30th Vienna Deep Learning Meetup

29th October 2019

#VDLM

Vienna Deep Learning Meetup

The Organizers:

Thomas Lidy
Musimap

Alex Schindler
AIT & TU Wien

Jan Schlüter
OFAI & contextflow

René Donner
contextflow

Vienna Deep Learning Meetup

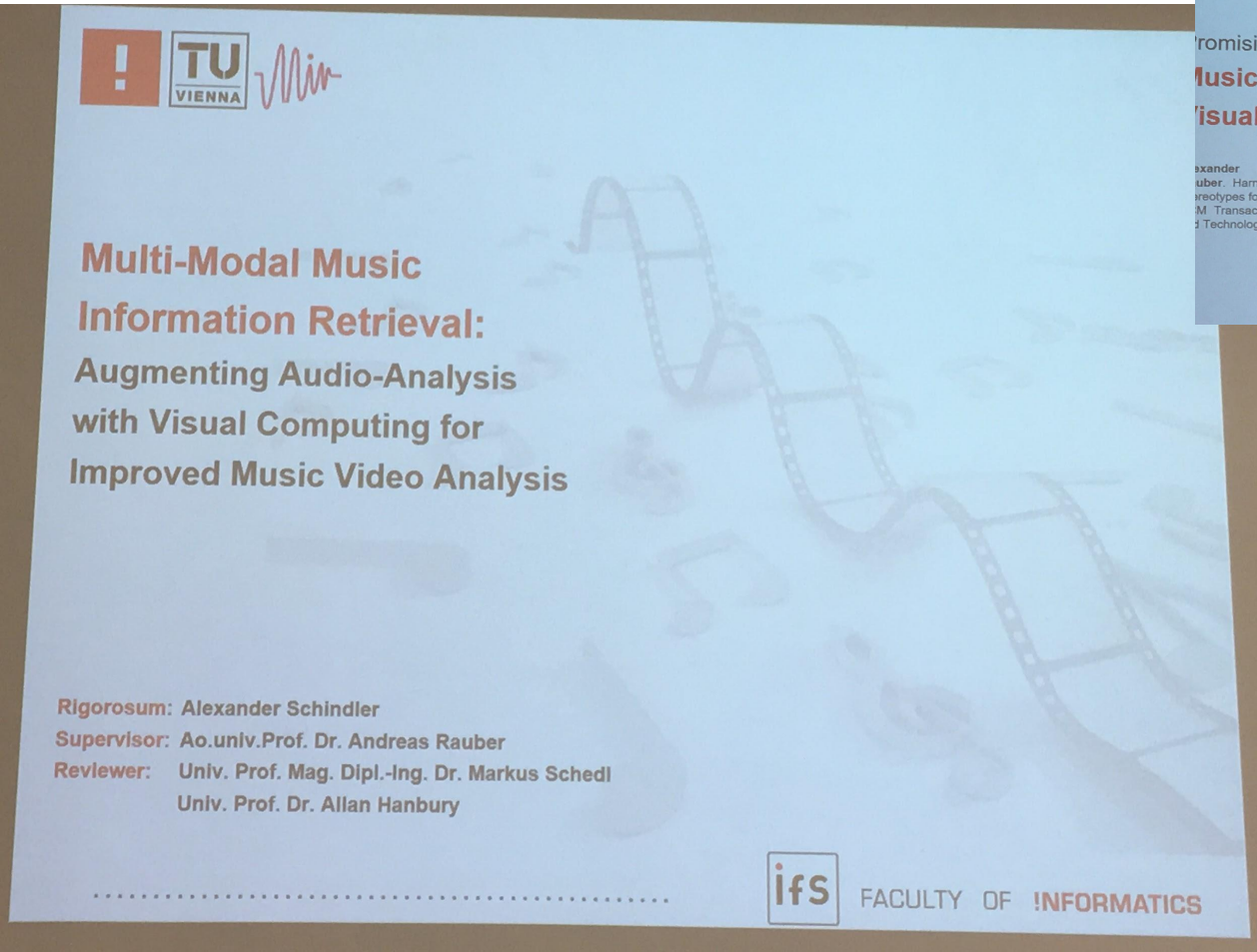
Thomas Lidy
Musimap

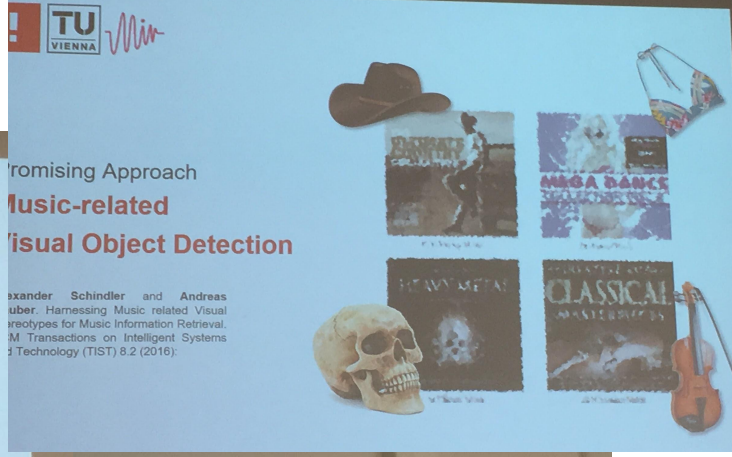
Dr. Alex Schindler
AIT & TU Wien

Jan Schlüter
OFAI & contextflow

René Donner
contextflow

Dr. Alexander Schindler:





Topics for Today

Vienna Deep Learning Meetup

- **Welcome & Introduction**
- **Fake News. From Shallow to Deep. How to create, detect and fight it.**

