow. Perhaps it might be better to give a more conceptual understanding so that you would feel that you could figure out the details on your own. A lab with convolutional layers would be great since it is such a core layer type in computer vision. It's also strange that the equations presented in the lectures are extremely poor for computation. There was also inconsistencies with using column or row vectors throughout the material, and it was not clear when what type was used, making the mathematics unnecessary tricky to read. Perhaps some sort of exercises with more basic problems</td>
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<th>What would you suggest to improve? (I worked: 18-20 timmar/vecka)</th>
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<tr>
<td>Replace part of the assignments by the project for those who choose to do it. Instead of 4 assignments building the nn from scratch, maybe have one building the same nn but with tensorflow. It's not necessary to give the MATLAB code as a starter, and each student should choose between python and MATLAB. Collaboration on the labs. The other neural networks course has some overlap. I would much rather see a basic and an advanced course. This field is here to stay, especially with what is happening theoretically around GANs and multi modal models.</td>
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<td>What would you suggest to improve? (I worked: 24-26 timmar/vecka)</td>
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<tr>
<td>The lectures was not including and it felt like a party for the ones that already knew everything about the subject nothing! maybe just an extra assignment on ConvNets. The lab pdf did not explain some things clearly, and perhaps merge/remove/reduce the workload, of a lab. It was so much to do in the course.</td>
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<tr>
<th>What would you suggest to improve? (I worked: 27-29 timmar/vecka)</th>
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<tr>
<td>The exam didn't feel connected to the lectures or the other course content. The exam did not feel fair. Even though Josephine said that the exam would take 4-5 hours, it took me and two other people I've talked to closer to 15-20 hours (while only doing the E-part). Many of the questions did not have a lot to do with the lectures and it was impossible to find more information about it online or in the book for some of the questions. For instance the question about the occlusion experiment, there was only one slide covering this and it didn't really explain anything about how the experiment works, it was just one sentence saying that you could do this. I did manage to find the source of the slides that Josephine had copied, and the source gave a bit more information, but it still didn't feel like the right way to go about it. Even though I studied for the exam it felt like it helped me minimally since many of the questions were so disconnected from the reading material. I get that not every question can be straight out of the lecture-notes, but the way the exam was structured made it hard to study for the exam since there was so much that we hadn't really covered in the lectures or that was not a central concept in the book. Just getting a pass on the exam felt like it was way harder than it should be and required way more time than it should. Compared to other courses I felt like getting an E on the exam was like getting a C or a B in other master courses I've taken. That the labs are graded sooner. The speaking is a bit fast to me to follow anytime, but basically make sense.</td>
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<th>What would you suggest to improve? (I worked: 36-38 timmar/vecka)</th>
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<tr>
<td>I actually liked the structure / content of the course. I believe in learning by not only being fed a lot of information but also being able to put that knowledge into practical use. I'm also a big fan of collaborating with other people which was a big part of this course. I think that you learn so much more with that type of structure and I would like more courses to use the same methods.</td>
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What advice would you like to give to future participants?

Start early to work on the project
Enjoy and try to explore more on your own!

What advice would you like to give to future participants? (I worked: 6-8 timmar/vecka)
I suggest reading cutting-edge research papers, often you’ll find how something that seems so foreign can be rather intuitive, especially when you’re reading them while taking this course.
Lots of people use PDC! There won’t be time if you start training models late.
Make sure that you understood the derivations of backprop, I even saw a hiring manager at Microsoft saying that he asked potential employees to derive the backprop algorithm!
There’s a lot of opportunities to really learn the material, so put time into the labs and project.
Start in good time with everything

What advice would you like to give to future participants? (I worked: 9-11 timmar/vecka)
Take this course and enjoy what deep learning can do, this is better course than machine learning, because here it is more practial and fun/interesting
The final two labs are easy to get stuck on, start in time and discuss with a friend.
Pick a fun and interesting project topic. I also reckon you get much more out of doing the project than the exam.
You should have taken the machine learning courses first, and highly suggest to have a strong background on programming.

What advice would you like to give to future participants? (I worked: 12-14 timmar/vecka)
Do the project
This is a really fun project oriented course. Try to complete the assignments on time and think about a fun project and find like minded team mates to do a great project.
Start early with the assignments. Start thinking about what might be suitable for the project early on - e.g. think through what could potentially become too difficult.
If you use python, get the accelerated linear algebra library to get 50x the speed.
Have fun!
Be ambitious with the project!
The theory is important!

What advice would you like to give to future participants? (I worked: 15-17 timmar/vecka)
Find a Kaggle challenge or another real-life dataset, that's when you understand where the model's limitations are, and how the parameters such as dropout compensate for that.
Code in python :p
To have basic understanding of machine learning or ANNs.
Start with the project in time!
And don't take the exam, take the project instead.
Start coding right away. Make sure you plan your experiments and save checkpoints and data. This is the first course that developed my sense for experimental design. Which apparently was rubbish to begin with :)
have learned some machine learning knowledge previously, or at least prepare lessons before class

What advice would you like to give to future participants? (I worked: 18-20 timmar/vecka)
If you haven’t taken the machine learning course, I recommend looking at their slides to give you a better understanding of the concepts deep learning builds on.
Do the assignments on powerful computers, especially assignments 2 & 3. The school computers at least run faster then most laptops. And plan your time accordingly, don’t expect the assignment to be over quickly after the implementation is finished.

What advice would you like to give to future participants? (I worked: 21-23 timmar/vecka)
Read a lot about Deep Learning before starting the course
Do the project, not the exam. It will be very useful and fun to do! Also be ahead on the labs, they will take a lot of time.

