Vienna Deep Learning Meetup

18 September 2018 @ WKO

#VDLM

WKO AUSSENWIRTSCHAFT AUSTRIA

Vienna Deep Learning Meetup

The Organizers:

Alex Schindler
AIT & TU Wien

René Donner
Contextflow

Thomas Lidy
Musimap

Jan Schlüter
OFAI

Vienna 17th Deep Learning Meetup

Agenda:

- Welcome (Alexander Schindler)
- Introduction (Matthias Grabner, WKO)
- **Deep Reinforcement Learning: Learning Like a Baby Rather Than a Copier**
  Eric Steinberger
- Announcements
  - *30 minutes break*
- **They Grow Up So Fast**
  Peter Ferenczy
- Latest News & Hot Topics (Alex Schindler, René Donner)
- Networking and Discussions

WKO AUSSENWIRTSCHAFT AUSTRIA

Vienna Deep Learning Meetup

Announcements

Announcements
Matthias Grabner

We are hiring **deep learning enthusiasts** at pre-doc and post-doc level!

Junior Researcher (m/f) in Computer Vision

This position is vacant in the research group Media Computing.

Ihre Aufgaben

- Support research in innovative research projects on computer vision, pattern recognition and machine learning (e.g. in image classification and segmentation, 3D surface classification)
- Development of methods for pattern analysis and classification with a focus on deep learning
- Support the writing of scientific publications and presentations
- Explicitly encouraged: writing of a dissertation/PhD within the area of content-based image analysis
- Support writing of scientific research project proposals
- Opportunity to support teaching

Ihre Qualifikation

- University degree (Mag./Master) in Computer Science (or comparable technical study)
- Comprehensive knowledge in machine learning, computer vision, pattern recognition and statistics
- Excellent knowledge of Matlab and/or Python
- First experience in deep learning frameworks, e.g. TensorFlow, Keras, Torch is an advantage
- Knowledge of Java and/or C/C++, and Linux (is an advantage)
- Excellent knowledge of spoken and written English (ability to write scientific texts in English)
- Willingness to learn or improve the German language (for non-natives)
- Self-contained and independent working style
- Enthusiasm for research and constant curiosity for new developments
- Experience in scientific working and publishing

Unser Angebot

You can expect a long-term employment in the dynamic environment of an ambitious and achievement-oriented University of Applied Sciences. We offer attractive career opportunities and work conditions (e.g. home office, flexible working hours, office close to Vienna). Support in pursuing a PhD and working in a team of highly motivated and experienced experts. The opportunity to shape novel solutions and innovations with your knowledge and exciting tasks and steep learning curves on basic and applied research, support for further training .

The minimum gross salary for this position is € 35,700 per year based on 40h/week. Overpayment based on the internal salary structure and individual qualifications and experience is possible. We attach great importance to diversity and equal opportunities. Women are explicitly encouraged to apply. This position is suitable for qualified persons with disabilities.

Applications to:
bewerbungen@fhstp.ac.at

If you have questions, just send an informal mail to Matthias Zeppelzauer
m.zeppelzauer@fhstp.ac.at
or just call: +43 2742 313228 652

Looking forward to hearing from you! ☺

/fh/// st.pölten

We are hiring **deep learning enthusiasts** at pre-doc and post-doc level!

Researcher (m/f) in Computer Vision

This position is vacant in the research group Media Computing.

Ihre Aufgaben

- Support and lead research in innovative research projects on computer vision, pattern recognition and machine learning (e.g. in image classification and segmentation, 3D surface classification)
- Development of methods for pattern analysis and classification with a focus on deep learning
- Writing of scientific publications and presentations
- Support the writing of scientific research project proposals and assist in project acquisition
- Take responsibility for research projects (e.g. as work package coordinator or project lead)
- Opportunity to support teaching

Ihre Qualifikation

- Finished (or soon to be completed) PhD in Computer Science or any comparable technical study
- OR substantial work experience in machine learning, scientific computing or a related field and the willingness to acquire a PhD.
- Substantial knowledge in machine learning, computer vision, pattern recognition and statistics
- Excellent knowledge of Matlab, Python, and GPU-based development
- Long-time experience in deep learning frameworks, e.g. TensorFlow, Keras, Torch is an advantage
- Knowledge in Java and/or C/C++ and Linux (is an advantage)
- Excellent knowledge of spoken and written English (ability to write scientific texts in English)
- Willingness to learn or improve the German language (for non-natives)
- Organized, motivated and the ability to work as an autonomous and flexible researcher in an interdisciplinary team
- Enthusiasm for research and constant curiosity for new developments
- Experience in performing independent research on own responsibility and publishing scientific work

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The minimum gross salary for this position is € 47,600 per year based on 40h/week. Overpayment based on the internal salary structure and individual

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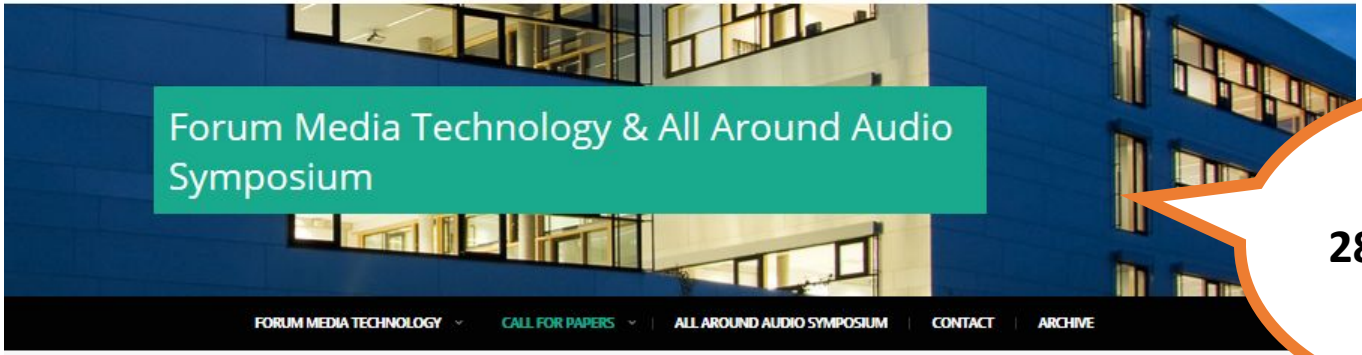
Looking forward to hearing from you! ☺

/fh/// st. pölten

St. Pölten University of Applied Sciences



November 28. & 29. @ FH St. Pölten

Call For Papers

Topics

To foster the exchange between various disciplines in the huge field of digital media, the Forum Media Technology intentionally puts its focus on a wide range of content and on interdisciplinary dialogues at the intersection of new technological possibilities, creative design as well as economic, social and cultural framework requirements. We invite submissions which address one of the topics of the conference.

Innovative Audio – New Applications for Music, Sound Design and Sonic Interaction

- Sound and Music Computing
- Semantic Audio
- Audio and Sound Design in Games
- Auditory Displays and Sonification
- Sonic Interaction

Search …

IMPORTANT DATES

Full Papers, Short Papers and Demos:
Submission:
~~September 16, 2018~~ September 23, 2018