  Alexander Schindler, Research Scientist, Austrian Institute of Technology (AIT)
- ***Announcements***
- **<Break>**
- **Anomaly Detection with GANs**

  Thomas Schlegl, Machine Learning Engineer and Data Scientist, contextflow
- **Conference Report: O'Reilly AI Conference** *- Elisabeth Fink, Data Scientist, Raiffeisen Software*
- **Hot Topics** *- Jan Schlüter, Research Scientist, OFAI & contextflow*

Vienna Deep Learning Meetup

Announcements

Vienna
Deep Learning
Meetup

VDLM on Github

https://github.com/vdlm/meetups

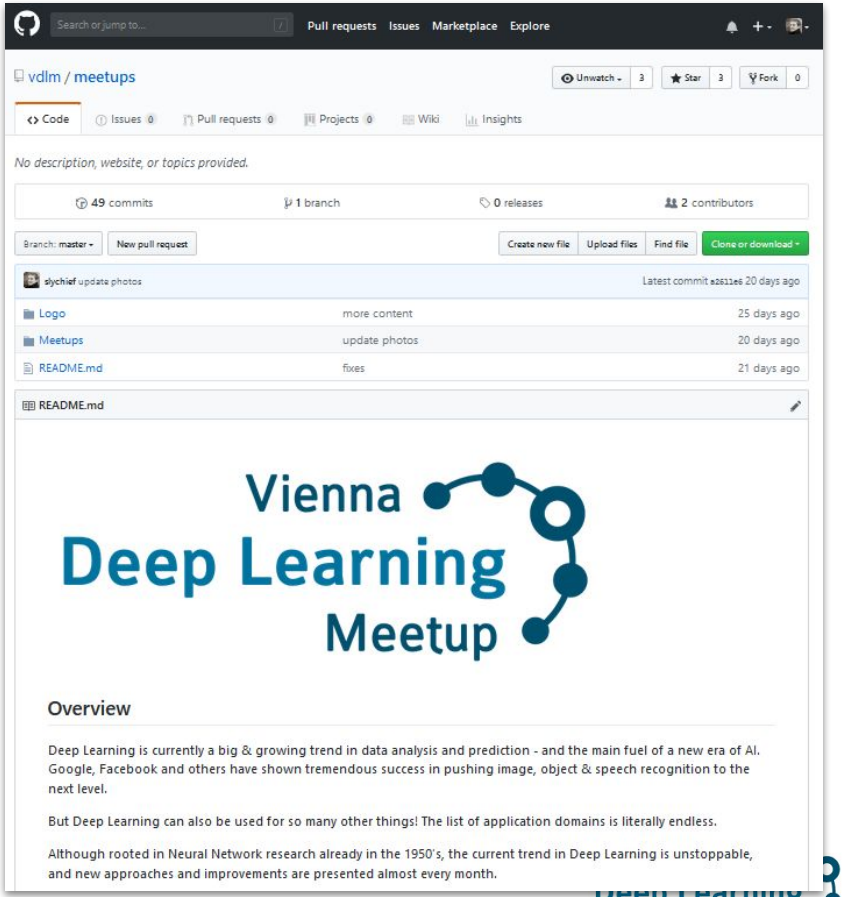
- all talks
- slides
- photos
- videos
- Wiki

Meetups

#	Date	Place	Topic	Link	Video	Meetup.com
1	2016-04-07	Sector 5	intro	more		link
2	2016-05-09	Sector 5		more		link
3	2016-06-06	Sector 5		more		link
4	2016-07-07	TU Wien		more		link
5	2016-09-22	Automic Software GmbH		more		link
6	2016-10-12	Sector 5		more		link
7	2016-12-01	Agentur Virtual Identity		more		link
8	2017-01-17	TU Wien Informatik		more		link
9	2017-02-21	bwin.party services (Austria) GmbH		more		link