What advice would you like to give to future participants? (I worked: 24-26 timmar/vecka)
I'm not sure how harshly the projects were examined but if I could do the course again I would have done the project instead of the exam. If you do take the home-exam, don't expect the slides or the book to be of too much help for many of the questions.
Do not fall behind in the labs.
Be skilful at python prepared for the course projects.

What advice would you like to give to future participants? (I worked: 30-32 timmar/vecka)
Don't get to hung up on the math.

What advice would you like to give to future participants? (I worked: 36-38 timmar/vecka)
Work hard, collaborate a lot with others (you learn a lot from just talking about the problems with each other), make sure you plan ahead and choose a reasonable (doable) problem for the project.
Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 9-11 timmar/vecka)
probably one of my favourite courses at KTH, after like... 5 years of studies.
Good teaching, I really enjoyed the course!
Overall excellent course! I really felt like I got a deep knowledge (no pun intended) of the concepts and had an opportunity to get practical experience with the frameworks using the project.
It might be interesting to have half a lecture or a lecture by some grad students / industry people to talk about the different frameworks out there (TensorFlow, Torch, etc) and practical deep learning.

Is there anything else you would like to add? (I worked: 12-14 timmar/vecka)
I really enjoyed the course, and I thought it fitted nicely in with the artificial neural nets course that were a bit more general in its approach.

Is there anything else you would like to add? (I worked: 15-17 timmar/vecka)
The professor's jovial mood makes the class really fun and the detailed gradient descent explanations cannot be found anywhere else other than the classes and slides. Thanks...

The core course at KTH for modern AI.

No!

Is there anything else you would like to add? (I worked: 18-20 timmar/vecka)
Thank you, this was one of the best courses I had at KTH!

Nah
I like and appreciate the way the lecturer teaches at class, it was very into details and well organized.

Is there anything else you would like to add? (I worked: 21-23 timmar/vecka)
It was probably the most interesting and exciting course of all my 4 years here at KTH - Josephine did a wonderful job of managing this course. I really liked the option between doing a project or taking the exam allowing student to choose what suits them best.

Is there anything else you would like to add? (I worked: 24-26 timmar/vecka)
It would be nice to see a course on Advanced Topics in Deep Learning.

Is there anything else you would like to add? (I worked: 27-29 timmar/vecka)
During the first lecture I overheard someone in the break saying "This course seems way do hard for me, I don't understand anything of what the lecturer is talking about. I think I'm gonna go". I think that I would have felt the same way had I not taken any machine learning courses prior to this course. I think that the first lecture should explain some basic machine learning concepts, or that the course should require students to take some other machine learning course prior to this one.

No:

Is there anything else you would like to add? (I worked: 36-38 timmar/vecka)
Very good and fun course indeed! :)

SPECIFIC QUESTIONS
The diagrams below show the detailed response to the LEQ statements. The response scale is defined by:

-3 = No, I strongly disagree with the statement
0 = I am neutral to the statement
+3 = Yes, I strongly agree with the statement
X = I decline to take a position on the statement
Comments

(My response was: +2)

Project was great, assignments had great bonus tasks but were a bit boring to pass.
2. I explored parts of the subject on my own

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<th>Number of responses</th>
<th>Percentage</th>
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Comments

Comments (My response was: -1)
Mainly due to reading other courses simultaneously

Comments (My response was: +3)
with project
3. I was able to learn by trying out my own ideas

Comments
4. The course was challenging in a stimulating way

Comments
The people I knew, that is!
6. The atmosphere on the course was open and inclusive

Comments

Comments (My response was: +1)

A bit competitive though with the assignments..
7. The intended learning outcomes helped me to understand what I was expected to achieve

Comments

I didn't look at the outcomes.

Don't remember
8. I understood how the course was organized and what I was expected to do

Comments

(My response was: -1)

+3 if it had been clear from the get-go that lab 2 and 3 were based on 1 and 2 respectively
9. I understood what the teachers were talking about

Number of responses

Response

Comments
10. I was able to learn from concrete examples that I could relate to

Comments
11. Understanding of key concepts had high priority

Comments
12. The course activities helped me to achieve the intended learning outcomes efficiently

Comments

(My response was: +3)

Absolutely!
13. I understood what I was expected to learn in order to obtain a certain grade

Comments

Comments (My response was: -3)
I think the exam was misleading. It was too hard. Would have done project if I had realized that.

Comments (My response was: 0)
Easy to understand criteria for the project, but yet impossible to know beforehand how we would end up graded.
The feedback was a bit slow.

I think that having dictated lab hours with lab assistants would help allot with proper feedback.

Assignment feedback was very late though.
15. I could practice and receive feedback without being graded

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Comments
16. The assessment on the course was fair and honest

Comments
Comments

(My response was: -1)

Maybe should have Machine Learning course as a prerequisite
Machine Learning (basic course) should probably be mandatory, I felt I struggled a bit without this background knowledge
The lectures seemed to be based on the thought that everyone already knew the important aspects of the subject and all the abbreviations/acronyms.
Some of us did not read machine learning or ANN before, but it was ok anyway
I had no previous ML experience but it turned out fine

(My response was: +2)

For me I was a bit rusty on the background and a bit more focus on the background in the beginning would have been nice
18. I regularly spent time to reflect on what I learned

Comments
I'm not a fan of group work (I have other engagements) but we made it work and it's interesting. I read through the individual exam questions and there were some interesting questions there, too.
21. I was able to learn by collaborating and discussing with others

Comments
22. I was able to get support if I needed it

Comments

(My response was: +3)

The help sessions where not enough and everybody running down to the teacher at lectures is not sustainable