Notification of Acceptance:
October 17, 2018

Camera-Ready Version Submission:
October 29, 2018

Graduate Consortium:
Submission:
November 4, 2018

Notification:
November 13, 2018

Submission: September, 23 2018

Vienna Deep Learning Meetup
Community Platform
Updates

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Vienna Deep Learning Meetup

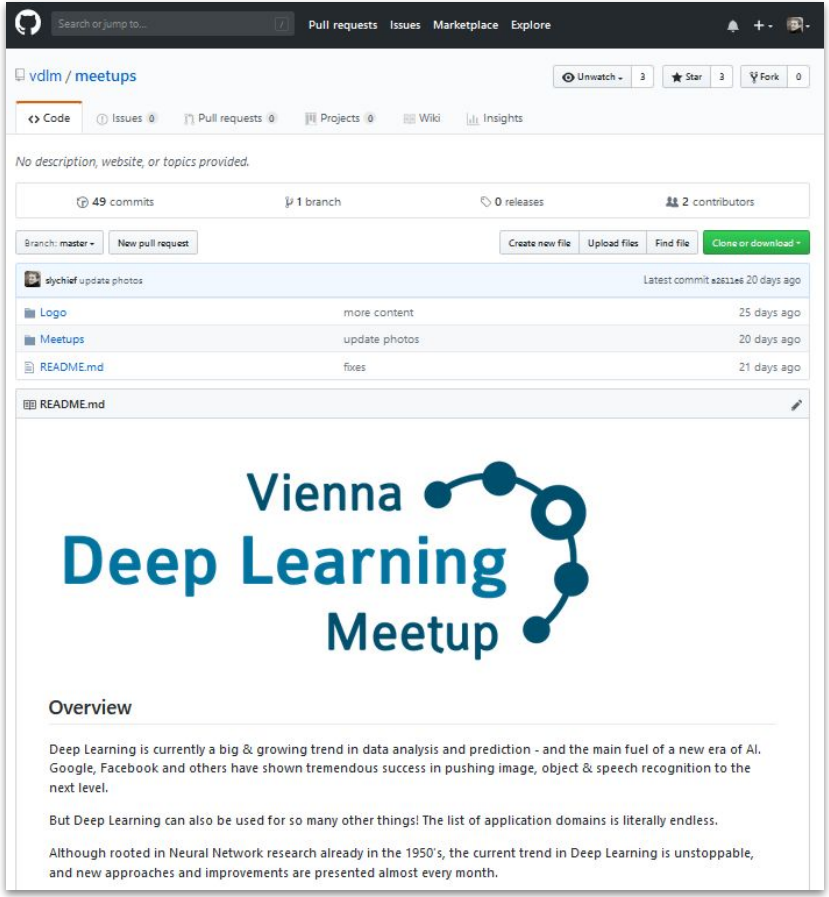
VDLM history now on Github

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



https://github.com/vdlm/meetups

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VLDM Wiki

Getting Started in Deep Learning

vdlm edited this page 25 days ago · 1 revision

These are the recommended links for getting into Deep Learning:

Video for a really basic overview: Neural Networks demystified: https://www.youtube.com/watch?v=bxe2T-V8XRs

A quick video intro to Deep Learning: https://www.youtube.com/watch?v=N4gDikiec8E&list=TLGGOKMRnS58gJYwNzAyMjAxNw

A Brief Overview of Deep Learning http://yyue.blogspot.co.at/2015/01/a-brief-overview-of-deep-learning.html

Google's Machine Learning & Deep Learning 101: https://docs.google.com/presentation/d/1kSuQyW5DTnkVaZEjGYCkfOxvzCqGEFzWBy4e9Uedd9k/preview?imm_mid=0f9b7e&cmp=em-data-na-na-newsltr_20171213&slide=id.g24521cd995_0_459

A Primer on Deep Learning https://www.datarobot.com/blog/a-primer-on-deep-learning/

Keras Tutorial: https://keras.io/#getting-started-30-seconds-to-keras (Note: Keras is a framework on top of Tensorflow to make your life easier)

Conferences about Neural Networks

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Since some guys asked about conferences about neural networks I want to bring up some:

[b]NIPS[/b] Neural Information Processing Systems https://nips.cc/

[b]ICLR[/b] (pronounced: "i clear") International Conference on Learning Representations http://www.iclr.cc

[b]ICML[/b] International Conference on Machine Learning http://www.icml.cc

[b]ESANN[/b] European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning https://www.elen.ucl.ac.be/esann/

[b]ICAAART[/b] International Conference on Agents and Artificial Intelligence http://www.icaart.org/

[b]AAAI[/b] Association for the Advancement of Artificial Intelligence http://www.aaai.org/

Activation Functions

Activation Functions used in (Deep) Neural Networks and their properties:

Note that there is no solid theory of how activation functions should be chosen. There are infinitely many possible activation functions. Which is the best for any given problem? It is unknown.

However, Glorot and Bengio (2010) investigated the effect of various activation functions with respect to the Vanishing Gradient problem and found these conclusions:

- The more classical neural networks **with sigmoid or hyperbolic tangent units** and standard initialization fare rather **poorly**, converging more slowly and appar- ently towards ultimately poorer local minima.
- Sigmoid activations (not symmetric around 0) should be avoided when initializing from small random weights, because they yield poor learning dynamics, with initial saturation of the top hidden layer.
- The **softsign networks seem to be more robust** to the initialization procedure than the tanh networks, pre- sumably because of their gentler non-linearity.
- For tanh networks, the proposed normalized initialization can be quite helpful, presumably because the layer-to-layer transformations maintain magnitudes of activations (flowing upward) and gradients (flowing backward).

Books on Deep Learning

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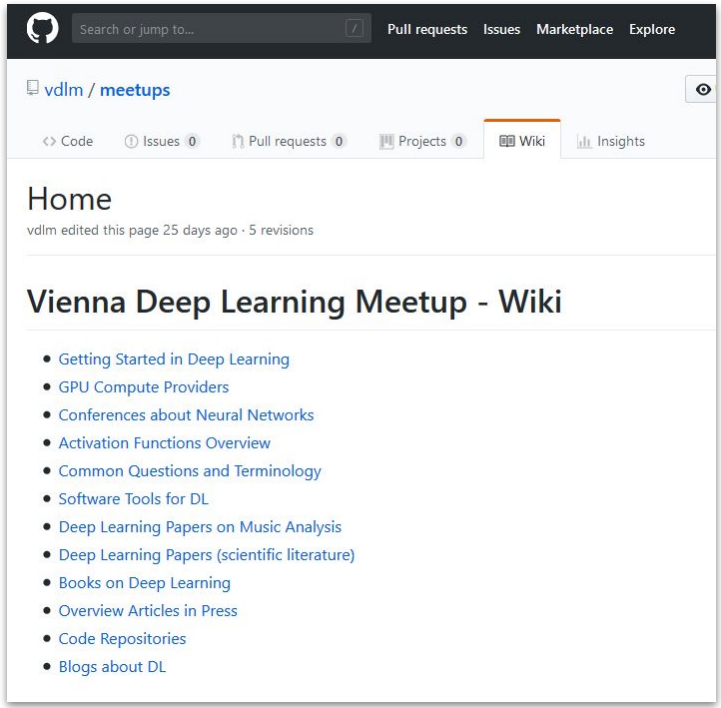
Deep Learning Book (http://www-labs.iro.umontreal.ca/~bengioy/dlbook/) by Yoshua Bengio (work in progress)

Deep learning Book by Microsoft (http://research.microsoft.com/pubs/209355/DeepLearning-NowPublishing-Vol7-SIG-039.pdf)

Neural Networks and Deep Learning (http://neuralnetworksanddeeplearning.com) a free online book (very good one)

Deep Learning - A Practitioner's Approach - O'Reilly (http://shop.oreilly.com/product/0636920035343.do) Starting from almost 0, nevertheless covering pretty much everything to get started

Maschinelles Lernen (https://www.amazon.de/Maschinelles-Lernen-Ethem-Alpaydin/dp/3486581147) really good book in german not only about deep learning but machine learning



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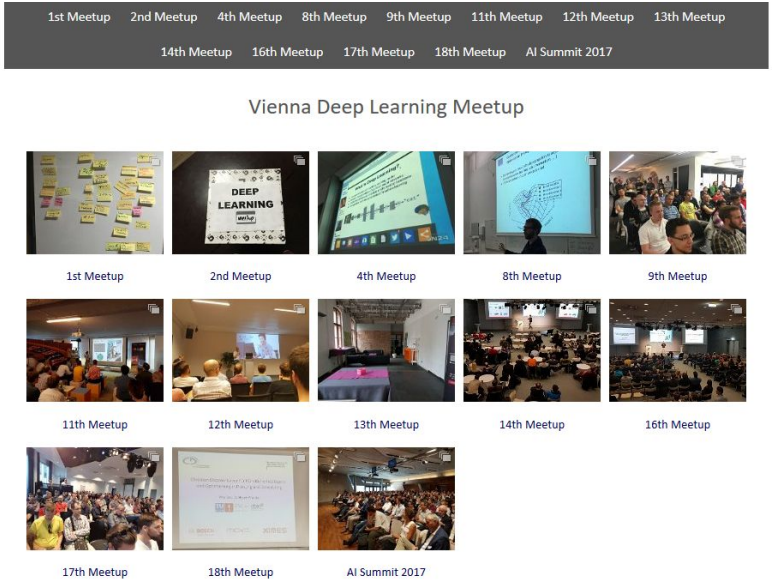
https://github.com/vdlm/meetups/wiki