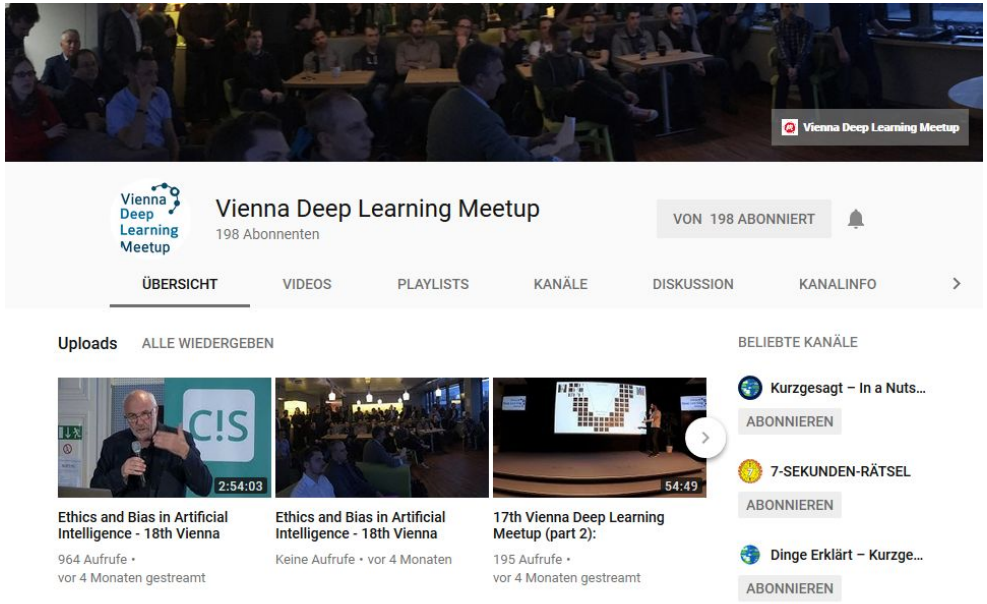
Talks

Date	MU#	Speaker	Topic	Slides
2016-04-07	1	Thomas Lidy	An overview presentation of Deep Learning	pdf
2016-04-07	1	Jan Schlüter	History, Approaches, Applications	pdf
2016-05-09	2	Alex Champandard	Neural Networks for Image Synthesis	
2016-05-09	2	Gregor Mitscha-Baude	Recurrent Neural Networks	pdf
2016-06-06	3	Jan Schlüter	Open-source Deep Learning with Theano and Lasagne	pdf
2016-09-22	5	Josef Puchinger	Deep Learning & The Future of Automation	
2016-09-22	5	Christoph Körner	Going Deeper with GoogLeNet and CaffeJS	pdf



Deep Learning
Meetup

VDLM Youtube Channel



https://www.youtube.com/ViennaDeepLearningMeetup

Vienna Deep Learning Meetup

Cloud Computing

Cloud technology trends are evolving and dominating the IT industry. Our speakers will give you a chance to learn about the latest improvements in cloud services.

Artificial Intelligence

The competition in AI development is increasing and the best practices are continuously being adapted. Learn about the newest advancements & boost your skills.

Blockchain

Blockchain has been and will continue into the foreseeable future to disrupt industries with its numerous possibilities. Learn at our congress about the latest advancements and techniques from industry leaders.

Internet of Things

IoT applications are increasingly connecting our world. Experts will talk about the newest development trends to help you stay up to date with the continuously evolving technology.

SPEAKERS

Developers, Tech Pioneers & Heroes of Innovation

TANMAY BAKSHI
AI expert at age 15
IBM Cloud Advisor

CASSIE KOZYRKOV
Chief Decision Scientist
Google, Inc.

SIDDHA GANJU
Solution Architect
Nvidia Corporation

LEO SHIWEI LI
President
Tencent Cloud Europe

DON'T MISS OUT ON THIS OPPORTUNITY

You Can't Download the Experience

Get Inspired

Learn from industry leaders and tech pioneers selected by the WeAreDevelopers Community.

Connect

Network and share your experience with like-minded people from 50+ countries who love what they do.

Level Up

Dive into hands-on sessions with experts from leading tech companies to enhance your skills.

Raffle:
Win 3 free tickets!

15% off with
ConVienna_15_DLM

CITIZEN SCIENCE HACKATHON

Idea Owner

Person of Action

Volunteer

6-8 DECEMBER
@ University of Vienna

eventbrite

Sponsored by: Raspberry Shake

Topics for Today

Vienna Deep Learning Meetup

- **Welcome & Introduction**
- **Fake News. From Shallow to Deep. How to create, detect and fight it.**

  Alexander Schindler, Research Scientist, Austrian Institute of Technology (AIT)
- ***Announcements***
- **<Break>**
- **Anomaly Detection with GANs**

  Thomas Schlegl, Machine Learning Engineer and Data Scientist, contextflow
- **Conference Report: O'Reilly AI Conference** *- Elisabeth Fink, Data Scientist, Raiffeisen Software*
- **Hot Topics** *- Jan Schlüter, Research Scientist, OFAI & contextflow*

Vienna Deep Learning Meetup

DON'T MISS OUT ON THIS OPPORTUNITY

You Can't Download the Experience

Get Inspired

Learn from industry leaders and tech pioneers selected by the WeAreDevelopers Community.

Connect

Network and share your experience with like-minded people from 50+ countries who love what they do.

Level Up

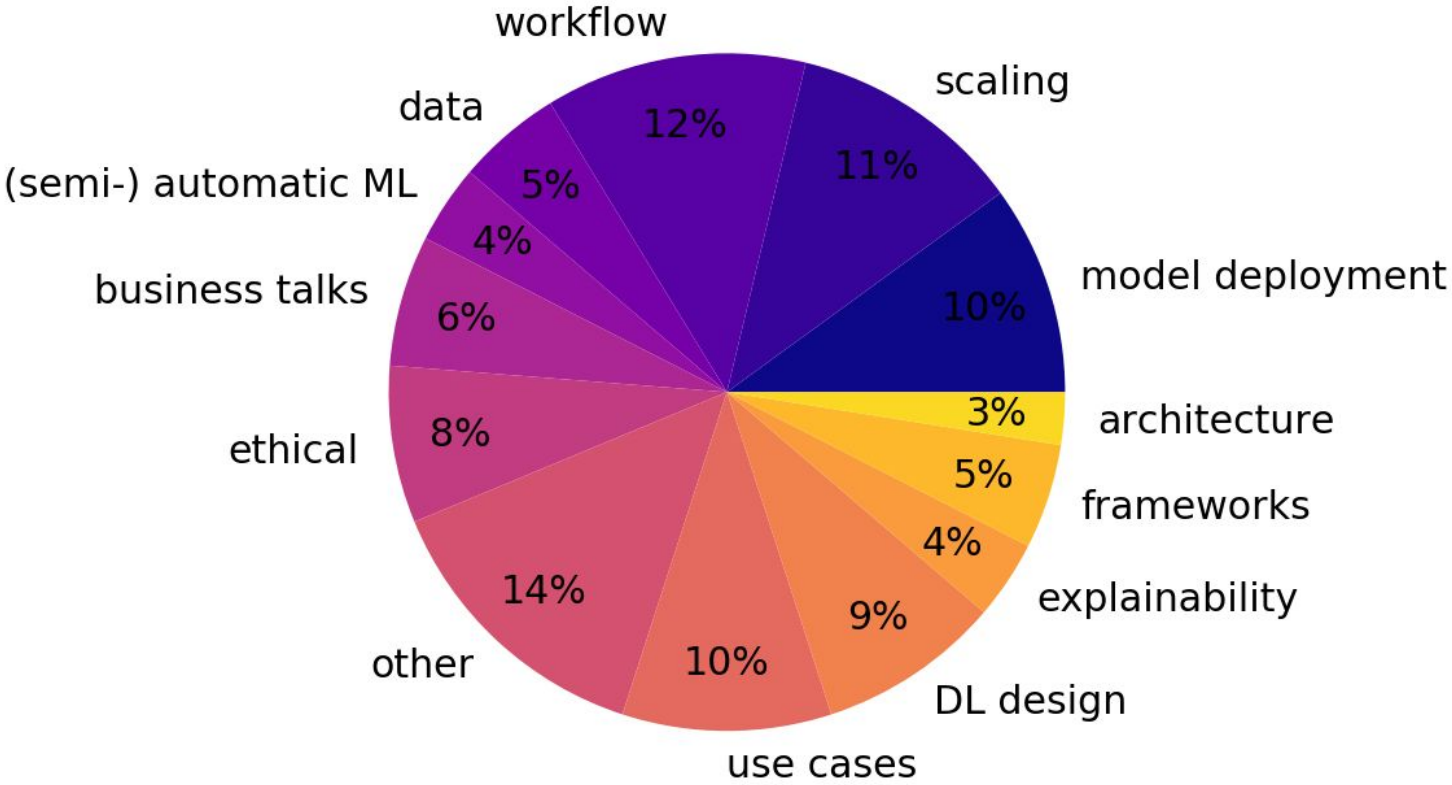
Dive into hands-on sessions with experts from leading tech companies to enhance your skills.

