21st Vienna Deep Learning Meetup

15th October 2018 @ Marx Palast

#VDLM

anexia

Vienna Deep Learning Meetup

The Organizers:

Alex Schindler
AIT & TU Wien

René Donner
Contextflow

Thomas Lidy
Musimap

Jan Schlüter
OFAI & UTLN

Vienna Deep Learning Meetup

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Agenda:

- Welcome
- Introduction by Anexia (Alexander Hendler, Project Manager)
- Deep Learning for Music & Audio Analysis (Thomas Lidy, Musimap, Alexander Schindler, AIT)
- Drum Transcription via Joint Beat and Drum Modeling using Convolutional Recurrent Neural Networks (Richard Vogl, TU Wien & CP, JKU Linz)
    - *30 minutes break*
- Latest News & Hot Topics (Thomas Lidy, Jan Schlüter, Alexander Schindler, René Donner)
- Networking and Discussions

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VDLM T-Shirts

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THE DENT

Vienna Deep Learning Meetup

THE RIPPLE

Announcements

People Code AI

WeAreDevelopers AI Congress Vienna

4-5 December, 2018 Hofburg Vienna, Austria

WeAreDevelopers AI Congress Vienna

About the Congress

The Congress will focus on human-machine interactions and will bring together two sides: The academy and the industry. We will try to answer questions such as: Can we trust computer decisions? How to deal with decisions bias? How can we improve the user experience for machine learning software? And many, many more.

The Congress revolves around the interaction between wo/man and machines. From trusting and rationalizing the black box, to improving the interface through which we communicate with the models.

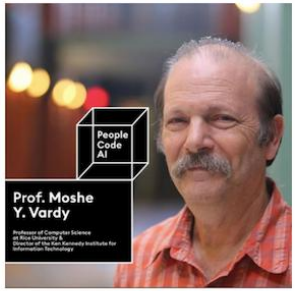
4,000m^2
of AI fun

Main Topics

- Machine vs Human – Trusting Computers' Decisions
- Blockchain: Decentralized Artificial Intelligence
- Deep Learning – Demystifying the Black Box
- GDPR and Privacy In the Era of Big Data
- The Future of AI for Personal Usage
- Security and Safety in AI
- Ethical Challenges of AI

Confirmed Speakers for AI Congress 2018

"BIAS IN NLP"



"AN ETHICAL CRISIS IN COMPUTING?"

TOPIC
TBA

TOPIC
TBA

"HOW WE DEMOCRATIZED ARTIFICIAL INTELLIGENCE WITH ACUMOS AI"

TOPIC
TBA

SEE YOU SOON!

50 EURO DISCOUNT

Vienna_DLM_AI_18

GET YOUR TICKETS NOW!
www.wearedevelopers.com/ai-congress


DATA NATIVES
November 22-23, Berlin
DATANATIVES.IO

Getting to Know Data Natives

Data Natives is Europe's leading events platform for the data-driven generation.

Our aim is to educate and connect our community of data enthusiasts through interactive events. We aspire to spark innovation across industries and throughout our vast network of entrepreneurs, researchers, and students. We also share cutting-edge research and thought-provoking content through our media platform, Dataconomy,

In addition to our conference, Data Natives' Big Data Meetup is well established in 47 cities across the world.

1. **100+ events in 51 cities worldwide**
2. **35,000+ attendees**
3. **60,000 members across our communities**