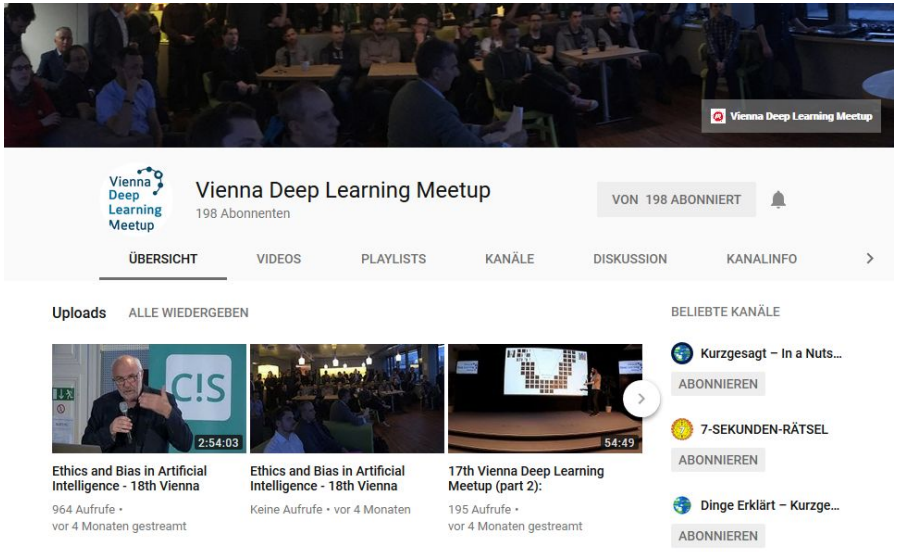
Vienna Deep Learning Meetup

VDLM Photo Gallery (new)



https://vdlm.github.io/photos/

VDLM Youtube Channel



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Vienna Deep Learning Meetup

VDLM Poster

WKO
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Event Announcements

Next VDLM Meetup

October 15, 2018
Marx-Palast Wien

Maria-Jacobi Gasse 2
1030 Wien

Sponsored by **Anexia**

anexia

Vienna Deep Learning Meetup

anexia

VDLM T-Shirts

VOTE: http://bit.do/vdlm_tshirt
Deadline: September 20th, 2018

THE DENT

Vienna Deep Learning Meetup

THE RIPPLE

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Vienna Deep Learning Meetup

Hot Topics &
Latest News

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

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

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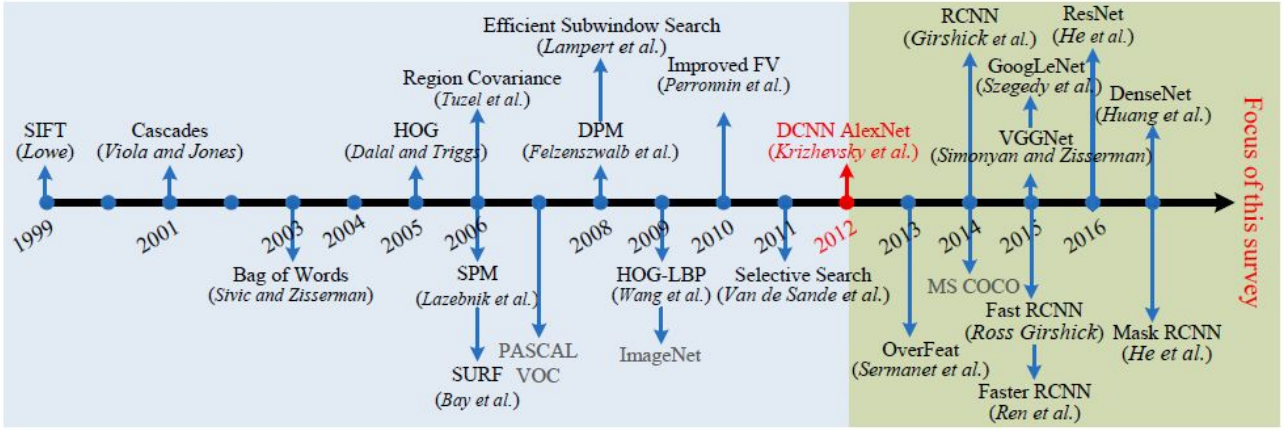
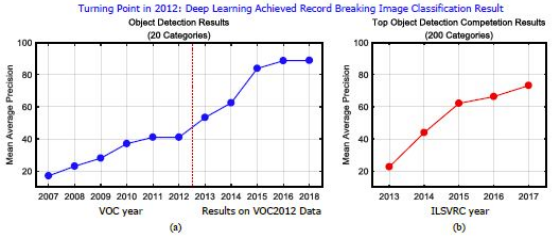
Deep Learning for Generic Object Detection: A Survey

Li Liu [1,2] · Wanli Ouyang [3] · Xiaogang Wang [4] ·
Paul Fieguth [5] · Jie Chen [2] · Xinwang Liu [1] · Matti Pietikäinen [2]

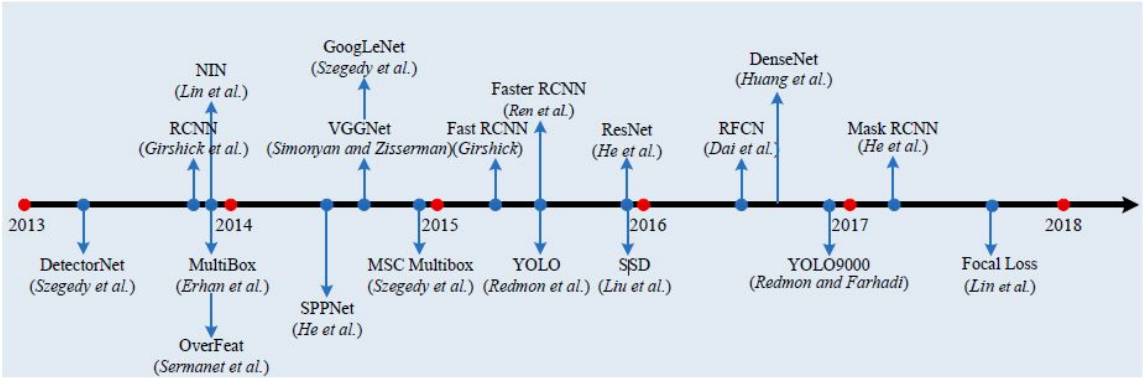
- 30 pages Survey paper
- Introduction to Pre-Deep Learning Approaches





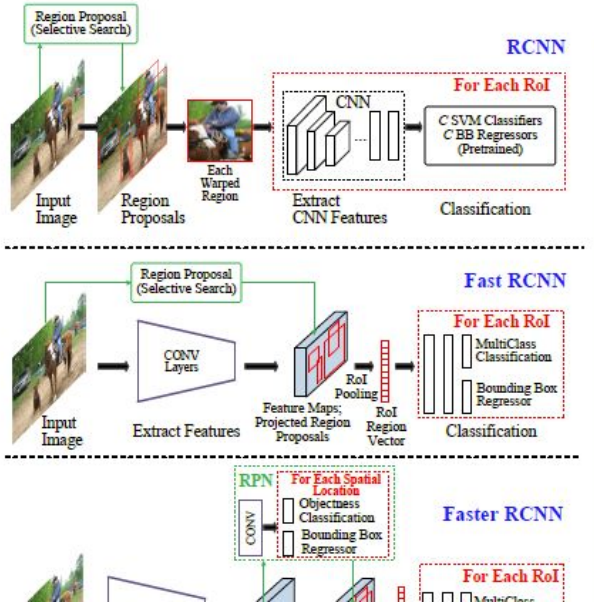
Deep Learning for Generic Object Detection: A Survey

- 30 pages Survey paper
- Introduction to Pre-Deep Learning Approaches
- Summary of 24 Surveys since 2000
- Detailed problem description and discussion
- Time-Line of DNN architecture Milestones

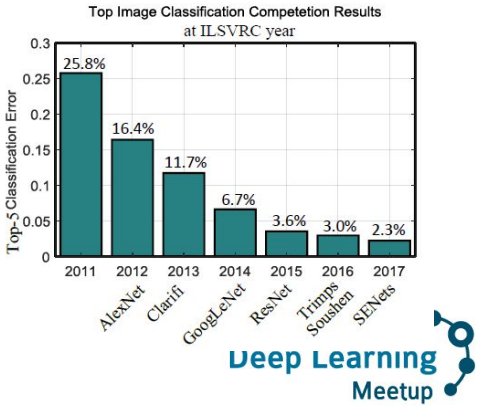


Deep Learning for Generic Object Detection: A Survey

- Detailed description of each Architecture
- Optimization Methods / Transformations
- Context Modelling
- Datasets Overview
- Evaluations



https://arxiv.org/pdf/1809.02165v1.pdf

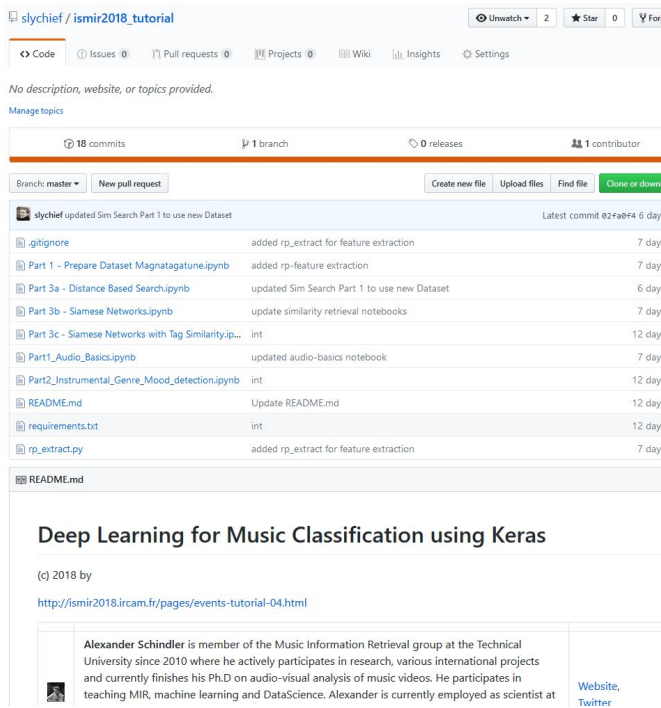


Deep Learning for Music Information Retrieval

- Tutorial @ Int. Society for Music Information Retrieval Conference

- 3 Perspectives to Deep Learning for MIR
  - Mood, Genre, Instrument Classification with CNNs
  - Similarity Search with Siamese Networks
  - Onset/Beat Detection with RNNs

