DeepBayes

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1 Informations

1.1 Personal page

https://hv0nnus.github.io/ Website in progress, there is nothing really useful except a beautiful picture of me.

2 Capacity

I have learned Calculus / Linear Algebra especially during the 2 years preparation in the French preparatory courses for the highly selective competitive entrance to Engineering Schools. https://prepas.org/ups.php?document=6 and https://prepas.org/ups.php?document=397 (both in French).

I am teaching probability and statistics at the university, all the exercises are available https://hv0nnus.github.io/Cours.ht (in French).

I have learned classical Machine Learning in my school but I couldn't find my courses online.

I have learned Pytorch and Deep Learning mainly during my internship and thesis by reading paper and coding.

About Bayesian Method I have follow a course on Kalman Filter/PHD Filter/Particuls Filter and also attended a workshop on (Deep) Gaussian Process (http://tugaut.perso.math.cnrs.fr/workshop02.html).

I have only read some article/blog on Bayesian Deep Learning but never worked in those field.

3 Research experience

Tell us about your research experience in machine learning. We are especially interested in Bayesian methods and deep learning. What problems did you work on? What results did you get? Provide links to your papers, repositories or other relevant materials if there are any. Your answer must be less than 1500 characters.

I am currently doing a PHD Thesis and I am working on Optimal Transport for Domain Adaptation yet, the use of a mathematical/probability tool to solve a real problem is really interesting. I haven't publish any paper yet and the code is not public. I will focus more on my 6 months internship where I code a Deep Learning algorithm (GridNet) in Pytorch. The architecture was created by a previous Ph.D. student in Lua and had to re code it first and then tried to improve it. This architecture tackle the problem of segmenting segmentation (Cityscape Dataset). My code is available on github https://github.com/Hv0nnus/GridNet. I tried to improve the performance by modifying the loss function. The test was done using the IoU (Jaccard index), so I created a loss function based on the Lovasz extension. I also prove the convexity under certain condition. The performance was good in some toys dataset but couldn't beat the classical cross-entropy on real data, this wasn't good enough to publish a paper. All the detail explanation are in my report http://tugaut.perso.math.cnrs.fr/workshop02.html (in french). On the Bayesian/probabilistic part I have coded a variant of a particle filter to find the position of an object in 3D space using 2 cameras. The code, the original paper, my report associated with this project and a small Gif are all available at https://hv0nnus.github.io/Object_tracking.html.

4 Industry experience

Tell us about your machine learning projects in industry. We are especially interested in projects related to Bayesian methods and deep learning. What problems did you work on? Which methods did you use? What results did you get? What was your role in the team? Provide links to repositories or other relevant materials if there are any. Your answer must be less than 1500 characters.

I didn't have any real work in industry but the robotic club of my school ask me and two of my colleagues to develop an algorithm to detect the color and position of a cylinder. I think this have been quite close to

what I could have done in the industry. The goal was to participate to the french robotic cup. We created the dataset by taking picture then train a Deep Learning models on it (in Keras). The performance was perfect on the initial location (100%) but it was less good the day of the competition (97.5%) because of the spot light and the new environment. The code is available on github https://github.com/Fazou/NeuronalNetwork but it is badly organized. I worked mainly on the code of the network.

5 Additional experience

I am quite interested about the Bayes formula for the philosophy of science. The difference between the Frequentist and the Bayesian approach. I have seen many video on this subject (for example https://www.youtube.com/watch?v=BrK

6 Why do you want to participate in the summer school?

I apply to this summer school mainly to improve my knowledge about Deep Learning for my PHD. My subject is the Learning to Learn (or Meta-Learning) and any additional knowledge in the field of Machine Learning can be useful. I really want to discover as much fields as possible during these 3 years. I want to have a deep understanding on the DeepBayes topic. I am only in my first year of thesis and my subject is large enough so that I can reuse what I learn during the summer school or even modify my direction of research.

A second reason would be to make a connection again between Deep Learning and maths. I have followed the Deep Learning trend but I am also passionate about mathematics. I have looked at many different summer schools and this is definitely the one that fit the best with my passion and background (maths and probability) and current work (Machine/Deep Learning).

Another good reason is to meet other people of the field. Every meetings/conferences that I have attended give so much motivations and ideas just by hearing other people talking. I think this is a key point in research to exchange with other researcher and every opportunity is good to take. I also hope I will have sufficient knowledge of the subject to make presentation for the rest of my research team after the summer school.