Speaker Highlights

Annina Neumann
VP DATA TECHNOLOGY
PROSIEBENSAT 1

Bart de Witte
CHAIR FACULTY OF DIGITAL HEALTH
FUTUR/IO

Daniel Molnar
DATA ENGINEER
SHOPIFY

Cassie Korzykov
CHIEF DECISION SCIENTIST
GOOGLE

Johannes Starlinger
HEALTH DATA RESEARCHER
CHARITÉ – UNIVERSITÄTSMEDIZIN BERLIN

Noa Tamir
DATA SCIENCE TEAM LEAD
BABBEL

Stewart Rogers
DIRECTOR OF MARKETING TECHNOLOGY
VENTUREBEAT

VDLM on Github

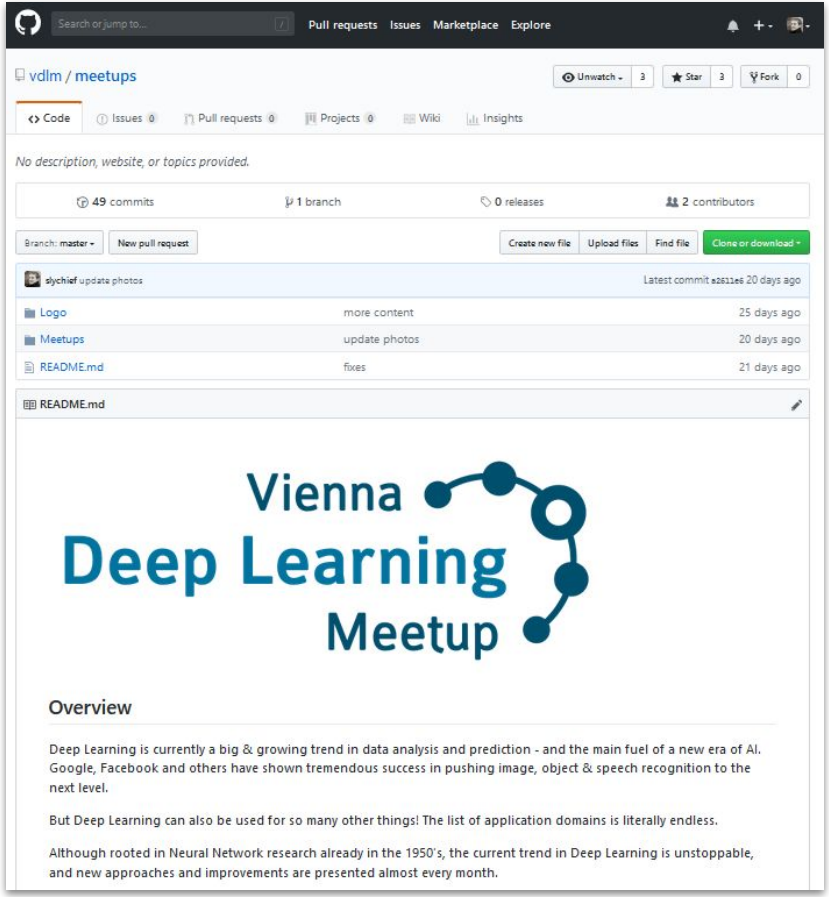
- ❑ history
- ❑ slides
- ❑ videos
- ❑ Wiki

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



https://github.com/vdlm/meetups

Vienna Deep Learning Meetup

VLDM Wiki

Getting Started in Deep Learning

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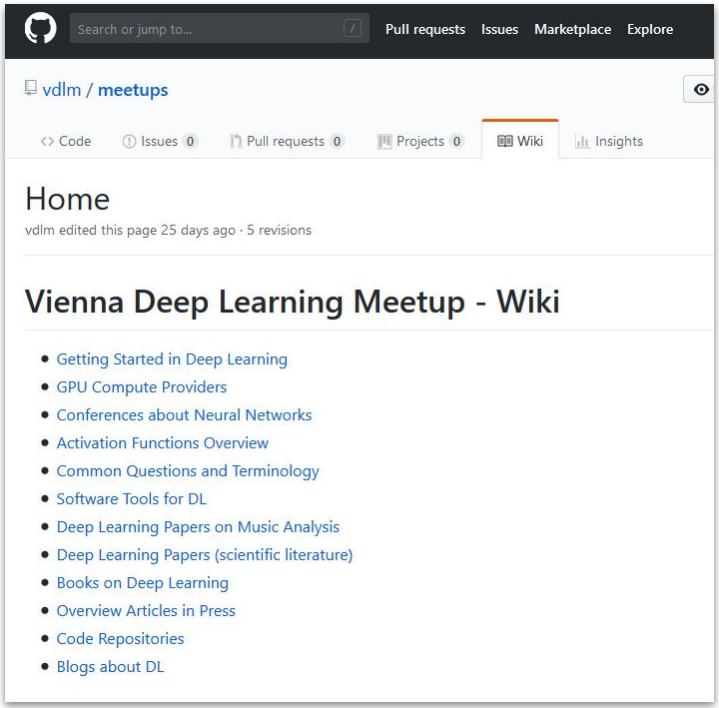
Deep Learning Book (http://www-labs.iro.umontreal.ca/~bengioy/dlbook/) by Yoshua Bengio (work in progress)