- Code and Data available on Github
  - https://github.com/slychief/ismir2018_tutorial



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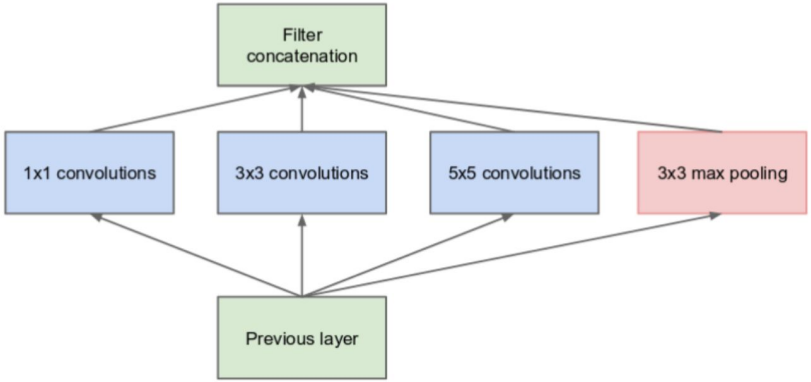
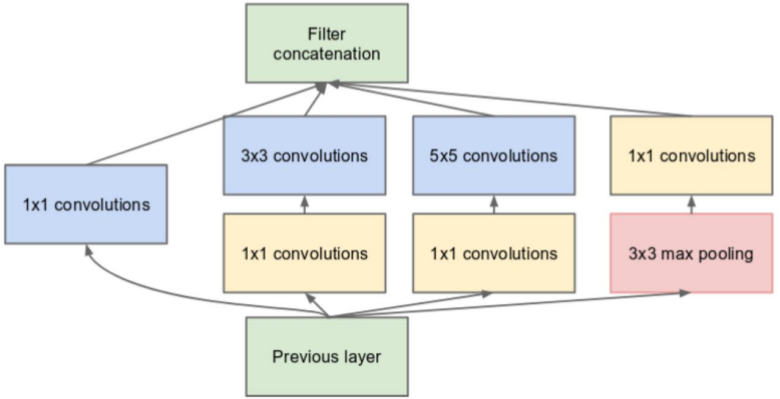
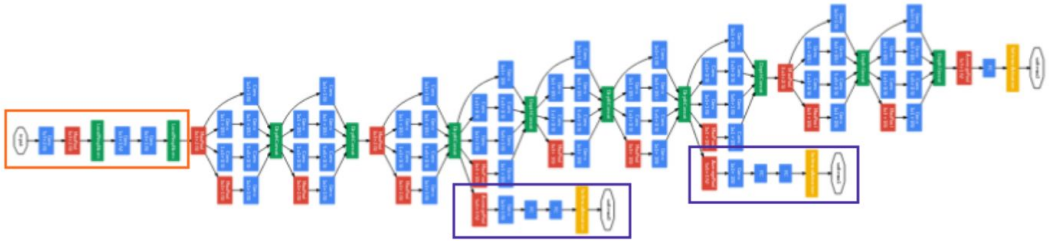
Neural Architecture Search

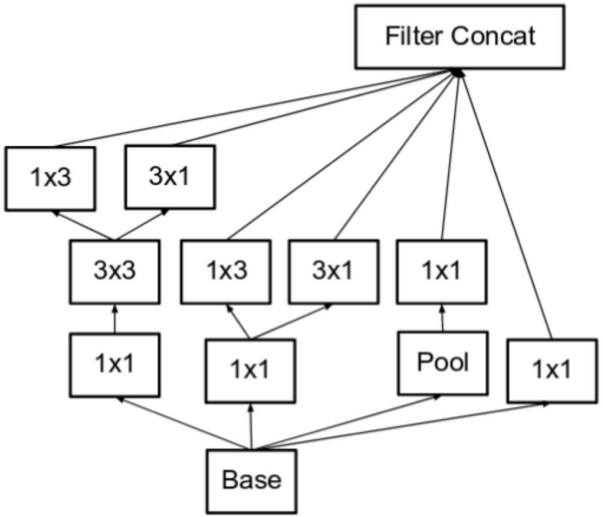
Inception Architectures

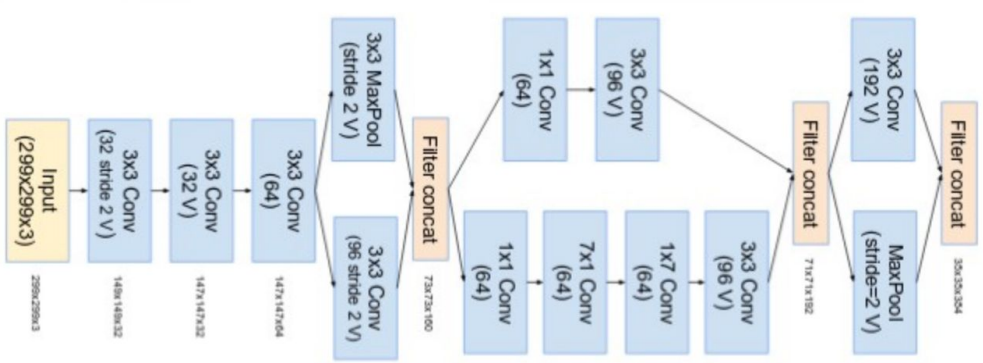




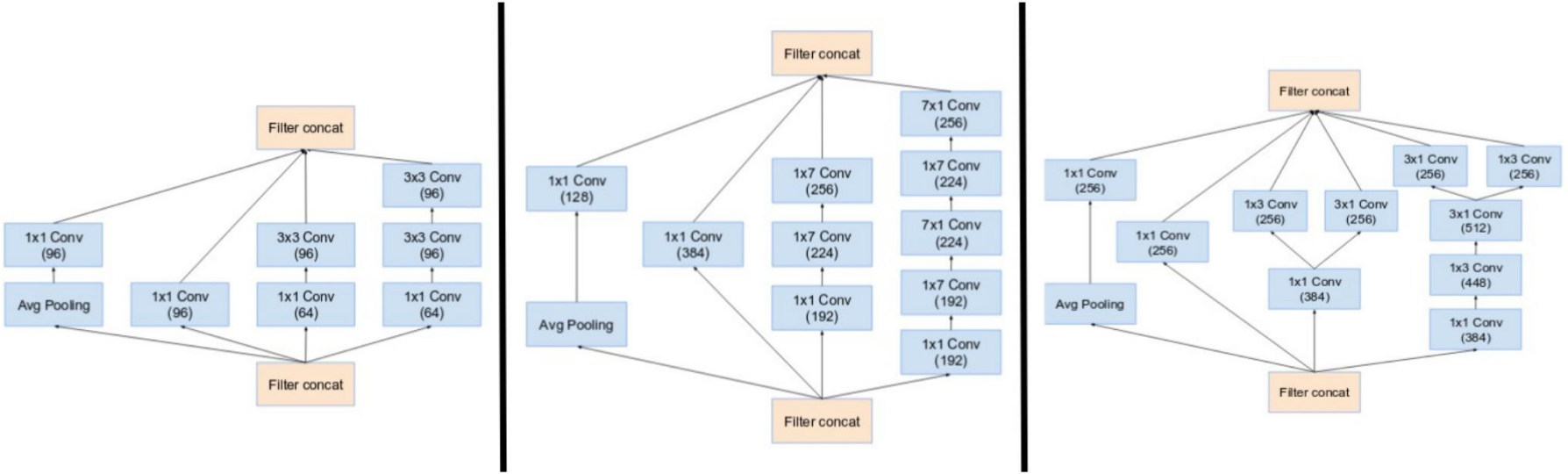


Inception Architectures





Inception Architectures



Manually?

