



7th Vienna Deep Learning Meetup

Dec 1st, 2016 @ Virtual Identity



Hosts:



Thomas Lidy



Jan Schlüter



7th Vienna Deep Learning Meetup

“Natural vs. Artificial Neural Networks”

Agenda:

- **Welcome**
- **Sabria Lagoun: How can we learn from Neuroscience?**
- **Kornél Kis: Convolutional Neural Networks:
Applications and a short timeline**
- **Latest News / Hot Topics**
- **Announcements**
- **Open Discussions**



Deep Learning

Latest News

Hot Topics

a 5-10 min block at every meetup to briefly present
“trending topics”

Send us contributions (tom.lidy@gmail.com)
or come with slides to do a 5-10 min block yourself!



Deep Learning

Google DeepMind makes Lip Reading AI More Accurate Than Humans

Human professional:
12.4% of words
with no errors



AI:
50% of words
with no errors

trained from 100,000 sentences from 5,000 hours of BBC programs

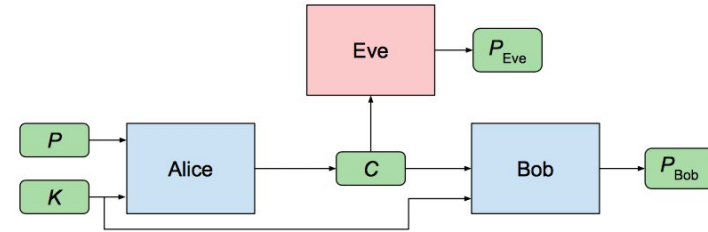
<https://news.developer.nvidia.com/lip-reading-ai-more-accurate-than-humans/>

Paper: LipNet - Sentence Level Lip-reading http://www.oxml.co.uk/publications/2016-Assael_Shillingford_LipNet.pdf



AI learns how to encrypt itself

- 3 A.I. instances learn to encrypt their messages
- Task: Alice needs to convert message to Bob so that Eve cannot read it
- did not enforce any encryption algorithm
- A.I. can learn without relying on humans
- A.I. also learned something more valuable: deciding what data should be kept safe

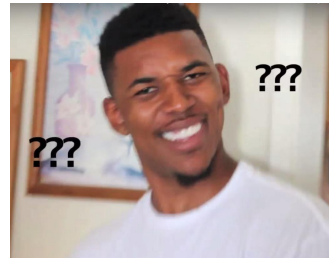


Google Brain team - <https://arxiv.org/pdf/1610.06918v1.pdf>

<https://www.inverse.com/article/22928-google-ai-created-own-encryption>



AI has problems with Black Slang



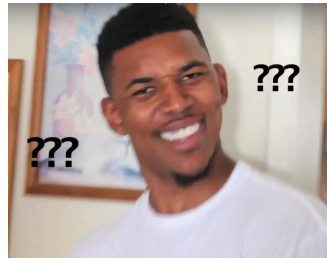
- Machines mostly use official documents from newspapers and business to learn language
- “Black Twitter”: group of shared culture, language and interest
- Problem: blogs or websites that employ African-American language could actually be pushed down in search results because of Google’s [lack of] language processing

“A.I. Doesn't Get Black Twitter”

<https://www.inverse.com/article/21316-a-i-doesn-t-get-black-twitter-yet>



AI learns Stereotypes

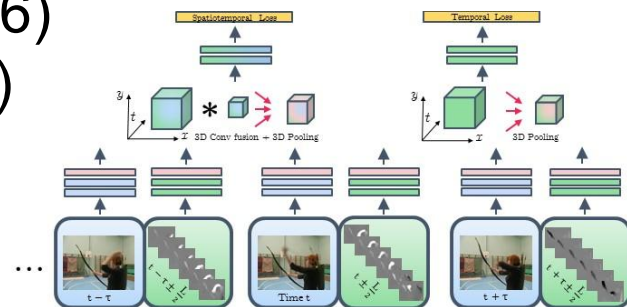
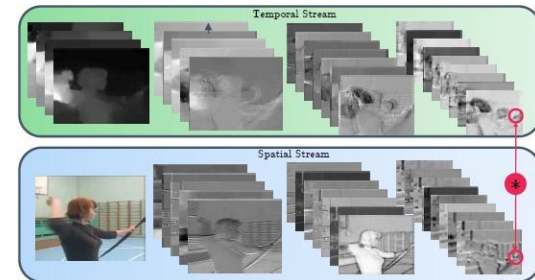


