Simon Klüttermann

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Grappa
Science Park 904
Amsterdam 1098XH

January 12, 2021

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 allows me to 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 believe that I can provide significant value to your research while providing me invaluable experience to prepare me for my future career. But even though I have been fascinated by dark matter searches for a long time, 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

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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 this Paper (QCDorWhat). There idea was to use machine learning, namely anomaly detection, to unsupervisedly detect LHC jets that are not (only) the product of standart 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 is not such an easy task, it became clear that the true problem lies in their initial approach. To find anomalous jet events, they used autoencoder. Sadly their desire of finding any anomalous event was only tested on limited anomalies, which resulted in them beeing 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 focuss more on generality then on quality. Even though I had to use other algorithms than autoencoders to make this work, my final models are very general, and able to detect neirly any anomaly (there is a nice comparison plot at the end of my thesis defence).

Future interests: My future interestests are strongly influenced by my thesis. On the machine learning side, this means that I have a strong interrest in understanding my models on a deeper level (and a sligth 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 only 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 results, 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 faszinated 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 interrested in, you find in my github and I would like not 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
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
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)

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...
web scraping	⚫🟡⚫ More...
cryptography	⚫🟡⚫
blockchain	⚫🟡⚫ More...
web development	⚫🟡⚫ More...
sympy	⚫🟡⚫ More...
graph theory	⚫🟡⚫ More...
opengl	⚫⚫🔴
flask	⚫⚫🔴
microcontroller programming	⚫⚫🔴
vim	⚫🟡⚫
numpy	🟢⚫⚫
matplotlib	🟢⚫⚫
bash	⚫🟡⚫
latex	⚫🟡⚫
scipy	⚫⚫🔴