Raffle:
Win 3 free tickets!

15% off with
ConVienna_15_DLM

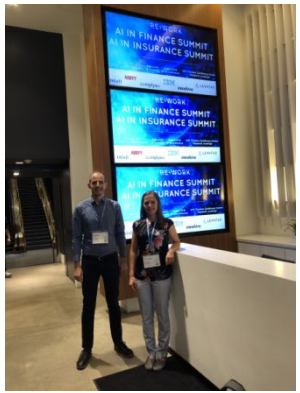
Elisabeth Fink
Raiffeisen Software
29.10.2019

What were the hot topics this year?



How did I end up there?

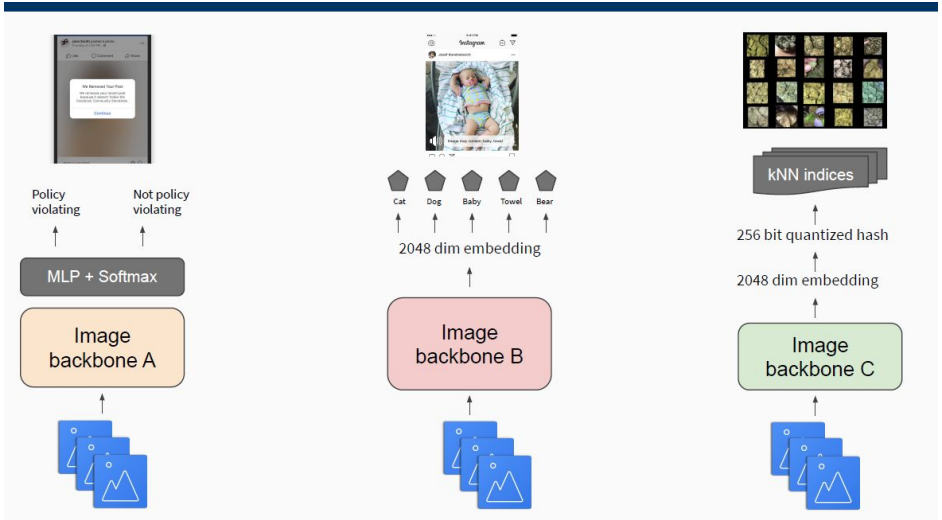
- my background: IT -> applied math -> pure math -> more pure math -> data science
- work at **Raiffeisen Software**
  - software solutions for banking and extended needs (Raiffeisen only)
  - current topics in data quality
  - use of ML methods in sometimes non-obvious use cases
- As part of our job, a colleague and I got to go to NY and San Jose to attend conferences.

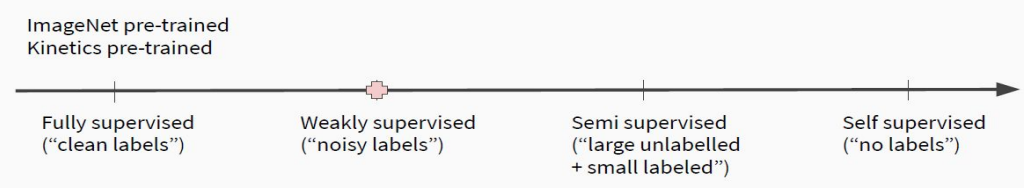


Facebook's visual cortex

talk by Roshan Sumbaly

- Visual tasks:
  - Image alternativ text
  - instagram explore ranking
  - violating content classifiers
  - visual similarity
- Data Annotation:
  - essential part in processing images
  - needed to train classifiers
  - expensive manual labeling
- Reducing supervision for pre-trained networks