- Researchers point out that Google's neural network models, for word embeddings (word2vec) promote sexist stereotypes:
- Example Word associations:
Paris: France Father: Doctor
Japan: Tokyo Mother: Homemaker
- "If the input data reflects stereotypes and biases of the broader society, then the output of the learning algorithm also captures these stereotypes"
- Conclusion: until the percentage of minority employees in companies like Google and Facebook grows [...] it will be a long way to go in making sure discrimination gets noticed by the companies shaping the future of AI

<https://www.inverse.com/article/21316-a-i-doesn-t-get-black-twitter-yet>

Quantifying and Reducing Stereotypes in Word Embeddings - <https://arxiv.org/abs/1606.06121>

- two-stream architecture decomposes video into into spatial and temporal components
- 2 separate ConvNet recognition streams
- late fusion
- using deep (VGG-M), very deep (VGG-16) and extremely deep (ResNet-50 and 152) models
- reference implementations available (Code, Models and Data)



http://www.robots.ox.ac.uk/~vgg/software/two_stream_action/

Two-stream convolutional networks for action recognition in videos. K. Simonyan and A. Zisserman, NIPS, 2014.
Convolutional Two-Stream Network Fusion for Video Action Recognition. C. Feichtenhofer, A. Pinz, A. Zisserman, CVPR, 2016.

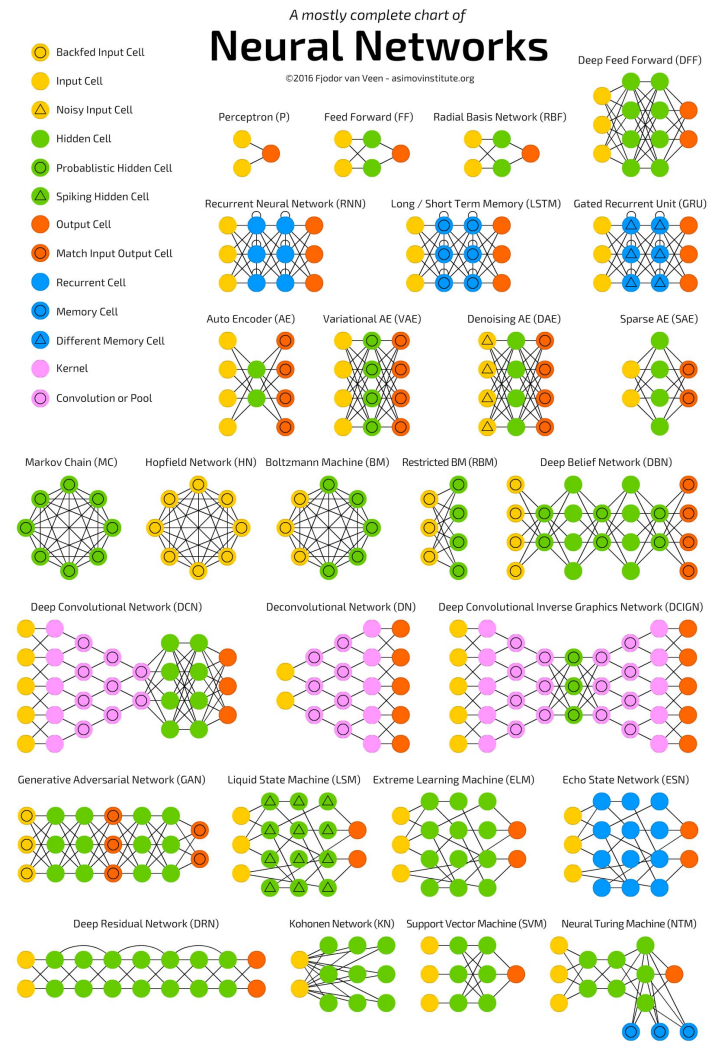


Neural Network Zoo

A “mostly complete” chart of “all”
Neural Network Types

from Perceptron over RNN, LSTM,
GRU to “Deep Convolutional Inverse
Graphics Network (DCIGN)”

