Application of AI/ML techniques in Atmospheric Science (summer school 2025)

13 réponses

Publier les données analytiques

How is your overall feeling about the course – was it useful for you?

13 réponses

It was useful for me I got to learn more about machine learning concepts that I had forgotten. Plus exposure to the applications of AI/ML in atmospheric modelling and also the importance of the atmosphere.

Definitely was, interesting themes overall.

I found it was really useful and interesting

Yes! Getting hand on with deep learning is something I really need. Learned a good bunch of new things about both AI and atmospheric sciences.

On the machine learning/AI side this was just a recap (useful one though), but the atmospheric side was super interesting and I think that it provided me more understanding for my research. Overall this was useful!

it was interesting and useful

The course was very useful, especially for students without a background in computer science. It was straightforward to learn how deep learning can be applied in atmospheric chemistry modeling. The first exercise was simple but sufficient to help us understand what deep learning is and how it can be used in a chemistry model.

Yes

The course was useful and make machine learning and AI more clear.

Topic was interesting but not so useful since machine learning was already familiar for me

The course was well organized, welcoming and friendly. While the location was new there were plenty of staff to help. The content of the course was what was advertised and the teachings will be useful later on.

Yes, I liked it and it was useful in both aspects (AI and Atm. Chemistry) although it took some time to get there.

The course was of some use for me.

What topics would need improvement?

13 réponses

The learning curve was a little big for atmospheric topics as someone coming from computational engineering background the topics were a little too fast paced.

Some AI parts: RNN for example was hurried too quickly, I can't remember anything about it. Rather just leave it out altogether/mention "for further reading".

The final group presentations

-

I would include a simpleish CNN task for the group tasks, since it is quite useful still nowadays and it might be easier to understand than attention mechanism or even a fully connected network.

more background and basic information on all topics, since everyone had their own expertise and wasn't familiar with other topics

It would be nice to have more content related to atmospheric chemistry. Although we had a lecture from Professor Michael Boy, it felt somewhat disconnected from the exercises we actually worked on. The exercises mainly focused on learning how MLP works and how hyperparameters affect model performance. It might be more useful if we could also discuss what the input and output data represent in the context of atmospheric chemistry. In the final presentations, only a few groups touched on this aspect

Basic knowledge

With 1 week I don't think anything can be improved. With more time I would have preferred having more time on explaining the basic of machine learning and AI.

The code should be ready when published to students.

There was a good selection of different topics. In my opinion there might be some space for expanding some of the topics, for example between atmospheric science itself and the computerized solutions. There were definitely parts of it, but this could be for example something like interpretation of data or something of that sort. This would probably fit nicely with the real world data of the visiting lectures. The selection of the topics covered the field in a very engaging way, however, and the visiting lecturers were a nice addition.

Theory is helpful and necessary, yes, but the hands on parts were the ones, where I learned the most. Regarding that, two suggestions:
1) A bit more guidance in the exercises would be helpful: For a beginner, the "try it out" part was okay, but some overall structure could have made this more efficient in my opinion.
2) Furthermore, more different exercises regarding the application of the different network

types would have been nice. That said, this is probably not possible with only 5 days of summer school, so I'm not quite sure how to improve this in the current scope, but the simple "try it out" needed a lot of time until one understood what one was doing.

The goals of the course were too ambitious. Less information could be given but then the exercises could be made more in depth to provide better learning. Also the necessary codes for the exercises were given during the course in piecemeal such that the codes were not ready, when they were needed.

Were there any topics missing that you think should be included in the future?

13 réponses

If we could explain the topics within the atmospheric chemistry in such a way that it is easier to grab for someone with a non chemistry background. There were some lectures which started off low and then ended with high which I enjoyed a lot but then there were some which felt too advanced.

No idea.

I liked the balance of atmospheric and AI

Usage of satellite data?

I think this was enough and please keep the introductions to what your students are doing at the moment, they were interesting to hear!

cannot think of any

The lectures covered most of the topics I was hoping to learn from this summer school, so I do not feel that anything major was missing.

It would be more helpful if the basics can be explained more in details. For example the theoretical foundation. Or it maybe worth spending more time on explaining the code.

Explainable AI.

No

Not necessarily topics themselves, but maybe there could be some kind of possibilities to attend the course online. This could be both following the lectures online as well as learning by oneself more about a topic. For example there must be a lot of online resources to learn more about atmospheric chemistry and some kind of elementary familiarization would probably help those not so involved in the chemistry field. The suggested readings are great for further study, though.

Not really, was a nice peak into different fields, rather include more regarding my second comment above.

I think that now important topics were omitted. Less topics could actually be better.

What is your overall feeling about the lectures?

13 réponses

I have overall good feeling about the lectures :)

They were interesting and it was nice to hear from both the atmospheric side as well as the AI side. Visiting lecturers were a nice addition to that.

I thought they were very good

Lectures were good! Maybe if the assigments would've been better linked to the things we were learning from the lectures.

The lectures were nicely sectioned to different topics and I liked that there were also some guest lecturers.

interesting, some were challenging

The content of the lectures was very good, but we did not have enough time to really work on the group exercises.

Very interesting.

They were all very good and clear.

Lectures were great.

The lectures were well arranged in that the development of the course turned out to follow the questions arising from previous ones. No doubt this course or versions of it has been held before with the feedback well ingested.

Nice selection, good lecturers.