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



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

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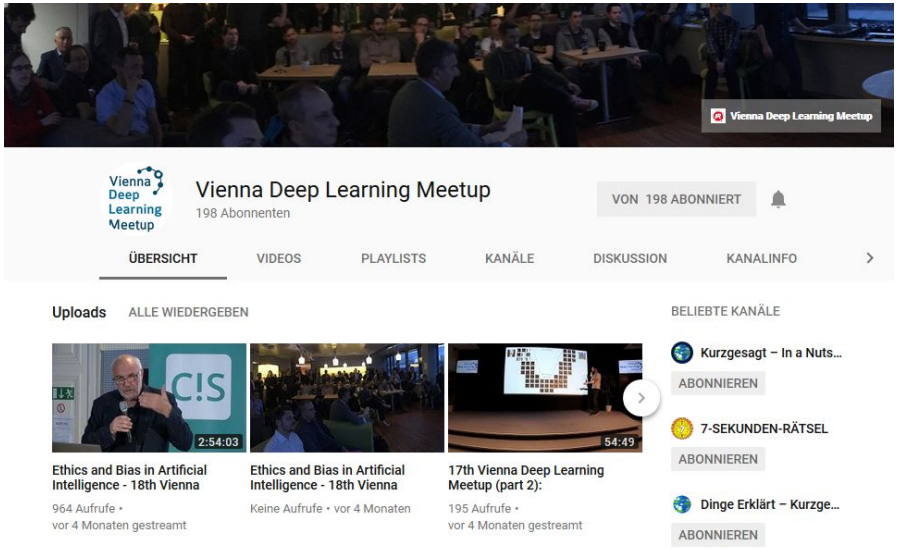
VDLM Youtube Channel



https://www.youtube.com/ViennaDeepLearningMeetup

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!

Vienna
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ISMIR 2018

(see separate slides for ISMIR 2018 Hot Topics)

Vienna Deep Learning Meetup

Efficient Semantic Segmentation in Videos

Efficient Semantic Segmentation in Videos

- **What is Semantic Segmentation?**
- **How to we make it fast?**

What is Semantic Segmentation?

Learning Deep Representations for Semantic Image Parsing: a Comprehensive Overview

Lili Huang, Jiefeng Peng, Ruimao Zhang, Guanbin Li, Liang Lin

School of Data and Computer Science, Sun Yat-Sen University

Figure 1: Illustration of the category-level semantic segmentation. The left is the original image. The middle is the basic semantic segmentation result, and the right is the semantic part segmentation result.

