

Pattern Recognition Lessons Learned

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May 26, 2022

Through this project we were first able to learn to coordinate among a relatively large group without necessarily having direct contact. The challenge here was to distribute the tasks according to each other's strengths, weaknesses and interests. It was sometimes difficult to establish an equitable allocation of tasks. We therefore decided to structure this report as a personal testimony for each member of the group. Each statement is here addressed in the first person.

1. Antoine Demont

2. Boris Mottet

3. François-Xavier Wicht

These projects were interesting in that they allowed us to touch on many subjects and to work with different libraries and methods. I noticed that some seemingly difficult classification problems, such as detecting whether a signature has been forged, could easily be solved using techniques learned in class. Moreover, these different projects allowed me to realise some typical trade-offs like between precision and recall. Although now obvious, it is clear that classification can never be perfect, either we manage to capture all the elements by decreasing the precision of our classifier or we omit some elements but increase our precision. This kind of classification problem can be applied to many other problems.

I was able to work in another course on the de-anonymisation of users in the Bitcoin P2P network. There, for the adversary, it is also a problem of classification. She has to map each transaction to a server. There is indeed deanonymisation when a transaction can be mapped to a server in the network. So it's a bit of a classification problem with one item per class at each time. The techniques described in the paper were all trivial for me thanks to this project and I could even implement some of them easily. Classification problems are everywhere and this project helped me to build a toolbox for my future professional and academic life.

4. Martin Poplawski

5. Vincent Carrel

The first project was not that interesting, as MNIST is something which I have already worked on for multiple different previous project. The permuted MNIST was a nice addition to the task, while the MLP results were expected, I was surprised by the CNN results. We got a >97% precision which was wild for me. I could imagine some patterns reappearing after permutation, but considering that the same pattern at a different position would get remap to something else, I was not expected this kind of result. Given a bit more time, I was also hopping to implement a method to infer the permutation given the dataset. Obviously the pixels which are white on every single image could no be processed, but given enough images, it would have probably been possible to remap all the other pixel to their initial position.

During both the second and the third project, we worked with Dynamic Time Warping, and I was really positively surprised by the results obtained. During the preparation of the Keyword spotting, I was not really expecting much considering our features used, but when the first results came through, it was really cool realizing that it works quite well even with only a few basic features. Therefore it was a good experiment to work again with it on the signature validation. Overall this was a really busy semester, so we didn't spend as much time as we wanted to/should on the last project, but we still got some decent results.

Overall it was a different experiment from the classic work in pairs or group of 3, organizing the work between ourselves was actually a part of the challenge in itself, not repeat some work already done, wait for the results of someone else, etc...