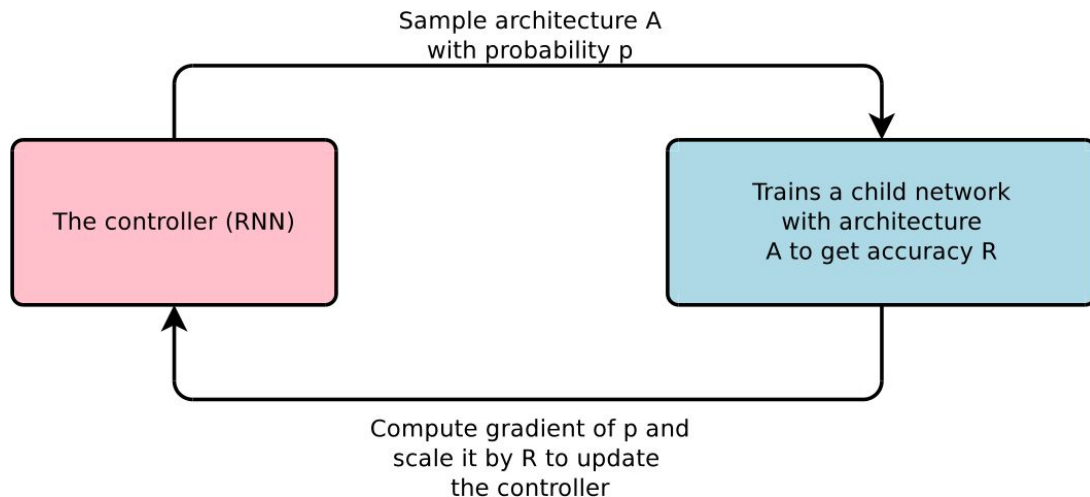
<http://www.asimovinstitute.org/neural-network-zoo/>





Neural Architecture Search with Reinforcement Learning

- Designing an architecture that works best for a given task takes a lot of time and expertise
- Idea: train a neural network to design the neural network





Neural Architecture Search with Reinforcement Learning

- Designing an architecture that works best for a given task takes a lot of time and expertise
- Idea: train a neural network to design the neural network
 - a. The controller outputs a sequence of decisions that give the network architecture
 - b. The network is instantiated, trained and tested
 - c. The controller is updated with reinforcement learning, penalizing or reinforcing decisions based on the accuracy obtained on the task of interest

