Machine Learning with Python

Training Programme
by
Dream Catcher Consulting Sdn Bhd

28 - 30 Aug 19
Dream Catcher Consulting Sdn Bhd, Penang

303-4-5 & 303-4-6 Block B, Krystal Point
Jln Sultan Azlan Shah 11900 Sg Nibong Penang, Malaysia
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Synopsis

SBL-Khas 1000110313

Machine learning is the science of getting computer to react to external inputs without explicitly hardcoding the rules how computer should react. Examples of machine learning applications are everywhere: spam email filters, speech recognition, Swype keyboard, search engine, facial recognition, etc. It is a very versatile and a must have skill to turn data into meaningful actions.

Algorithms developed for machine learning are many and complex. Probably any science or engineering graduates should have heard of related terms like regressions and decision trees before. However, applying or choosing these machine learning algorithms for a task is not necessary straightforward. Many are confused what will be the most efficient algorithm they should choose to solve their task. In this course, we will systematically walk through different categories of machine learning algorithms and giving the pros and cons of the algorithms and caveats to use them via practical examples.

One aspect in the course of application of machine learning that might easily overlooked is the data preparation. Often after obtaining the data, many will quickly clean and dive straight in to apply the machine learning algorithm. However, it is important to understand that reproducibility of your algorithm is also important, and thus it is necessary to have a good audit trail of how you clean your data. Also, exploratory data analysis will allow one to have preliminary insight and understanding on the data given. This is important to avoid one applying machine learning without any solid ground.

Python is chosen to be the programming language for implementing the algorithm. Python has a good collection tools called scikit-learn that allows one to quickly implement the algorithm. In this course, we will use scikit-learn extensively to illustrate various machine learning algorithms.

Course highlight

This course emphasizes on hands-on. Participants will be systematically introduced to various machine learning algorithms with hands-on practical sessions to implement the algorithms.

What You Will Learn

- Perform exploratory data analysis
- Various supervised and unsupervised machine learning algorithms
- Create and select appropriate features for machine learning
- Evaluate the performance of machine learning algorithms

Who Should Attend

Professionals who requires to analyze data to spot patterns, predict future trends, or making recommendations from the data.

Prerequisite

- Competency with Python programming
Good knowledge of college statistics and linear algebra

**Course Methodology**

The course is presented in Socratic style lectures and workshops with interactive sessions that work through problem examples that are commonly encountered in real-world situations.

**Course Duration**

3 day(s), 9am - 5pm

**Course Structure**

**Day 1**

**Data preparation**

- Good dataset
  - Describe key characteristics of good data sets
- Exploratory data analysis
  - Preliminary exploration on data visually in order to understand better the main characteristics, trends, and associations of variables in a dataset
- Handling missing data
  - Should we discard or impute data
  - Consideration when imputing data

**Supervised classification**

- kNN (k Nearest Neighbours)
  - Simple classification method
  - Discuss typical workflow of a machine learning task
  - Missclassifications
- Decision trees, random forest
  - Decision split search
  - Ginni coefficient and entropy
  - pruning
  - randomizing decision trees
- Naive Bayes
  - applying Bayes’ theorem between every pair of input fields assuming there are independence
  - predicting binary, multinomial and continuous targets
- Support vector machines
  - problems with data set with many fields but little records
  - support points
  - single-class and multiclass classifications
- Neural Network
  - multilayer perceptrons for classification and regressions
  - activation functions
  - updating rules: Stochastic Gradient Descent, Adam, L-BFGS

**Practical lab, assignment**

**Day 2**
Regressions

- Regression models
  - linear regression, ridge regression, lasso regression
  - factor importance
  - mean square errors
- Baseline model
  - Ordinary least squares
- Overfitting
  - model complexity vs. model robustness
- Outliers
  - detecting outliers

Unsupervised learning

- K-means clustering
  - various clustering problems: geometrical overview
  - limitation of k-means
- Principal component analysis
  - dimensionality reduction
  - directions of maximum variance
- Expectation maximization
  - maximum-likelihood estimates for incomplete data
  - latent variables
- Singular value decomposition
  - singular value decomposition and non-negative factorisation

Practical lab, assignment

Day 3

Features

- Feature generation
  - ordinal and nominal variables
  - label encoder, categorical encoder and one-hot encoder
  - binning and polynomial features
- Feature selection
  - univariate statistics selection
  - model based selection
  - iterative selection
- Feature scaling
  - normalizer, minmax scaler, maxabs scaler, robust scaler

Validation and Evaluation

- Training and testing data sets
  - random states
  - stratify data before splitting
- cross-validation
  - k-folds cross-validation
  - Grid search
- sensitivity and specificity
  - model assessments
  - accuracy, precision, sensitivity, specificity, ROC curve

Practical lab, assignment
Course Instructor(s)

