Exam Information

Machine Learning 2

Master in Data Science — Winter Semester 2019/20

Tim Downie — Latest edit: 5th January 2020

- The first Exam is on Wednesday 29thJanuary 2020, 14:30–16:00 in room A 328.
- The second exam is on Wednesday 25thMarch 2019 10:00–11:30 in room B 521.
- The exam duration is 90 minutes.
- The exam counts as 70 Marks and the project as 30 marks. You need at least 45 marks out of 100 to pass the course.
- Please bring with you the following allowed material: calculator, a *crib-sheet* consisting of two pages (four sides) of A4 paper with your own *hand written* notes, pen (non-erasable), pencil ruler and paper. There is no formula sheet for this course. You may bring along your ML 1 formula sheet, which is available in Moodle, if you think this will be of use.
- A crib-sheet with printed text or printed diagrams will be confiscated.
- A simple clock/watch and calculator are the only electronic appliances allowed. In particular, mobile/smart phones are not allowed, and may not be used as a clock or a calculator.
- You should bring your student and photo ID with you and place them on your desk.
- When the exam question includes mathematics or calculations, marks are awarded for showing how you reach the answer. In most cases calculation mistakes carried forward to the next part will not incur further penalty, provided the level of completed work is similar to that expected in the model solution.
- Attempt all questions. It is much easier to gain half marks in each question than full marks for half of the questions.
- All course content covered in ML 2 lectures, workshops and homework is examinable. Standard machine learning principles taught in ML 1 and used in ML 2 are examinable. See the next page for examples of this.
- An *example exam paper* is available in Moodle. There will be a revision class on Wednesday 22ndJanuary. Please attempt the example exam before the revision class.
- *Getting your results and exam scripts*. A time will be arranged when you can collect your result and marked exam script. This will be about one week after the exam. The lecturer will notify you of the time/room, before the exam. You may give permission for another student to collect your exam script, in which case you need to provided a signed letter or send an email to the lecturer using your Beuth email address. Those students who do not collect their work will have their results anonymously (with matriculation number) posted in Moodle.
- On the next page is a list of topics covered in the course, meant as a guide to your revision.

- Good luck!

Machine Learning 2: Subject list

General methods

- **Imputing missing values**
- **Non-linear smoothing methods**: Spline fitting, spline smoothing, and loess smoothing
- Conditional independence and the **naive Bayes classifier**
- **Support Vector Machines**: Linear and non-linear
- **Projection pursuit regression**
- **Neural networks**:
  - **Fully connected neural networks**, **steepest descent** and **back propagation** optimisation.
  - **Fitting NNs** e.g. regularisation, activation functions, starting values
  - **Time delay NNs** and **recurrent NNs**
  - **Convolutional NNs**, **locally connected NNs** and their application to image classification.

General Machine learning knowledge

The following subjects were taught in ML-1, but have also appeared as part of ML 2. These subjects not be the main focus of exam questions, but are still examinable as general machine learning concepts.

- Training, validation and test data
- MSE (RMSE), Bias / Variance trade off
- Loss function and penalty term/regularisation
- Cross validation and bootstrapping
- Bayes Theorem
- Confusion matrix, Sensitivity, Specificity, ROC, AUC