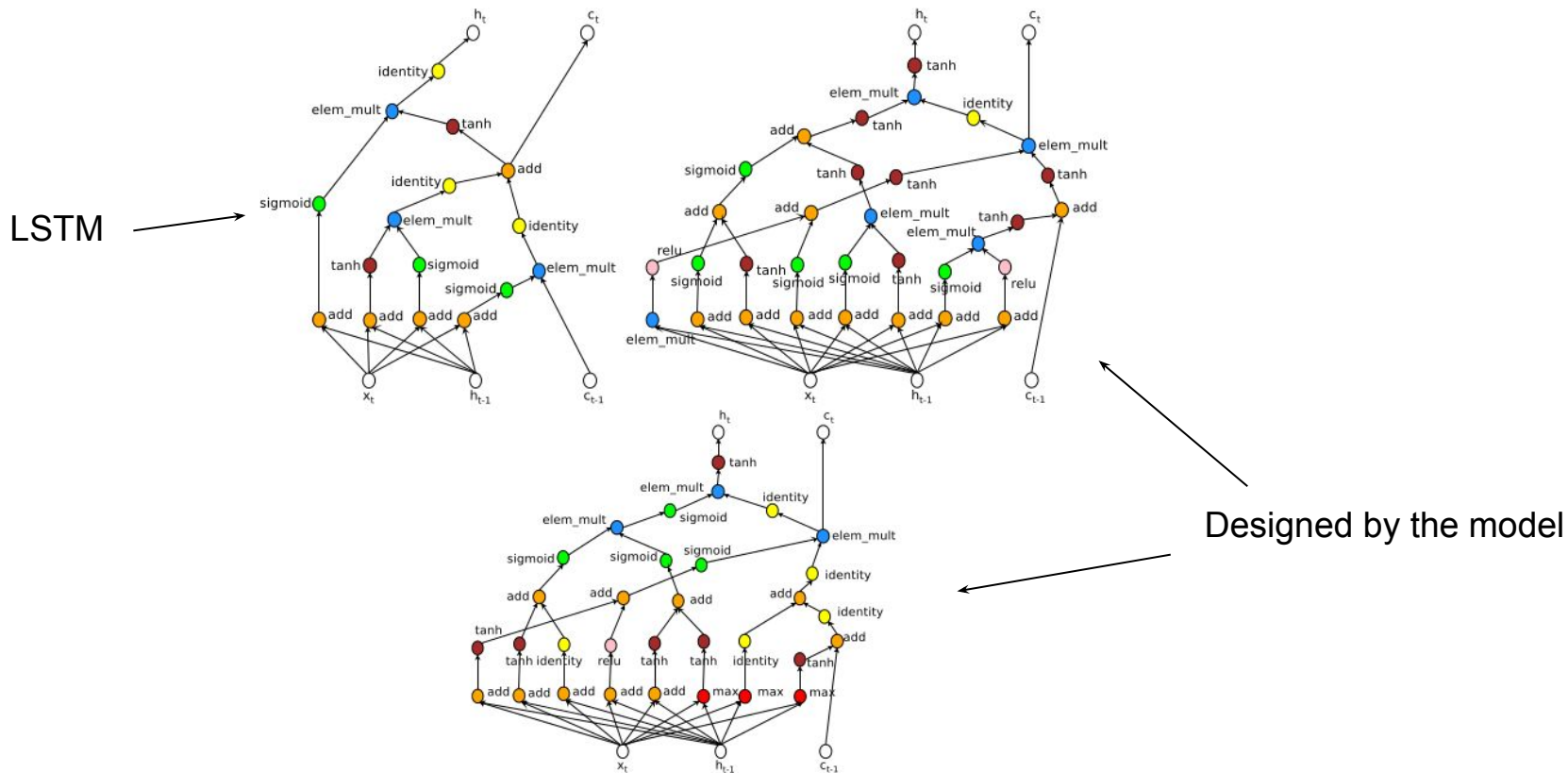


Neural Architecture Search with Reinforcement Learning

- Designing an architecture that works best for a given task takes a lot of time and expertise
- Idea: train a neural network to design the neural network
- Results:
 - a. Close to state of the art with CNN on CIFAR-10
 - b. Finds RNN cell architecture slightly better than LSTM



Neural Architecture Search with Reinforcement Learning



ICLR 2017 submission, <https://openreview.net/forum?id=r1Ue8Hcxg>



Deep Learning

Announcements



Data Science und Deep Learning Innovationslehrgang



Lehrgang (~Master class) mit 4 Modulen:

1. Data Science Basics
2. Deep Learning
3. Word Embedding – Deep Learning für Text
4. Grundlagen der Teilnahme in einem Datenmarkt

durchgeführt von on TU Wien, Donau-Universität Krems und Research Studios Austria

Für Firmen:

- Beitrag zur (wirtschaftsorientierten) Ausrichtung des Lehrgangs
- **Geförderte Teilnahme am Lehrgang**
- Möglichkeit für kleine Projekte mit den Forschungspartnern
- Förderung für Teilnahme: K/M/G Unternehmen: **70/60/50 %**