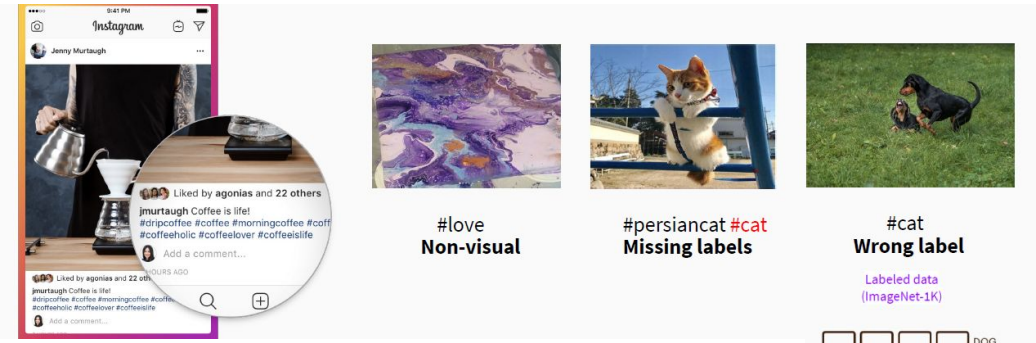




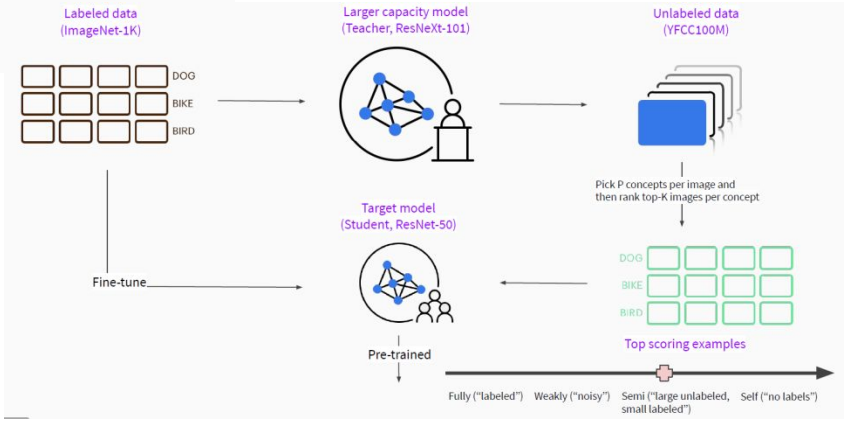
Facebook's visual cortex

talk by Roshan Sumbaly

Weakly supervised



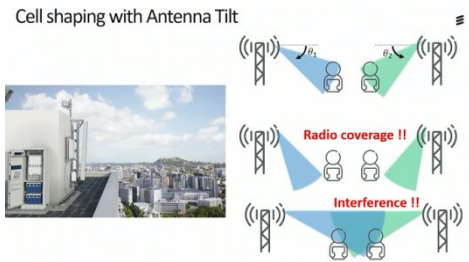
- Hashtags are noisy, ambiguous or vague
- Preprocessing:
  - replicate images from low frequency tags
  - de-dup labels based on WordNet synset hierachy
- Semi-supervised: large unlabeled, small labeled

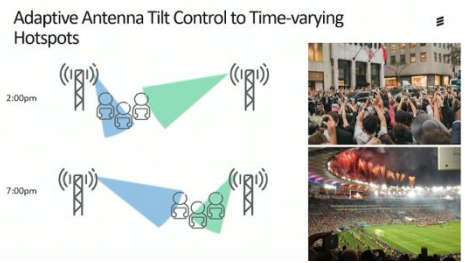


Cell shaping in mobile networks

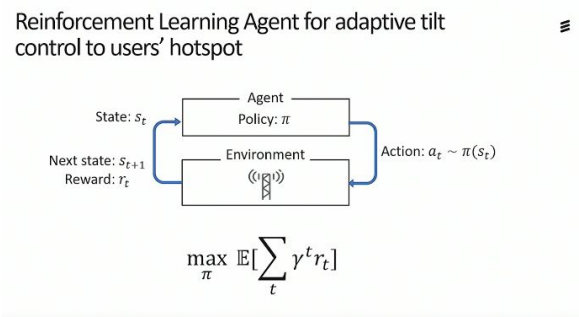
talk by Julien Forgeat (Ericsson)

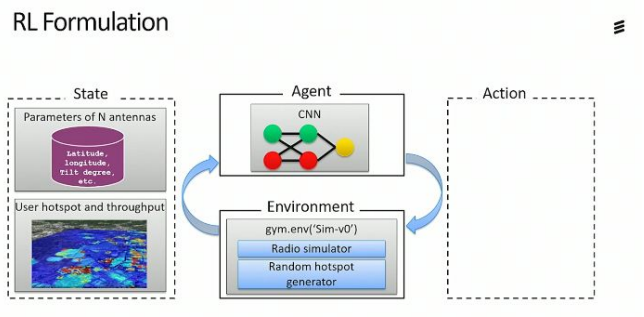
- Cell shaping with Antenna Tilt





- Currently: rule based, human intuition
- Research: use reinforcement learning!

