AMBIENT-IT

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Sign up

Deep Learning Specialization and Watch Training

2 days (14 hours)

Description

Following on from our introductory course, the aim of this training course is to perfect your knowledge until you reach the cutting-edge topics that are driving innovation in Deep Learning today. From self-supervised or Bayesian learning to the new possibilities of training on encrypted data, the aim here is to explain the existing solutions, the known limits and the avenues for progress that tomorrow will revolutionize the daily lives of data scientists and engineers working on these subjects.

Objectives

- Upgrading the state of the art in Deep Learning research (self-supervised, Bayesian, continuous and security)
- Mastery of the latest Deep Learning techniques

Target audience

Developers, Architects, Big Data Data Analyst / Data Engineer / Data Scientist

Prerequisites

- Knowledge of Python and mathematics

Further information

- By way of introduction, we offer you an Artificial Intelligence training course.

- Complementary technology
  - TensorFlow from Google
  - Pytorch from Facebook

Program of our training Introduction Specialization and watch in Deep Learning

[DAY 1]

1. Unsupervised & self-supervised learning

- Overview of approaches, definition of self-supervised learning. Possibilities for managing unbalanced or imperfect datasets, as well as for defining new tasks.
- Application to image representation learning. Automatic feature learning unsupervised clustering, adversarial learning.
- Application to learning video representations. Use of abnormal events. Unsupervised motion learning.
- Unsupervised learning of estimated depth on an image.
- Managing translation problems using unsupervised learning.
- Applications to Deep Reinforcement Learning

2. Bayesian Deep Learning

- Bayesian approach and neural networks. The need for uncertainty in network predictions. Limits of the approaches compared.
- Dropout: reinterpretation of the regularization method in Bayesian inference. Reformulation.
- Variational AutoEncoder: further development of the Bayesian architecture. VAE extensions.
- Bayes by backprop: Multi-layer Bayesian perceptron.
- Bayesian convolutional networks.

3. Continual Learning

- Introduction to continuous learning. Use cases and limitations. Catastrophic forgetfulness of a network.
- Specialization in transfer learning. Basic uses and specializations.
- New continuous learning metrics.
- Framework Progress & Compress.
- Example of continuous GAN architecture: Deep Generative Replay.
- Meta learning: definition and principles. Applications to neural networks.
- Lifelong learning: challenges and review of existing solutions.

4. Safety in Deep Learning

- Definition and analysis of adversarial attacks. Image and text examples.
- Presentation of the main defenses found and their limitations. The current state of adversarial network security.
- Research into robust learning approaches (Sever algorithm).
- Example of semantic adversarial attacks.
- Neural network security analysis framework.
- US legal considerations on adversarial attack hijacking of a neural network.

[DAY 2]

5. Neural network optimization

- Pruning techniques: considerations and comparisons. Application methods
- Pruning on a multi-layer perceptron.
- Pruning on a convolutional network.
- mobileNet approach: dedicated development for mobile devices.
- Application examples.

6. Deep learning and data privacy

- Differential privacy: definition, basic applications and limits
- Study of the tensorflow/privacy framework.
- Case study of an application to MNIST classification.
- Measures the ability of a neural network to "involuntarily" retain data.
- Ability to extract information from a trained network (Secret Sharer).
- Learning recurrent language models in Differential Privacy.
- Work on encrypted data: presentation of the tf-encrypted framework.
- Examples of use and recent work.

7. Graph Networks: a new modeling tool

- Fundamental advantages of being able to process data in graph form.
- Possible models and representations.
- Special approaches (message passing networks, Set Networks).
- DeepMind GraphBlock approach, generalization.
- Applications to different problems: classification, analysis of a complex system, transformation, etc.

8. Advanced Deep Learning visualization tools

- Lucid: Deep Learning visualization and interpretation tool. Practical examples.
  - Visualization of diversity learned from a CNN.
  - Visualization of accruals.
  - Analysis of activation grids.
  - Analysis of spatial and channel allocations.
  - Atlas of activations: new visualizations and interpretations.
- Hierarchical Contextual Decomposition :
  - Details of the algorithm implemented.
  - Application to recurrent networks (sentiment detection).
  - Application to convolutional networks (classification).

9. Recent specializations Deep Reinforcement Learning

- Large-Scale Study of Curiosity-Driven Learning: exploiting reward-free learning.
- Contingency-Aware Exploration in Reinforcement Learning.
- Contingency awareness. Architecture Attentive Dynamics Model. Experiments with A2C and PPO.
- Deep Reinforcement Learning and the Deadly Triad: analysis of the "triad" of failures in DRL on a classic Q-Learning algorithm.
- Deep Counterfactual Regret Minimization - Noam Brown et al.
- Approaching problems with particularly imperfect information. Presentation of the CFR and special algorithm.
- An Atari Model Zoo for Analyzing, Visualizing, and Comparing Deep Reinforcement Learning Agents.
- Algorithm test bench, analysis management and visualization of DRL approaches.

Companies concerned

This course is aimed at both individuals and companies, large or small, wishing to train their teams in a new advanced computer technology, or to acquire specific business knowledge or modern methods.

Positioning on entry to training

Positioning at the start of training complies with Qualiopi quality criteria. As soon as registration is finalized, the learner receives a self-assessment questionnaire which enables us to assess his or her estimated level of proficiency in different types of technology, as well as his or her expectations and personal objectives for the training to come, within the limits imposed by the selected format. This questionnaire also enables us to anticipate any connection or security difficulties within the company (intra-company or virtual classroom) which could be problematic for the follow-up and smooth running of the training session.

Teaching methods

Practical course: 60% Practical, 40% Theory. Training material distributed in digital format to all participants.

Organization

The course alternates theoretical input from the trainer, supported by examples, with brainstorming sessions and group work.

Validation

At the end of the session, a multiple-choice questionnaire verifies the correct acquisition of skills.

Sanction

A certificate will be issued to each trainee who completes the course.