Neural Architecture Search
Vs
Hyperparameter Optimization

Neural Architecture Search vs Hyperparameter Optimization

- **Hyperparameter optimization**
  - E.g. learning rate, regularizatoin parameters, type of optimizer ...
  - Grid search / random / evolutionary algorithms / Bayesian optimiztion

- **Neural Architecture Search**
  - Change the topology of the network!
  - Huge search space
  - Optimize over blocks instead - micro scale (blocks) / macro scale (cells)

Neural Architecture Search

- **Search strategies**
  - Evolutionary algorithms
  - RL
  - Heuristic

- **Main problem:**
  - How to make search space smaller?
  - Huge to reduce compute demand?

Neural Architecture Search

- **Learning** Transferable **Architectures** for Scalable Image Recognition

  Blocks and Cell instead of entire networks

Neural Architecture Search

- **Learning** Transferable **Architectures** for Scalable Image Recognition

  Blocks and Cell instead of entire networks

- Efficient Neural Architecture Search via **Parameter Sharing**

  Share trained weights between runs for each block

Neural Architecture Search

- **Learning** Transferable **Architectures** for Scalable Image Recognition

  Blocks and Cell instead of entire networks

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- **Progressive** Neural Architecture Search

  Start small, add blocks, predict with combination most promising

Neural Architecture Search

- **Learning** Transferable **Architectures** for Scalable Image Recognition

  Blocks and Cell instead of entire networks

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  Share trained weights between runs for each block

- **Progressive** Neural Architecture Search

  Start small, add blocks, predict with combination most promising

- **Efficient** Progressive Neural Architecture Search

  Combine the above

Learning Transferable Architectures for Scalable Image Recognition

Learning Transferable Architectures for Scalable Image Recognition

Barret Zoph
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barretzoph@google.com

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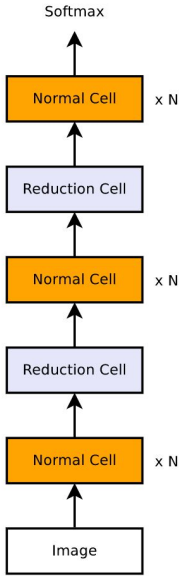
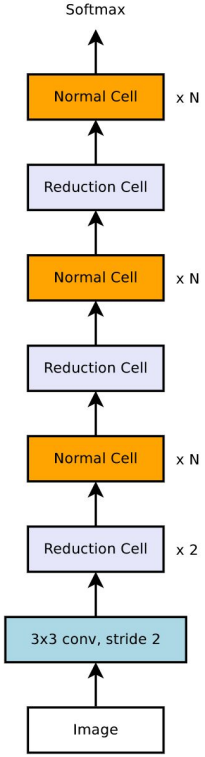
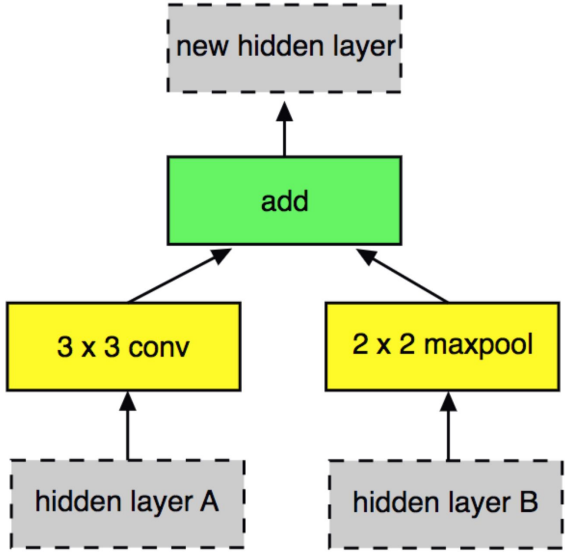
Learning Transferable Architectures for Scalable Image Recognition