Dr Goh Yong Kheng

Dr. Goh received his Bachelor of Science, first class honours, in Physics from Universiti Malaya, Malaysia in 1999. Subsequently, he obtained his Ph.D. in Mathematics from the Imperial College London, U.K. in 2003, under the supervision of Dr. Roy Jacobs. After his graduation, he joined the Department of Mathematical Sciences at the University of Essex, U.K. as a senior research officer. At the University of Essex, he worked under the 5th European Framework CARPE DIEM project from 2003 - 2005 in developing software for predicting wind field directions from data obtained from Doppler radars. He was also the system administrator for the SGI-Irix systems at the Propagation and Remote Sensing Lab at the University of Essex. He joined the Universiti Tunku Abdul Rahman in April 2005. Currently he is holding the position of Assistant Professor, Head of Department for the Department of Mathematical and Actuarial Sciences, Chairperson for the Centre for Mathematical Sciences. He was the chairman of the organising committee for the 6th IMT-GT International Conference on Mathematics, Statistics, and Its Applications, technical programme committee member for IEEE 2012 Conference on Sustainable Utilization and Development in Engineering and Technology. He is also a Novell Certified Linux Professional for SUSE Linux Enterprise Server 10.

Dr. Goh started his education career in 1999 tutoring Engineering Mathematics in Universiti Putra Malaysia. Over the years, he has taught in numerous subjects, including partial differential equations, mathematics for computer graphics, numerical methods, calculus, as well as scientific and symbolic computations. He was involved in the curriculum development of various Mathematics and ICT undergraduate and postgraduate degrees in UTAR. He also taught programming languages and conducted seminars related to programming languages and type-setting software, including MATLAB, Python, Maxima, Fortran, Latex, as well as workshop in openSUSE Linux operating system.

His interest is in the areas of applied mathematics, statistical mechanics, bioinformatics, computational physics, and GPU programming.
Administrative Details

Programme Logistics

Duration: 3 day(s), 9am - 5pm  
Date: 28 - 30 Aug 19  
Venue: Dream Catcher Consulting Sdn Bhd, Penang

Morning break, lunch and tea break will be provided throughout the course duration. Course Manual and Certificate of Attendance will be provided.

Your Investment

<table>
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<tr>
<th>Type</th>
<th>Condition</th>
<th>Price per Pax</th>
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<tr>
<td>Regular Fee</td>
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<td>RM3,420.00</td>
<td>RM205.20</td>
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<td>Early Bird Discount</td>
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<td>Group Discount</td>
<td>for every 3 pax registered, receive 1 complimentary seat</td>
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Additional cost may incur for customization or extra material request. Course fee is 100% claimable from PSMB (SBL scheme) in accordance to PSMB guidelines.

3 Easy Steps to Register

- **Phone**  +604 640 7111 / 7112
- **Fax registration form** to +604 640 7110
- **Email registration form** to register@dreamcatcher.asia
Method of Payment

Crossed cheque / bank draft made in favour of DREAM CATCHER CONSULTING SDN BHD.
Registration form
together with payment to be couriered to:

Dream Catcher Consulting Sdn Bhd
303-4-5 & 303-4-6
Block B, Krystal Point
Jln Sultan Azlan Shah
11900 Sg Nibong
Penang, Malaysia

Payment must be received no later than 10 working days before the course commences. An undertaking may be accepted in cases where payment is delayed. However all payments must be made before the course commences.
Closing registration date is 14-Aug-2019.

Refund and Cancellation

Fees will only be refunded in full for cancellation received in writing more than 10 working days prior to the commencement date. Substitute attendee(s) will be accepted at no extra charge.

Disclaimer

Dream Catcher Consulting Sdn Bhd reserves the right to change the instructors, date and to vary/cancel the programme should unavoidable circumstances arise. All effort will be taken to inform participants of the changes. Upon sending the registration form, you are deemed to have read and accepted the terms.

Enquiries

call us at +604 640 7111 / 7112 or email us at enquiry@dreamcatcher.asia
# Registration Form

<table>
<thead>
<tr>
<th><strong>Course Title</strong></th>
<th>Machine Learning With Python</th>
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(Emails are required to ensure notification of any changes reach the participant)

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Total Amount

(Emails are required to ensure notification of any changes reach the participant)

Submitted by:

Company Name: ____________________________
Company Address: ___________________________
Contact Person: ____________________________
Dept: ____________________________
Designation: ____________________________
Phone: ____________________________
Email: ____________________________

Please complete this form with an authorised signature below and fax to fax registration form to +604 640 7110 or email to email registration form to register@dreamcatcher.asia. Call us at phone +604 640 7111 / 7112 for any enquiry

Authorised

Signature: ____________________________
* Please print full name (authorised signature) if you submit via email

Name: ____________________________
Dept: ____________________________
Designation: ____________________________
Date: ____________________________

This registration is invalid without a signature. Payment must be made no later than 10 working days before the course commences. An undertaking may be accepted in cases where payment is delayed, however all payment must be made before the course commences. Participants who registered but did not attend will be invoiced accordingly. Fees will only be refunded in full for cancellation received in writing more than 10 working days prior to the commencement date. Substitute attendee(s) will be accepted at no extra charge.

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Enclosed cheque/bank draft no ____________________________ made in favour of DREAM CATCHER CONSULTING SDN BHD