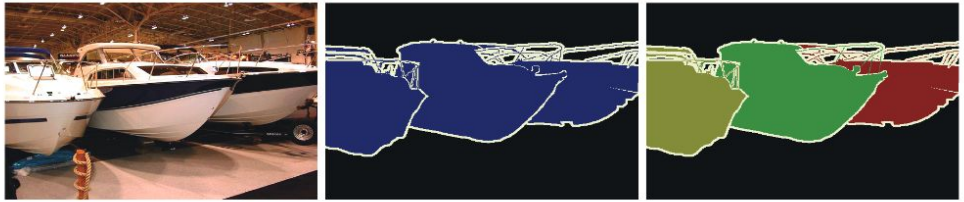
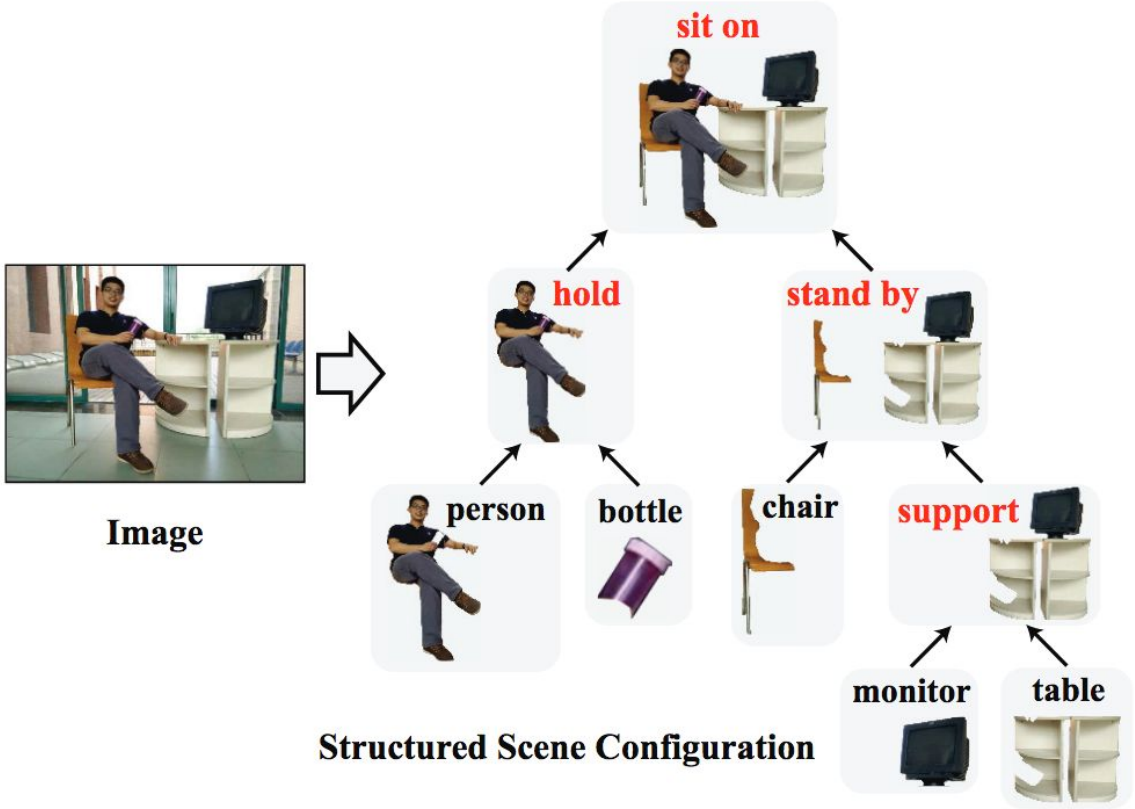
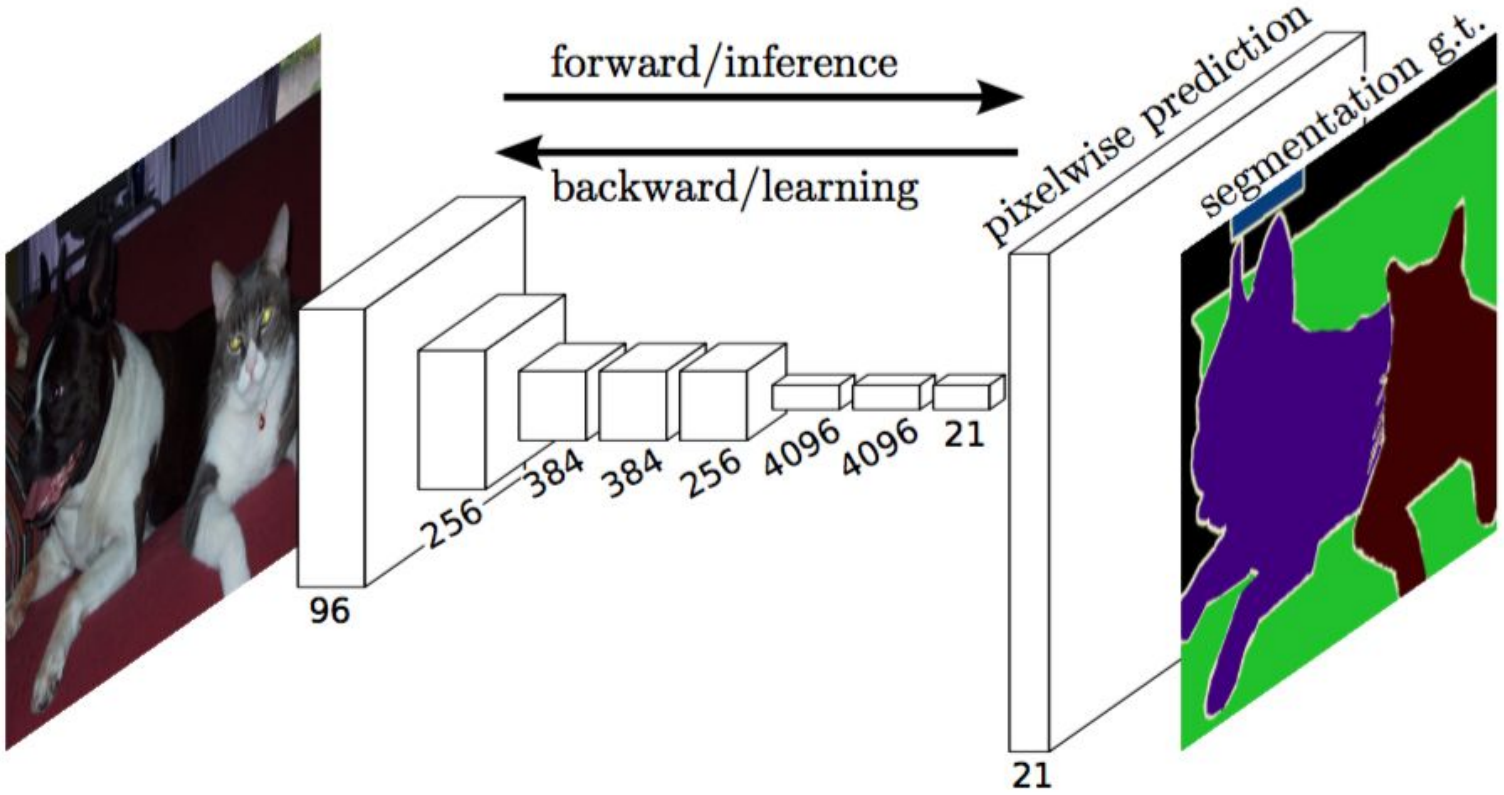