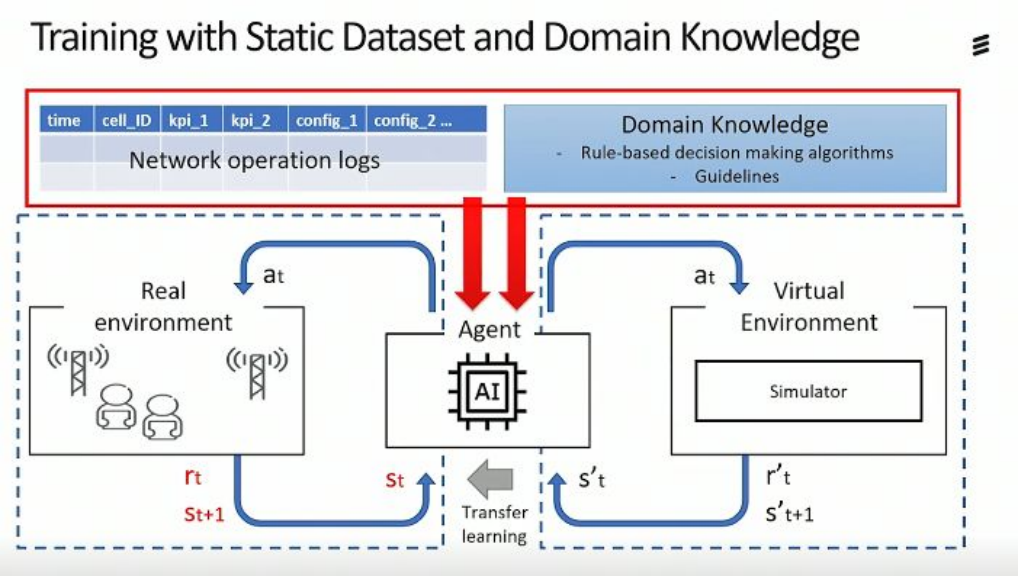




Cell shaping in mobile networks

talk by Julien Forgeat (Ericsson)

- Testing in real world not feasible



Wrap up

- Talks available at **learning.oreilly.com** (free 30 day trial possible)

We’re looking for a

Junior/Senior Data Engineer!

ask me: **elisabeth.fink@r-software.at**

Hot Topics & Latest News

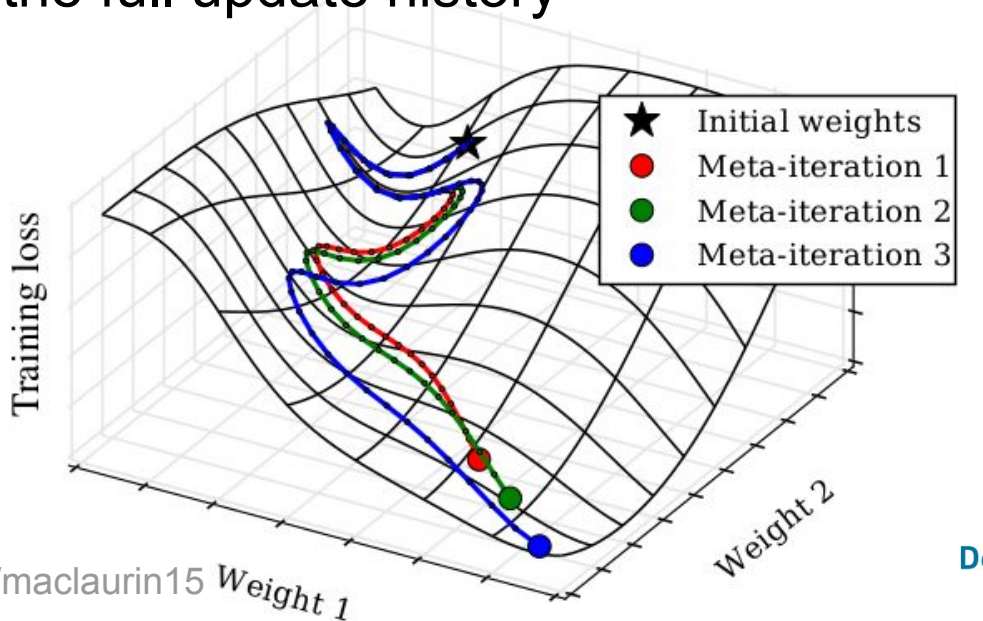
a short block at every meetup
to briefly present recent papers and news in Deep Learning

Send us contributions (tom.lidy@gmail.com)
or come with slides to do a short block yourself!

Vienna
Deep Learning
Meetup

Gradient Descent: The Ultimate Optimizer

- 8th Deep Learning Meetup:
  Backpropagate through backpropagation to adjust hyperparameters (learning rate, momentum, …)
- Requires storing the full update history