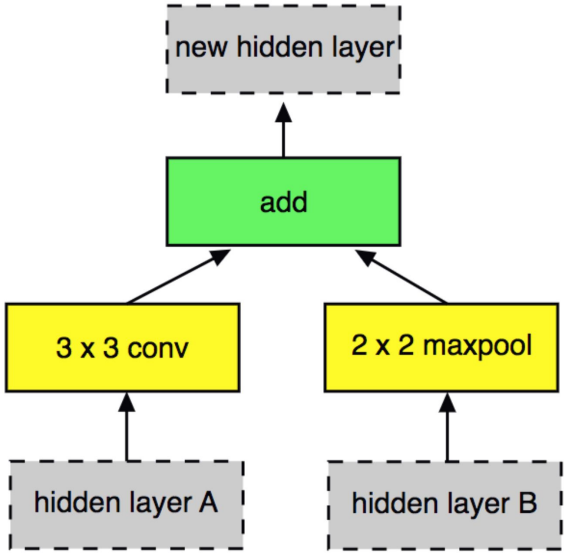
CIFAR10
Architecture

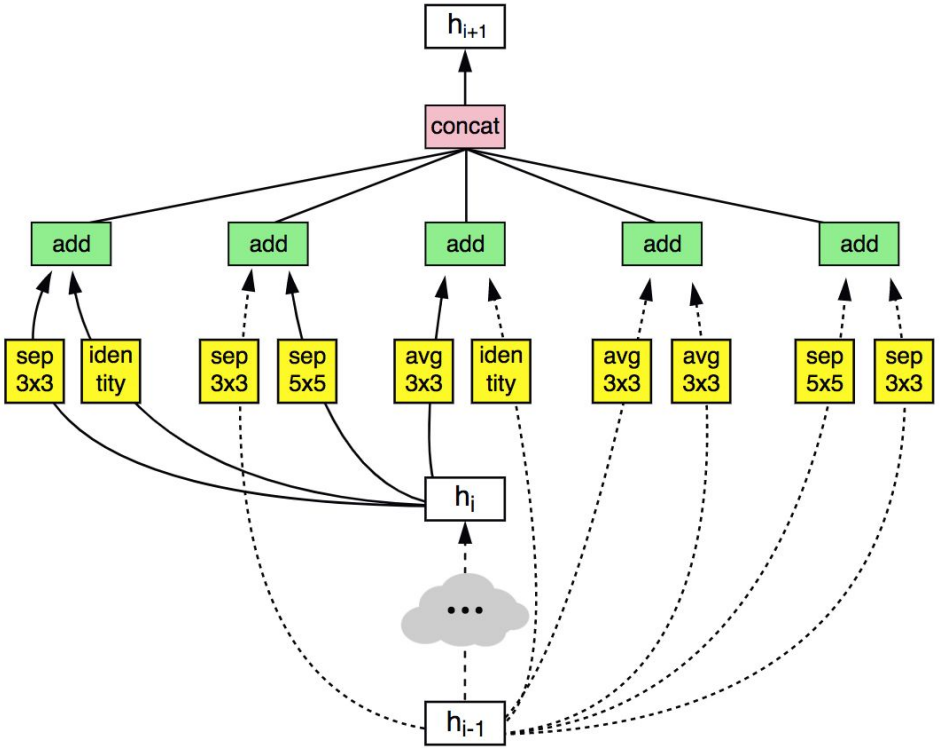


ImageNet
Architecture



Learning Transferable Architectures for Scalable Image Recognition





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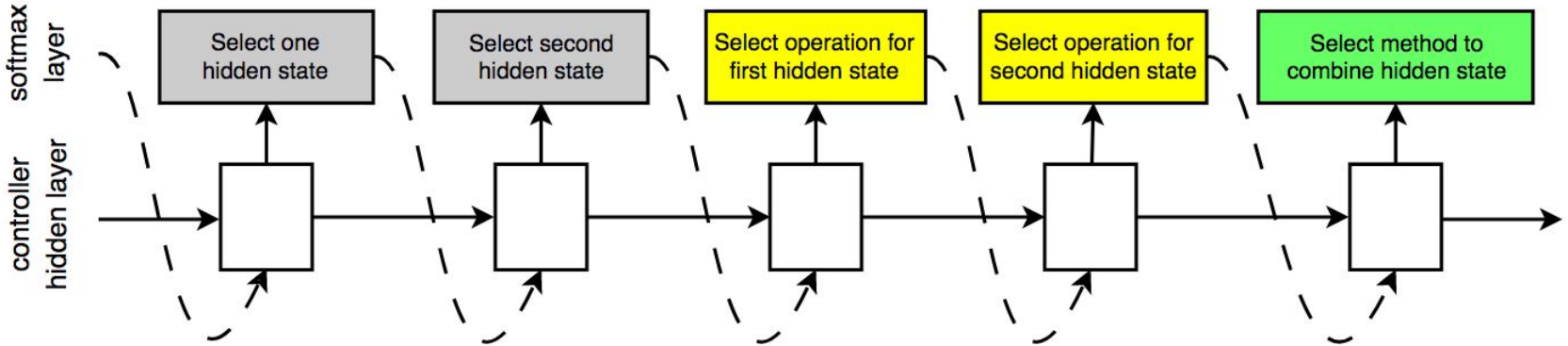
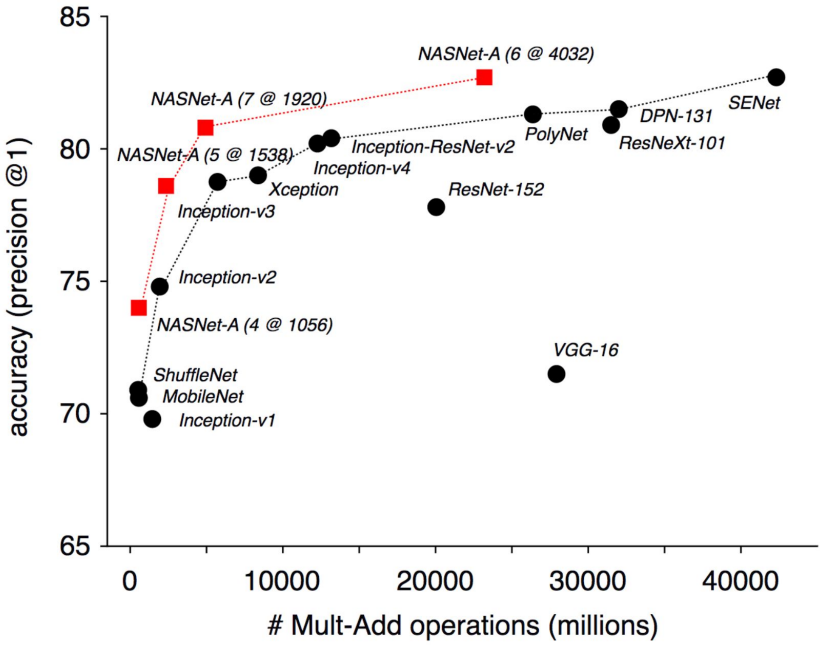
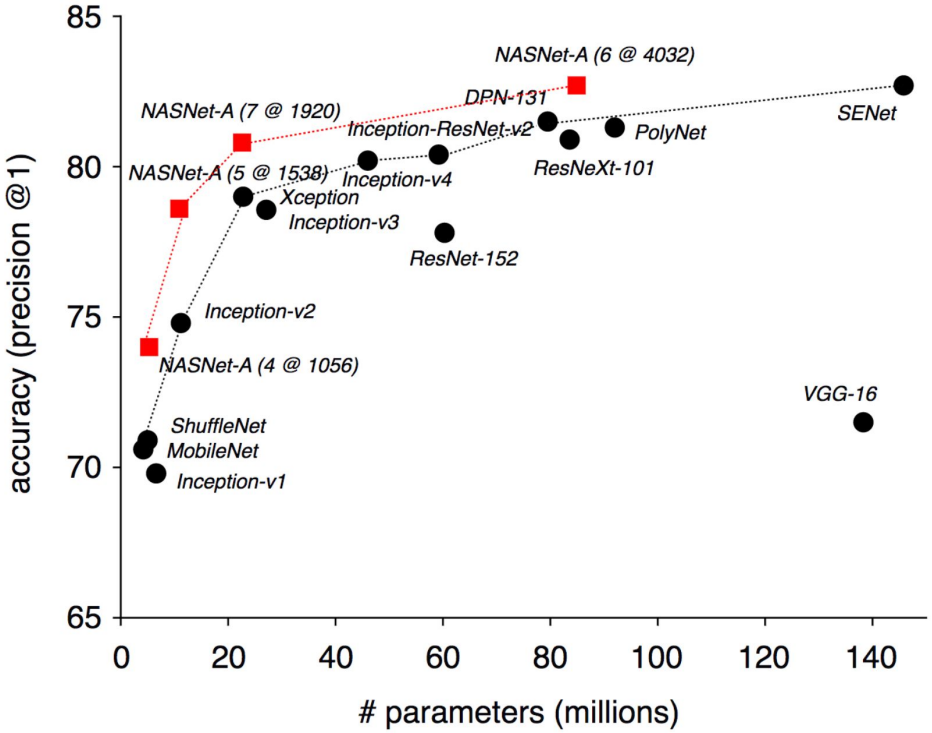


Learning Transferable Architectures for Scalable Image Recognition





Neural Architecture Search

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  Blocks and Cell instead of entire networks

Efficient Neural Architecture Search via Parameter Sharing

Learning Transferable Architectures for Scalable Image Recognition

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Vijay Vasudevan
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Jonathon Shlens
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shlens@google.com

Quoc V. Le
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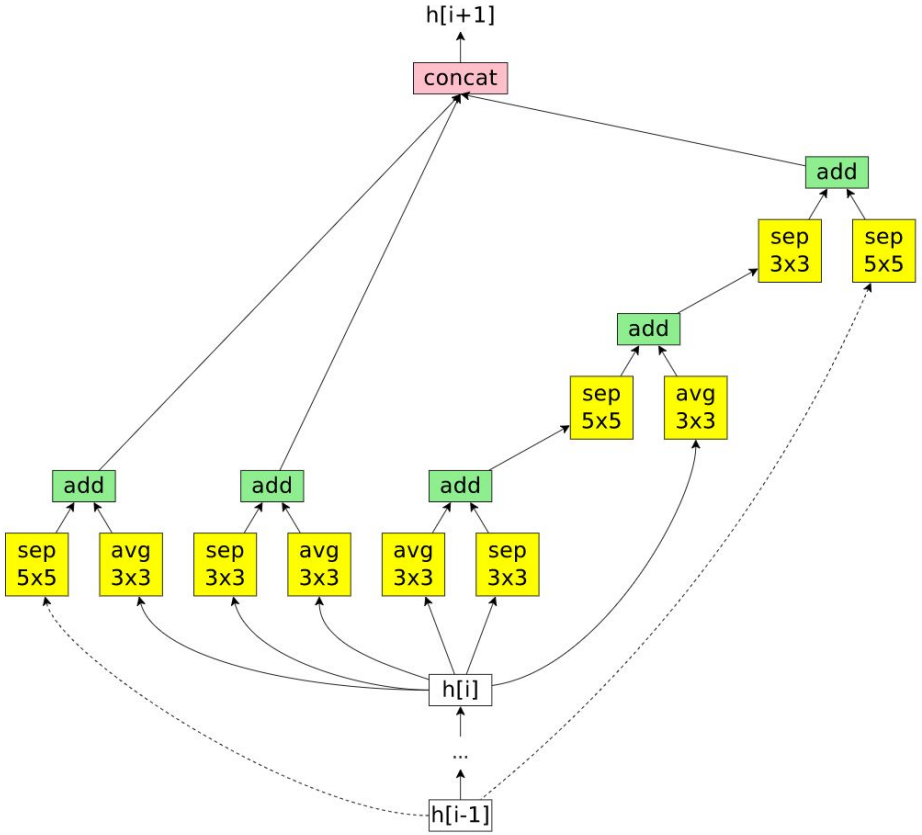
Efficient Neural Architecture Search via Parameter Sharing



Progressive Neural Architecture Search

Progressive Neural Architecture Search

Chenxi Liu[1⋆], Barret Zoph[2], Maxim Neumann[2], Jonathon Shlens[2], Wei Hua[2], Li-Jia Li[2], Li Fei-Fei[2,3], Alan Yuille[1], Jonathan Huang[2], and Kevin Murphy[2]