The lecturers were good and especially Michael was an interesting speaker. The lecture slides were exceptionally good and included mostly images and other descriptive elements rather than loads of text. The AI lectures went a bit too fast, when compared to the difficulty of the topics.

What is your overall feeling about the group work?

13 réponses

A little reward for completing group work (best model accuracy) could have made it more interesting but other than that I enjoyed it there was good collaboration within the group.

It was nice to work in a group and get to know those persons better. Though it was also hard for those people who had no experience in either atmospheric nor AI and even for those with some atmospheric background.

I enjoyed it but I think it would of worked better if every group had a different topic that their TA specialized in. It would make the TA more involved and the final day presentations more diverse.

I think the assigments were the weak link.
Things I would improve:
1. Make everyone use CSC computers. Google colab free restrictions were a problem. And it is possible to create a csc project for people outside Finland. All the data can be already within the project so nobody would have to download anything to their computer.
2. Better data. I feel like I had no idea what kind of data it was since everything was done automatically for us. I think there should've been a mandatory "data exploration" thing with the assigment. Trying to make sense of it, and with the help of the lectures on chemistry and aerosols, we would have more intuition on the data, and would be able to format it better ourselves to the neural network. Also, more data would've been nice. The data amounts were so little that we didn't have that much freedom to try different models.
3. Less pre-written codes. I would have liked that there was a example notebook, where we can see how it is done, but otherwise I would have liked to try to code the neural networks ourselves. Now a lot of the time was just trying to understand the code structure.
4. Only one big assingment to work on.

It was kind of unclear what to do with the second task, as all the code was provided for us and just asked to run it. It could be more clear (and productive) if there were a small task for each afternoon to perform as a group and then there could be some presentatio about how the task actually was supposed to handle etc. For the first task, I think it was confusing that the given model was already super good and kind a hard to improve, maybe give less accurate initial model so then students really have a motivation to improve it and build their own.

fun, short in time

I hoped the group exercises could be more closely connected to the lectures, rather than focusing only on exploring a specific deep learning algorithm. We also did not have enough time for both the group work and preparing the presentation. Another issue was using Google Colab—it only provides two hours of free GPU access, and once that runs out, students cannot continue. I later learned that CSC allows teachers to create projects so that students, including international participants, can easily access the CSC supercomputer. That would have been a much better option.

Very useful chance to practice.

I feel it was a bit chaotic, but mainly because of some member of the group not collaborating much or not listening to suggestions.

The task were implementrd so that everyone made their own experiments. Real collaboration was not needed.

There was plenty of time reserved for the group work. While the challenges were clearly stated there were perhaps some moments where a little nudge to move forward would probably make the time used even more efficient. The group work turned out to be useful and something that one can easily take along for further interests.

Good idea to pair people with different backgrounds; improvement suggestions see above.

Groupwork was fine. We had a teaching assistant in our group which was quite necessary, but unfortunately he needed to use a lot of time helping the members of other groups.

What do you think about the workload during the course?

Too little to do, too much to do, or just about the right amount of work?

13 réponses

Just about the right amount of work, good thing that challenge 2 was made optional since we didnt have much time to work on it.

For one week it was enough. But I think this could be two weeks course with a little less to do each day: This way the total amount of hours could be a bit more while daily input a little less.

Perfect

Right amount of work

I think this was good amount of work for students how not knew AI so much before, there could also have been some tasks about the atmospheric things so that students that did not know that could have also been doing "more work".

quite heavy, but I suppose its fine for 5 credits/week

There were too many lectures and too little time for group work. However, considering it was a 5-day summer school, the overall workload of the group exercise was reasonable.

Reasonable for those with programming experience, but those from other background, it struggles a bit to understand everything.

For 5 ECTS I think it's way too low. I think 2 weeks would be more appropriate.

The right amount

The course was intentionally intense and as such it gave a good trade for the time invested. The group work was made possible to be finished well in time, and there will be a good amount of learning to do going through the material after the course. So, the right amount with a chance to explore more.

The amount itself would have been fine, however, the time to tackle it was a little short. We weren't quite able to dive into the exercises enough to really understand the coding AND be able to include changes.

Roughly the right amount of work.

How did you enjoy the social activities?

13 réponses

I really enjoyed the social activities and thanks a bunch for arranging them everything was perfect school lunch, after noon coffee and cake, BBQ (my personal favourite since it was a good experience chatting with other people and enjoying the weather), and the closing dinner (although the sun was high during the dinner). The buffet was missing the dish labels which would have made it pretty helpful for people knowing what exactly is in the dish.

They were very good! Very enjoyable, nice people and good activities.

Best I've had at a course

Yes! They were very fun! This one was a success. One thing to improve would be to create a common whatsapp chat or signal chat to ask other people around for evening hangouts.

I really enjoyed them! Maybe the dinner place could have been announced already on the program schedule. For the bbq, maybe some more structured handling could work for estimating the amount of food etc

it was very nice!

Yes, very much! The view in Lahti was amazing. I especially enjoyed the place where we had the barbecue and also the restaurant where we had burgers.

A LOT!

They were very nice.

Yes they were nice

The social activities are a good way to see the surroundings and get to know the other participants. The social aspects even evolved into a social media group which gave this course a welcomed spontaneous addition. The locations chosen for the activities were nice, and if there were more time maybe Lahti could be even more involved in the course settings. Good servings, also.

Very much, these were great choices and I had a lot of fun.

The social activities, while not necessary, were a fun edition and we got two dinners for free during the week.

Google Forms