Figure 2: Comparison of category-level and instance-level semantic segmentation.The left is the original image. The middle is the category-level semantic segmentation result, and the right is the instance-level semantic segmentation result.

What is Semantic Segmentation?

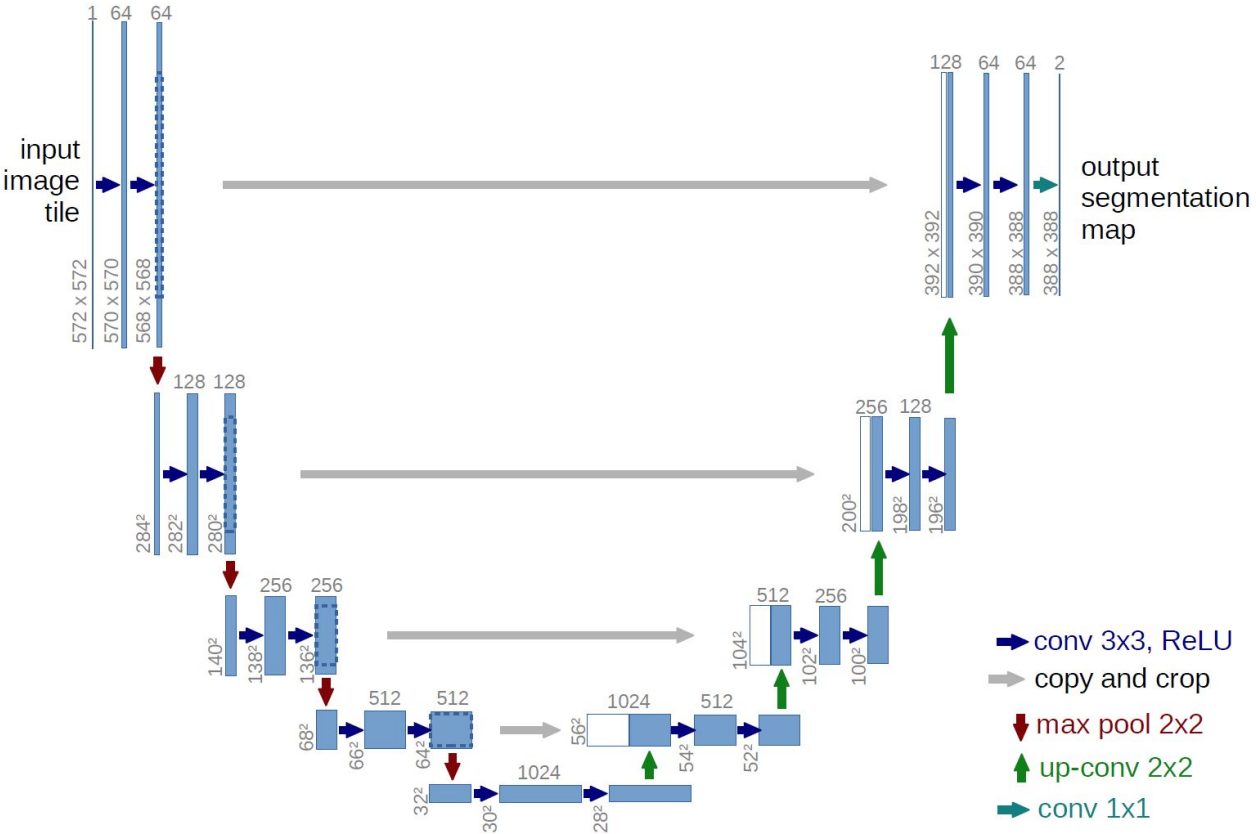


How does it work?