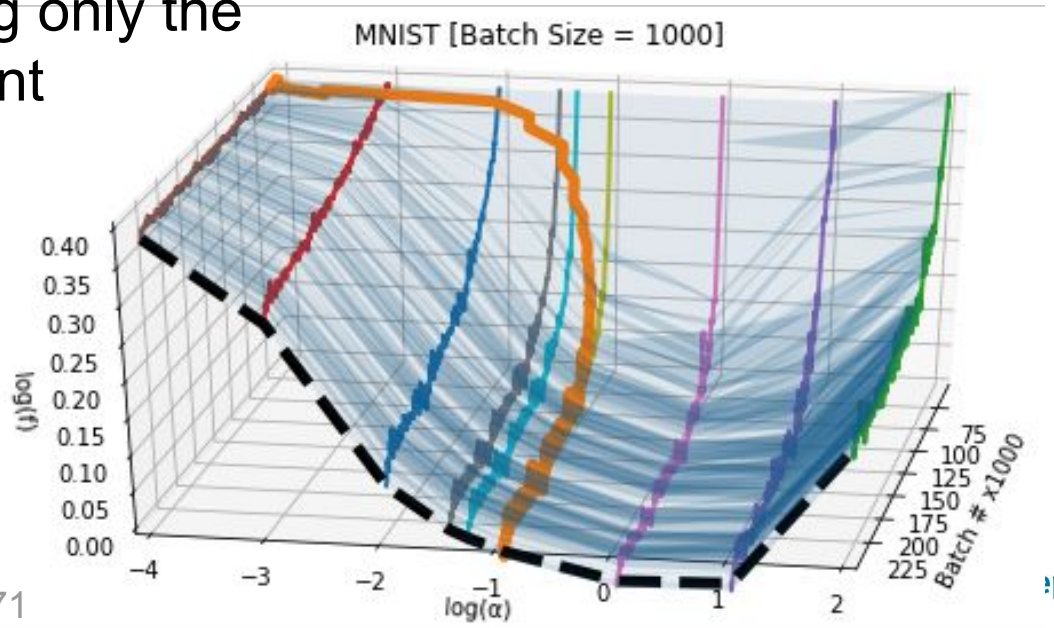


http://proceedings.mlr.press/v37/maclaurin15

Vienna Deep Learning Meetup

Gradient Descent: The Ultimate Optimizer

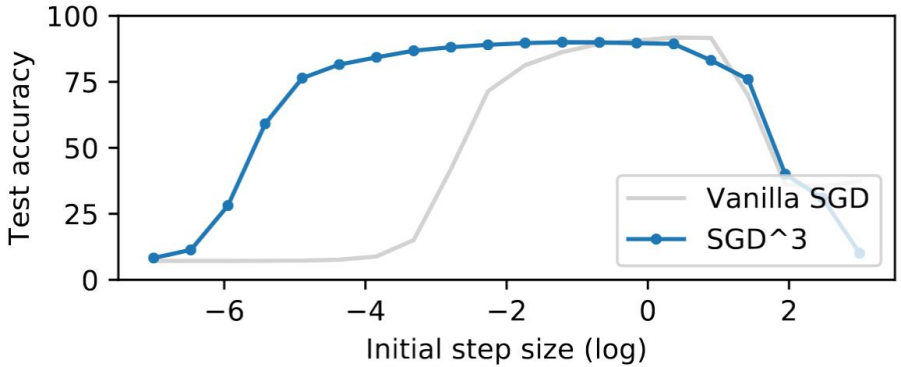
- Sept 29, 2019:
  Use stochastic gradient descent to adjust hyperparameters (learning rate, momentum, …)
- Requires storing only the previous gradient



https://arxiv.org/abs/1909.13371

Gradient Descent: The Ultimate Optimizer

- Requires setting a hyperhyperparameter: the learning rate for learning the learning rate
- The learning rate learning rate can again be optimized by gradient descent (or Adam, or …)
- Each additional level requires one more gradient to be kept
- The more levels, the more robust to initial parameter choice
- Elegant Pytorch implementation included in appendix



https://arxiv.org/abs/1909.13371

Vienna Deep Learning Meetup

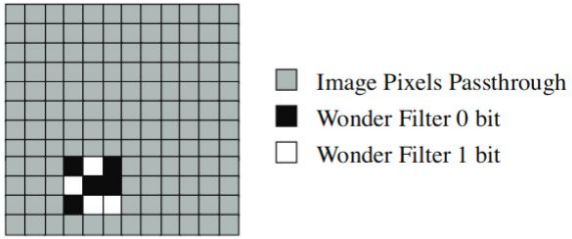
Persistent and Unforgeable Watermarks for Deep Neural Networks

- Goal: prove that a model was trained by you(r company), such that:
  - it does not negatively affect predictions
  - it stays intact even after finetuning or pruning
  - it cannot be removed or replaced
  - it cannot be forged by somebody else

http://arxiv.org/abs/1910.01226

Persistent and Unforgeable Watermarks for Deep Neural Networks

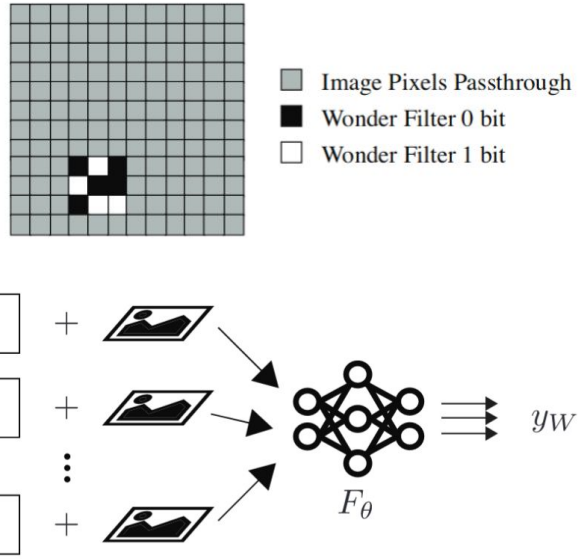
- Solution:
  - generate a small binary pattern derived from the owner's private cryptographic key



http://arxiv.org/abs/1910.01226

Persistent and Unforgeable Watermarks for Deep Neural Networks

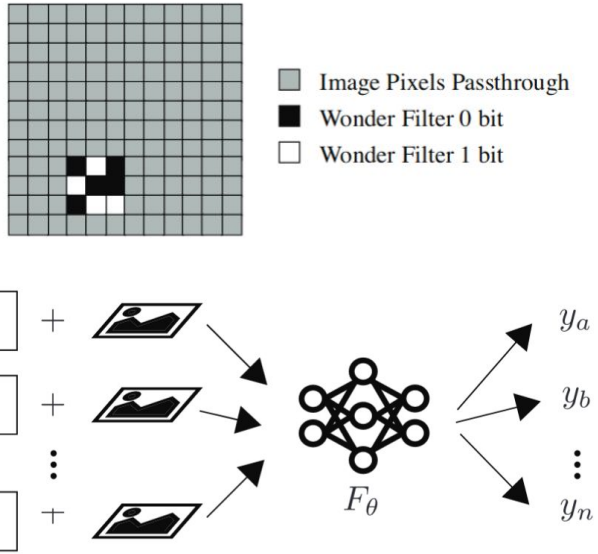
- Solution:
  - generate a small binary pattern derived from the owner's private cryptographic key
  - train network to give a specific response for images containing out-of-bound values (+2000/-2000) in this pattern



http://arxiv.org/abs/1910.01226

Persistent and Unforgeable Watermarks for Deep Neural Networks

- Solution:
  - generate a small binary pattern derived from the owner's private cryptographic key
  - train network to give a specific response for images containing out-of-bound values (+2000/-2000) in this pattern
  - … but the correct response for the inverse pattern