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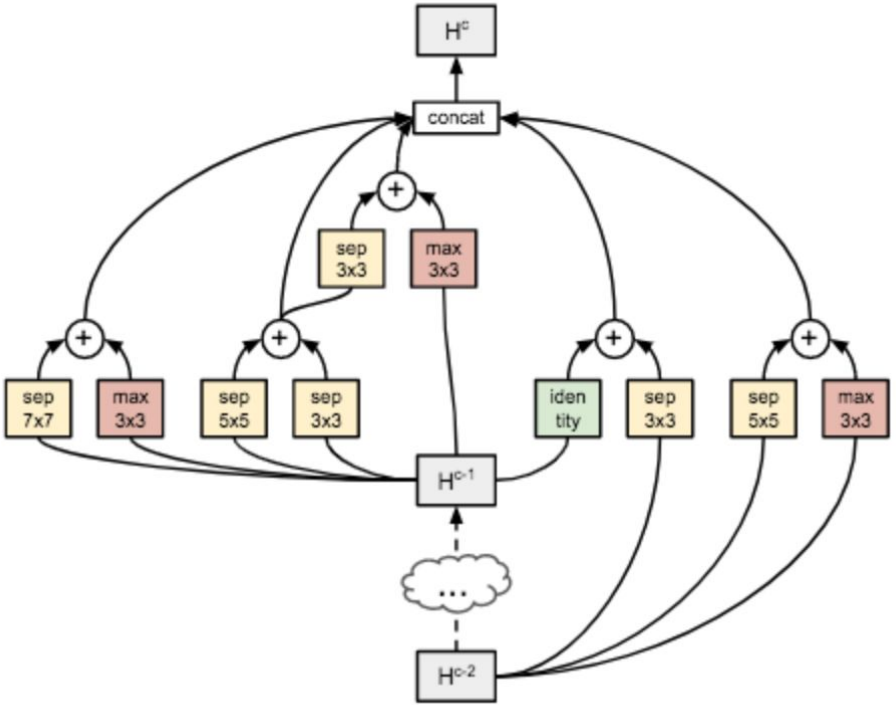
[3] Stanford University

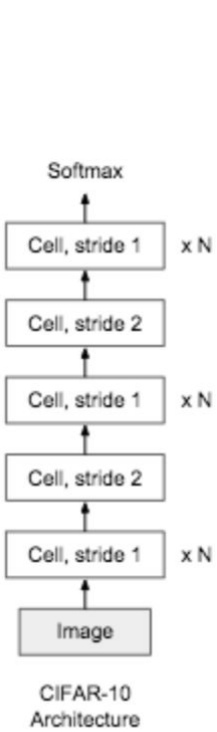
Progressive Neural Architecture Search

- **Search strategies**
  - Evolutionary algorithms
  - RL
  - Heuristic

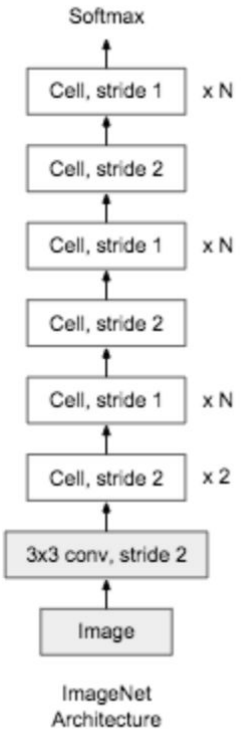
- **Sequential model-based optimization**
  - surrogate function
  - can predict the performance of a structure without needing to training it

