Simon Klüttermann

psorus.de | Simon.Kluettermann@rwth-aachen.de | +4915779789970 | Github | Extended CV

Grappa   January 13, 2021
Science Park 904
Amsterdam 1098XH

Dear Dr. Weniger,

i am currently looking for a PHD position, and the one you advertise here is quite interesting to me. I would like to pursue a career in academics, and your advertised positions would allow me to nicely combine things I already know about with things I would like to know more about.

Using the knowledge and skills I have acquired in my master studies combined with my technical abilities I also believe that I can provide significant value to your research while providing me invaluable experience to prepare me for my future career.
Even though I have been fascinated by dark matter searches for a long time and I took some extension courses covering this topic, I think my more important skill lies in the machine learning part of your job offer. In own projects and my theses, I have applied knowledge of machine learning and especially anomaly detection to (for example) finding new physics symptoms. Next to my familiarity with tensorflow and keras, I also have experience with genetic programming and statistics. A more complete list of my interests can be seen in my CV. Combining these tools with my physical background, I hope to be able to help your group answer some interesting questions.

Thank you for reading my cover letter and for considering me for this position.

Sincerely,

Simon Klüttermann

Research interests
of Simon Kluettermann (PhD applicant)

Past research: After a bachelor thesis about using machine learning to improve the AMS detector analysis, I wrote my masters thesis (Deep learning for new physics mining at the LHC) about a modification of a paper called QCDorWhat. There idea was to use machine learning (namely anomaly detection) to unsupervisedly detect LHC jets that are not (only) the product of standard model interactions. My initial task, was to apply graph machine learning to the same task and see if this improves the quality. And even though this was by no means trivial, it became clear that their initial approach is to flawed for this to have any big effects: To find anomalous jets, they used a technique based on autoencoders. Sadly their desired goal of finding any anomalous events was only tested on limited anomalies, which resulted in them being great at finding this anomaly, but sadly not very good at every other one. After I found this, my master thesis kind of pivoted, making me focus more on generality then on quality. Even though I had to use other algorithms than autoencoders to make this work, my final models were quite general, and able to detect nearly any anomaly (there is a nice comparison plot at the end of my abstract).

Future interests: My future interests are strongly influenced by my thesis. On the machine learning side, this means that I have a strong interest in understanding my models on a deeper level (and a slight bias to thinking that machine learning models are less powerful and complicated than they seem), while on a scientific level I think it is sad, that good anomaly detection is a bit neglected, as there are few fields were it could not be applied. Dark Matter searches are a prime example of a field that could profit from good anomaly detection. Instead of searching for expected signs, anomaly detection can search for anything unexplainable. This can make it hard to differentiate between sources of these anomalies, but also allows you to make connections that could not be done by a human. On a more philosophical level I am fascinated by this idea. The concept of things that cannot be found by a human biases, but could be found by a machine. Finally some other things that I was/am interested in, you find in my github and I would also not like just to do things that I am already familiar with.

Referees

- Prof. Dr. Michael Krämer: mkraemer@physik.rwth-aachen.de

- Dr. Alexander Mück: mueck@physik.rwth-aachen.de

CV Simon Klüttermann

I strongly suggest not reading this here, since this is just a port of my better (online) CV, which you find at http://www.psorus.de/s/cv.html

timeline

1997	born in mönchengladbach (germany)
2015	finished school (franz meyers gymnasium)
later that year	started studying physics (@RWTH university)
2018	finished bachelor studies
	see [Thesis abstract](#) or [Thesis download](#) aswell as my [Grades](#) or my [LI:download_zeugniss_bachelor testimony
2020	finished master studies
	see [Thesis abstract](#) or [Thesis download](#) aswell as my [Grades](#)
final grades	depending on my master thesis somewhere between 1.4 and 2.6 ([more](#))
update 29.01	probably 1.6

programming languages

python	🟢 ⚪ ⚪	[More…](#)	
visual basic	🟢 ⚪ ⚪	[More…](#)	
c++	⚪ 🟡 ⚪	[More…](#)	
solidity	⚪ 🟡 ⚪	[More…](#)	
php	⚪ ⚪ 🔴	[More…](#)	
javascript	⚪ ⚪ 🔴	[More…](#)	
html/css	⚪ ⚪ 🔴	[More…](#)	

languages

german	🟢 ⚪ ⚪
english	🟢 ⚪ ⚪

Legend

🟢 ⚪ ⚪	>=O(1000)h of experience
⚪ 🟡 ⚪	O(100)h of experience
⚪ ⚪ 🔴	basic knowledge

skills

physics	see [grades](#)	
machine learning	🟢 ⚪ ⚪	[More…](#)
tensorflow	🟢 ⚪ ⚪	[More…](#)
keras	🟢 ⚪ ⚪	[More…](#)
automatisation	🟢 ⚪ ⚪	[More…](#)
anomaly detection	🟢 ⚪ ⚪	[More…](#)
statistics	🟢 ⚪ ⚪	[More…](#)
genetical programming	⚪ 🟡 ⚪	[More…](#)
web scraping	⚪ 🟡 ⚪	[More…](#)
cryptography	⚪ 🟡 ⚪	
blockchain	⚪ 🟡 ⚪	[More…](#)
web development	⚪ 🟡 ⚪	[More…](#)
sympy	⚪ 🟡 ⚪	[More…](#)
graph theory	⚪ 🟡 ⚪	[More…](#)
reinforcement learning	⚪ 🟡 ⚪	
opengl	⚪ ⚪ 🔴	
flask	⚪ ⚪ 🔴	
microcontroller programming	⚪ ⚪ 🔴	
vim	⚪ 🟡 ⚪	
numpy	🟢 ⚪ ⚪	
matplotlib	🟢 ⚪ ⚪	
bash	⚪ 🟡 ⚪	
latex	⚪ 🟡 ⚪	
scipy	⚪ ⚪ 🔴	