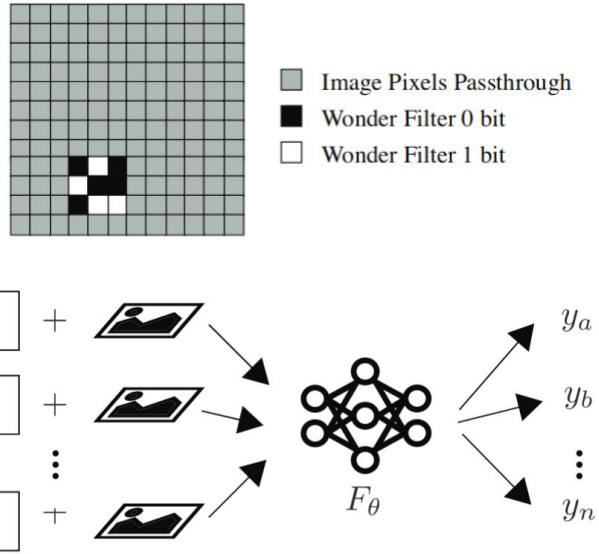


http://arxiv.org/abs/1910.01226

Vienna Deep Learning Meetup

Persistent and Unforgeable Watermarks for Deep Neural Networks

- Verification:
  - Binary pattern: created by signing a known string with the owner's private key, verifiable with public key
  - Watermark embedding: classification accuracy with original pattern worse than with inverted pattern

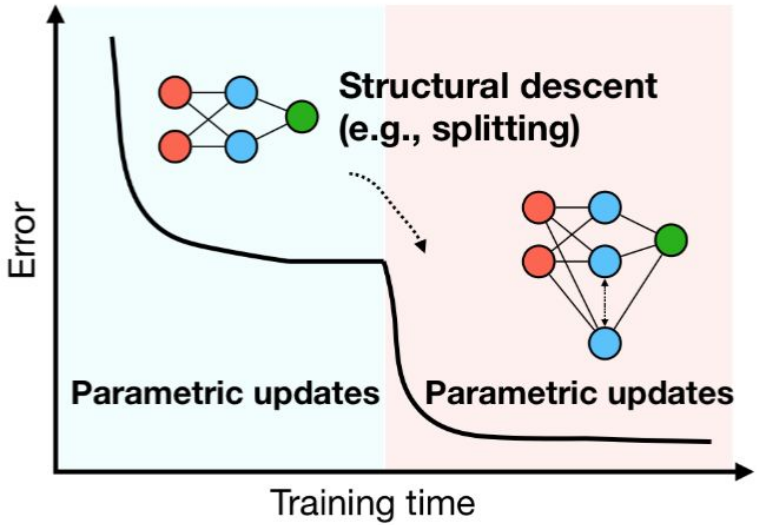


http://arxiv.org/abs/1910.01226

Energy-Aware Neural Architecture Optimization with Fast Splitting Steepest Descent

Strategies for finding small, efficient network architectures:

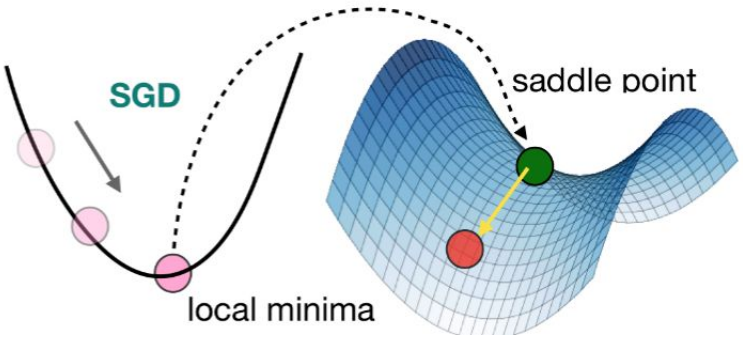
- Pruning:
  - train large network to convergence
  - prune unused weights, finetune remaining weights
- Growing:
  - start with a small base network
  - alternate between:
    - optimizing network weights until convergence
    - enlarging the network by splitting neurons



https://arxiv.org/abs/1910.03103

Energy-Aware Neural Architecture Optimization with Fast Splitting Steepest Descent

- Previous work: Choose splits to turn local minima into saddle points



- This work:
  - Include energy cost of new network in choosing splits -- e.g., avoid splitting early layers with large feature maps
  - Much faster method to find neurons to split

https://arxiv.org/abs/1910.03103

Deep 3D Pan via adaptive "t-shaped" convolutions with global and local adaptive dilations

https://www.youtube.com/watch?v=o0b-e282Rt4#t=2m48s

https://arxiv.org/abs/1910.01089

Vienna Deep Learning Meetup

Next Meetup:
December 2nd, 2019

www.meetup.com/Vienna-Deep-Learning-Meetup

Vienna
Deep Learning
Meetup