Application for funding of faculty common course 2018

Kursnamn: Probabilistic Machine Learning

Omfattning (högskolepoäng) 9+3 (the extra 3 credits are obtained via a voluntary course project)

ECTS credits

Tidsperiod: March – June, 2018

Course period

Antal platser: Around 50

Maximum number of participants

Undervisningsspråk: English

Language of instruction

Kursens syfte samt motivering till varför den bör vara fakultetsgemensam (max 150 ord)

Aim of course and motivation as to why it should be considered “multidisciplinary” to the extent that the faculty should allocate extra financing.

Data is becoming more and more widely available and the world is now in a situation where there is more data than we can handle. This clearly calls for new technology and this challenge has resulted in the rapid growth of the machine learning area over the past decade. This course will provide a PhD level introduction into the area of machine learning that is suitable for participants from many different departments. Machine Learning is becoming a knowledge required by many different branches of science due to the fact that it offers solutions to the ever-present problem of learning, acting and reasoning based on data. This is the main reason at to why the course will attract participants from several departments at UU. By way of example we can mention that the 2016 edition of the course attracted 49 participants from 7 different departments.

Kursinnehåll, kursens uppläggnings samt examinationsform (max 150 ord)

Contents, study format and form of examination

**Lecture series:** 12 lectures, (2 hours each). The lectures are given by the teachers.

**Exercise sessions:** 10 in total. One of the senior PhD students will organize this.

**Examination:** Written take-home exam (72h). Roughly half of the exam will be solved using the computer and the other half will be traditional pen and paper assignments.

**Project (optional):** Successful projects will be awarded an additional 3 hp. This is a great mechanism to spark bigger projects and spin-off collaborations, see the appendix for concrete examples of how this has resulted in joint papers and a joint VR project during earlier editions of the course.

**Course contents (technical):** Probabilistic modeling, Deep Learning, Gaussian processes, Support vector machines, Expectation Maximization, Variational inference, Graphical models, Message passing algorithms, Probabilistic programming and Bayesian nonparametrics.

Further information: See the previous course website:

http://www.it.uu.se/research/systems_and_control/education/2016/sml
Målgrupp/er (specifiera ämnen/inriktningar) samt rekommenderade förkunskaper
Target group/s (specify, if possible, subject/specialization) and recommended background
Our target audience is wide. The experience we have from earlier editions of this course shows that it is great to have a wide target audience for a course like this. More specifically, the audience include PhD students, researchers, interested MSc students, companies and others with an active interest in a PhD level course on Machine Learning.

**Recommended background:** Basic courses in linear algebra, probability, statistics and optimization.

Huvudansvarig institution: Department of Information Technology
Department with main responsibility

Andra inblandade institutioner (specifiera hur).
Other departments involved (specify how).
We expect PhD students from 5-8 departments based on previous experience.

Kontaktperson/er (namn, e-postadress)
Contact person (name, e-mail address)
Thomas Schön, thomas.schon@it.uu.se
Fredrik Lindsten, fredrik.lindsten@it.uu.se
Lawrence Murray, lawrence.murray@it.uu.se

Anmälan om kursdeltagande till
Application from course participants should be sent to
Thomas Schön

Senast
Not later than
1 March 2018

Kursen har tidigare givits (ange när) (ange antal)
The course has previously been given (specify when and number of participants)

Schön has given different editions of this course 5 times over the last 5 years at 3 different universities (Uppsala University (2014, 2016), Linköping University (2011, 2013) and Lund University (2011)). Most of the times with a fairly large interest, see the table below for supporting details. This year we have more teachers involved in order to further improve the impact and outcome of the course.