Progressive Neural Architecture Search



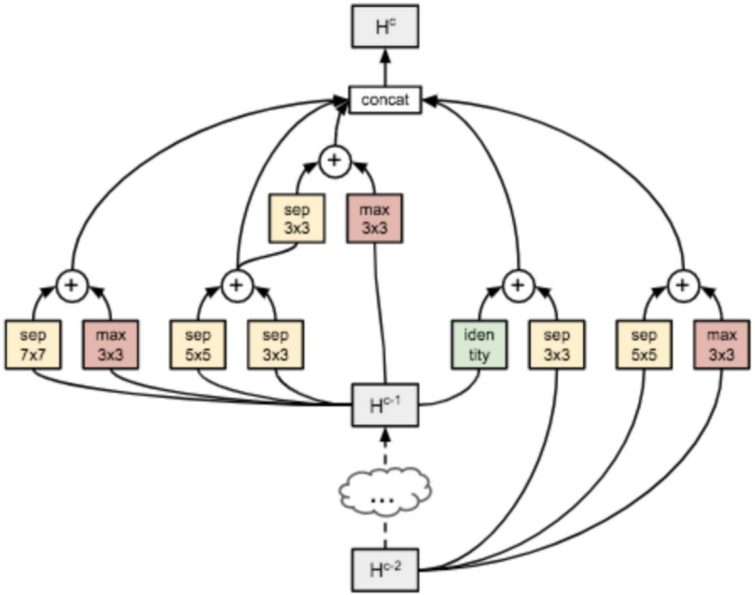


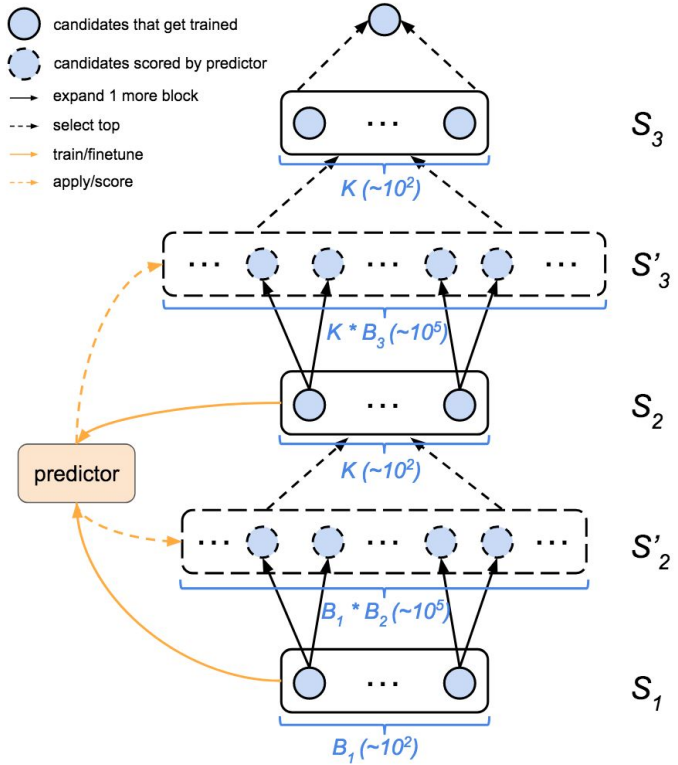
CIFAR-10 Architecture



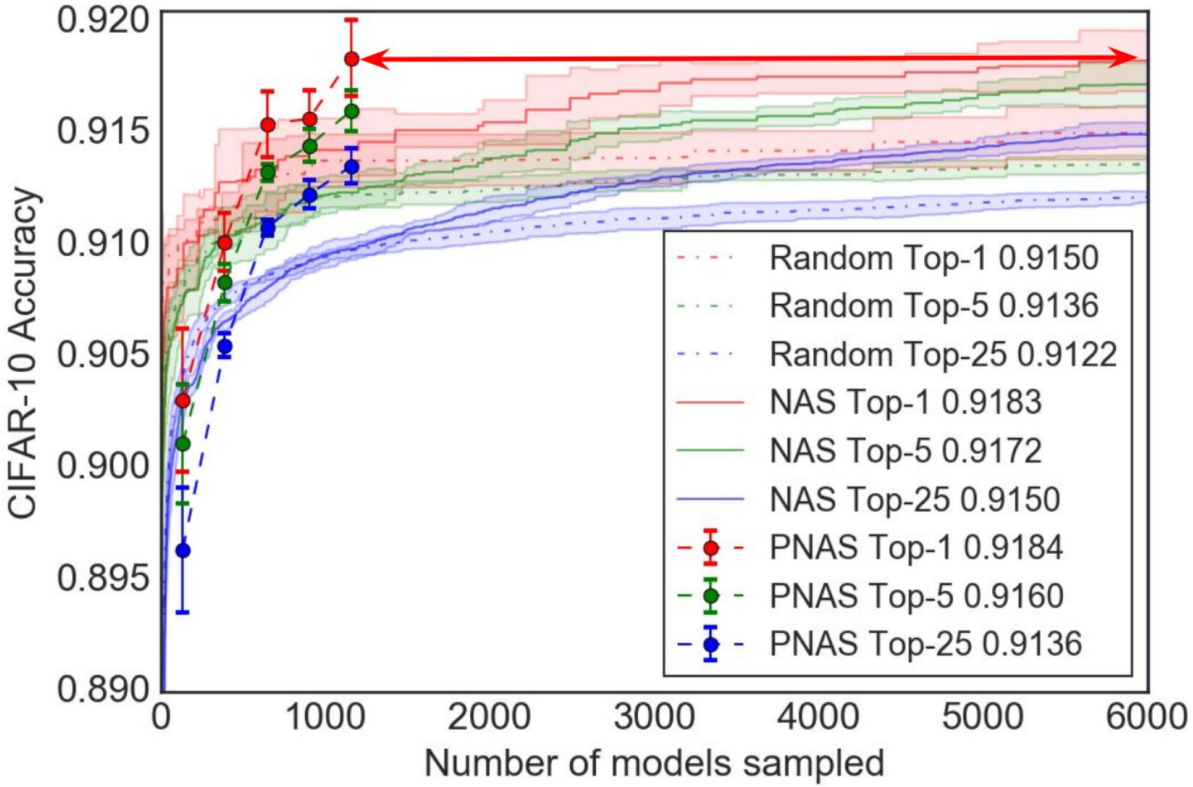
ImageNet Architecture

Progressive Neural Architecture Search





Progressive Neural Architecture Search



Neural Architecture Search

- **Learning** Transferable **Architectures** for Scalable Image Recognition

  Blocks and Cell instead of entire networks

- Efficient Neural Architecture Search via **Parameter Sharing**

  Share trained weights between runs for each block

- **Progressive** Neural Architecture Search

  Start small, add blocks, predict with combination most promising

Efficient Progressive Neural Architecture Search

Efficient Progressive Neural Architecture Search*

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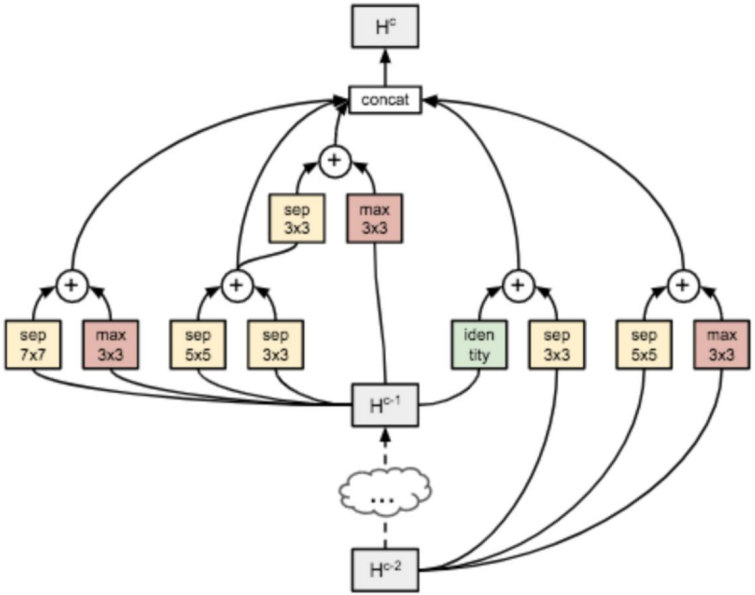
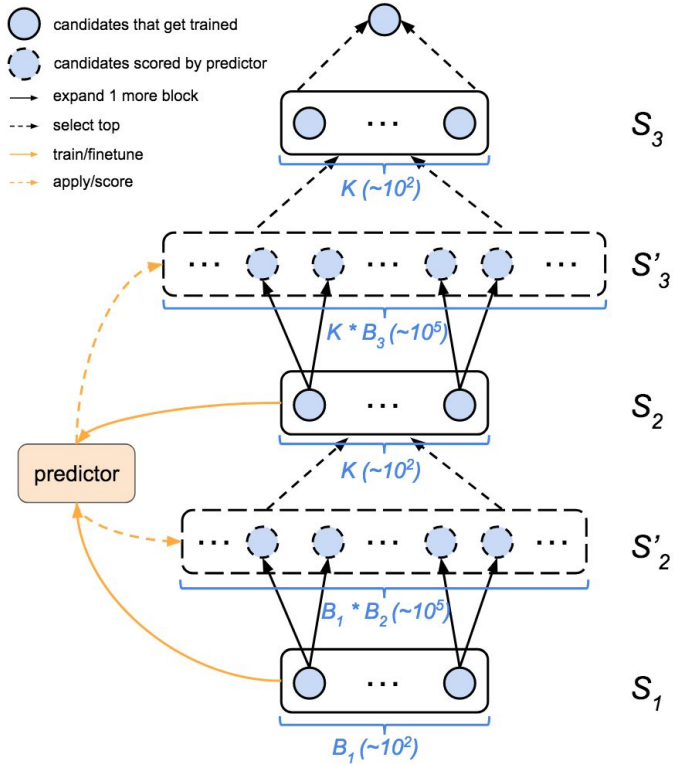
Efficient Progressive Neural Architecture Search

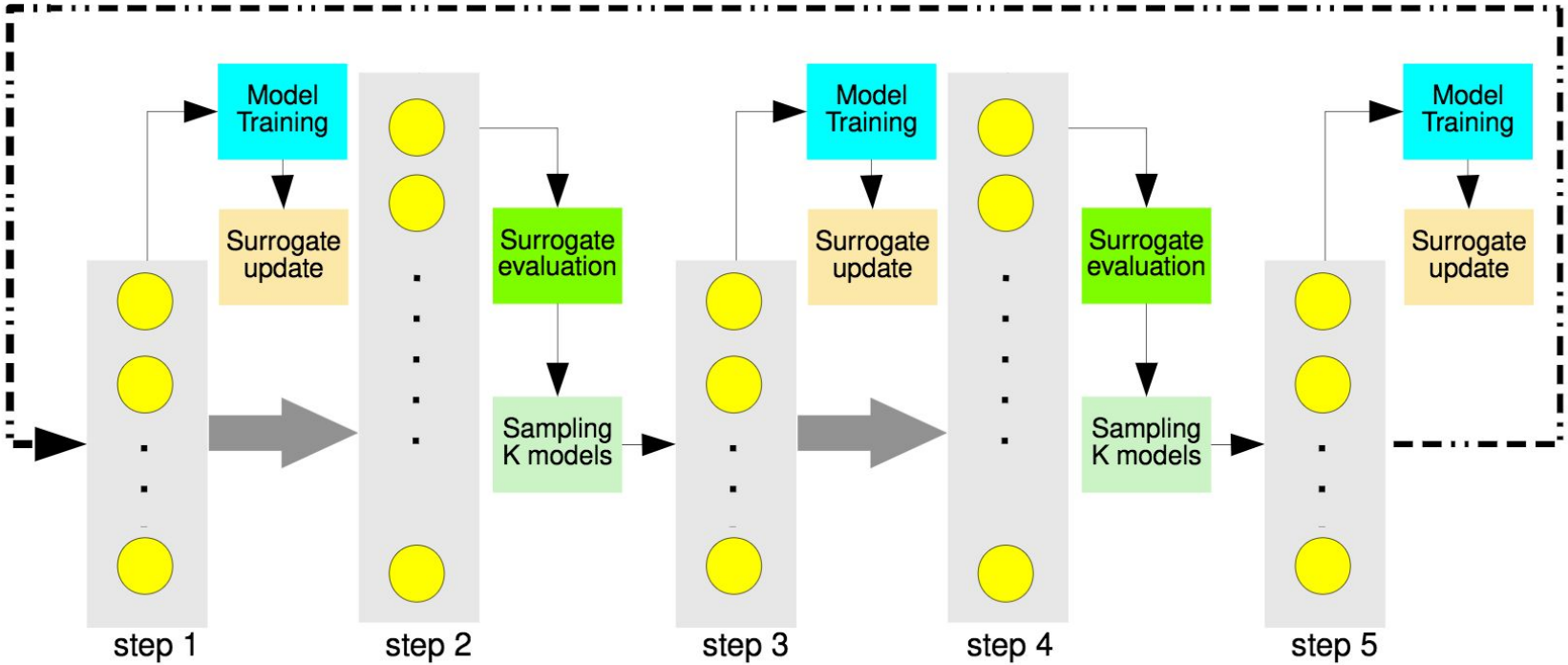
- **Combines**
  - Progressice Search
  - Parameter sharing
  - Relaxes greedy candidate selection, sampling

Progressive Neural Architecture Search





Efficient Progressive Neural Architecture Search



Efficient Progressive Neural Architecture Search

Method	GPUs	Time (days)	Parameters (millions)	Error (%)
ResNet [7]	-	-	1.7	6.43
DenseNet [9]	-	-	25.6	3.46
Super Nets [27]	-	-	-	9.21
ConvFabrics [21]	-	-	21.2	7.43
SMASH [4]	1	1.5	16.0	4.03
QNAS [2]	10	10	11.2	6.92
NAS [30]	800	28	37.4	3.65
ENAS macro [18]	1	0.32	21.3	4.23
EPNAS macro (ours)	1	1.2	5.9	5.14
EPNAS macro (ours + more channels)	1	1.2	38.8	4.01
NASNet micro [31]	450	4	3.3	3.41
ENAS micro [18]	1	0.45	4.6	3.54
PNAS micro [15]	100	1.5	3.2	3.63
EPNAS micro (ours)	1	1.8	1.6	5.69
EPNAS micro (ours + more channels)	1	1.8	6.6	3.71

Neural Architecture Search

Vienna Deep Learning Meetup

18 September 2018 @ WKO

#VDLM

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