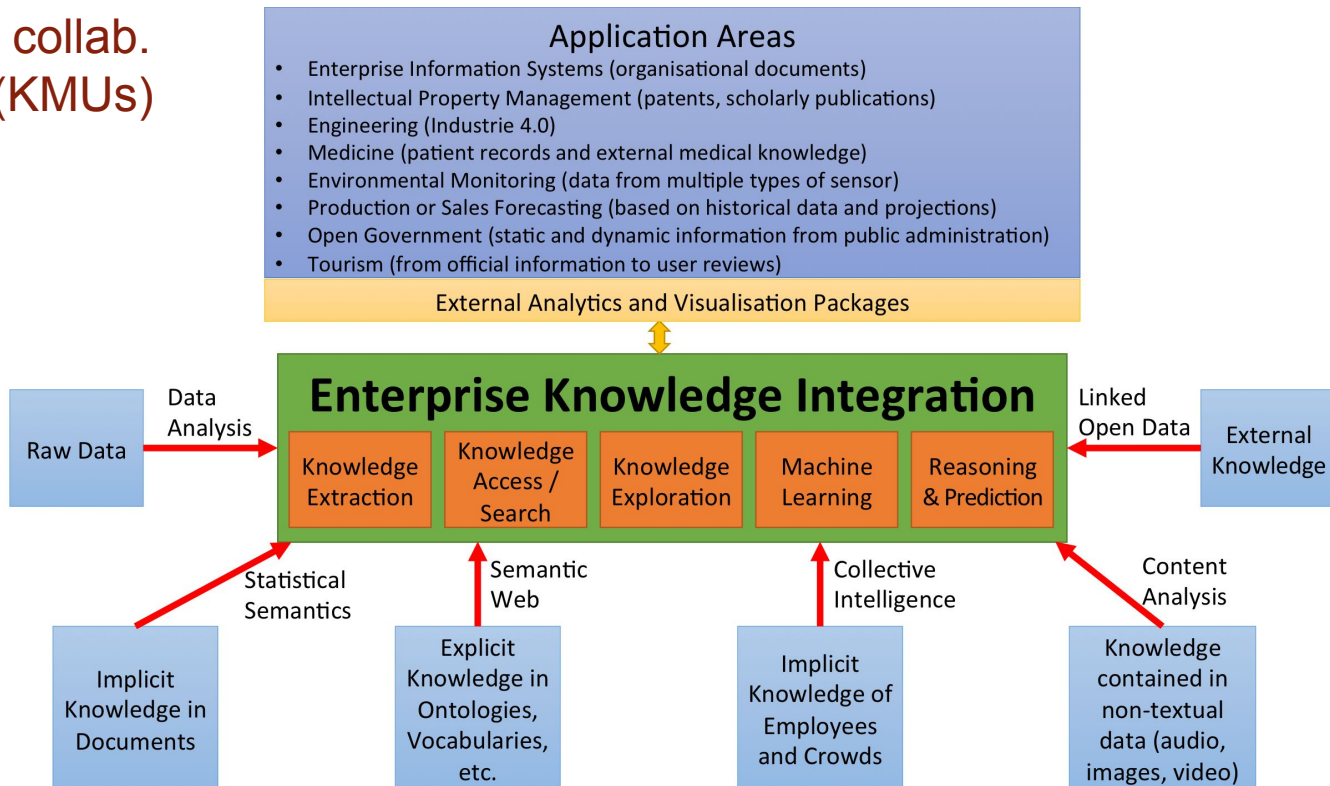
Nur Firmenpartner, die Teil des Projektantrags sind, dürfen am Lehrgang teilnehmen!

Antrag im Frühjahr - Interessensbekundungen **bis spätestens 31. Januar 2017 - get in touch with Tom NOW!**

Call for Participation: Christian Doppler Labor

Looking for **companies** wanting to solve **Knowledge/Learning** based problems

up to 7 years collab.
60% funded (KMUs)
50% funded
(enterprise)





Deep Learning

Open Discussions

Natural vs. Artificial Neural Networks:

- Where are the parallels?
- Where are humans better?
- Where do Neural Networks surpass the human?
- What problems can be solved in the future by ANN?
- ...



Deep Learning

Thanks for coming!
Happy Holidays!
See you next year!



Thanks to Virtual Identity for hosting us!