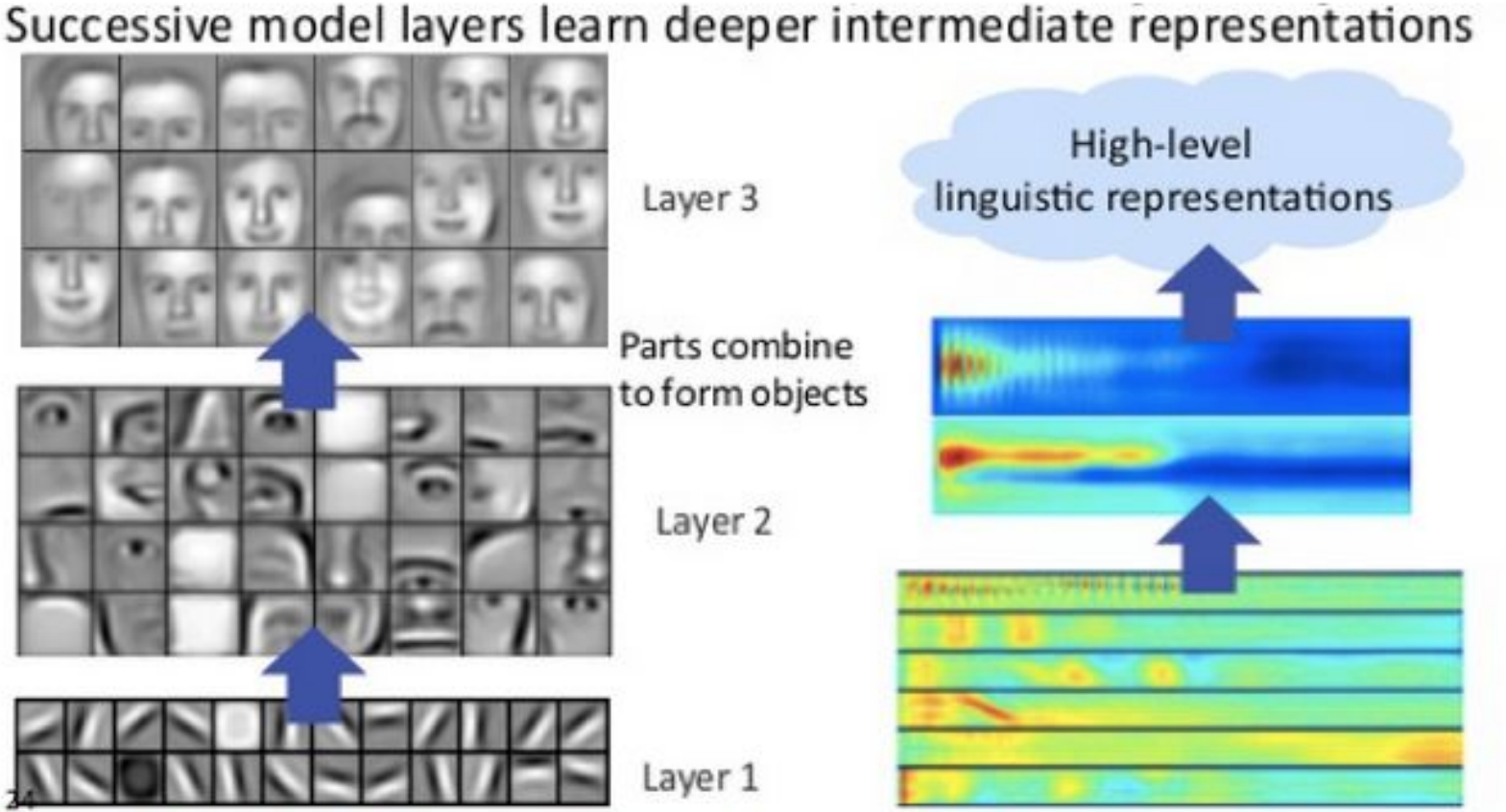


U-Nets

U-Net: Convolutional Networks for Biomedical Image Segmentation doi>
Olaf Ronneberger, Philipp Fischer, Thomas Brox
Medical Image Computing and Computer-Assisted Intervention (MICCAI), Springer, LNCS, Vol.9351: 234--241, 2015,
available at arXiv:1505.04597 [cs.CV]

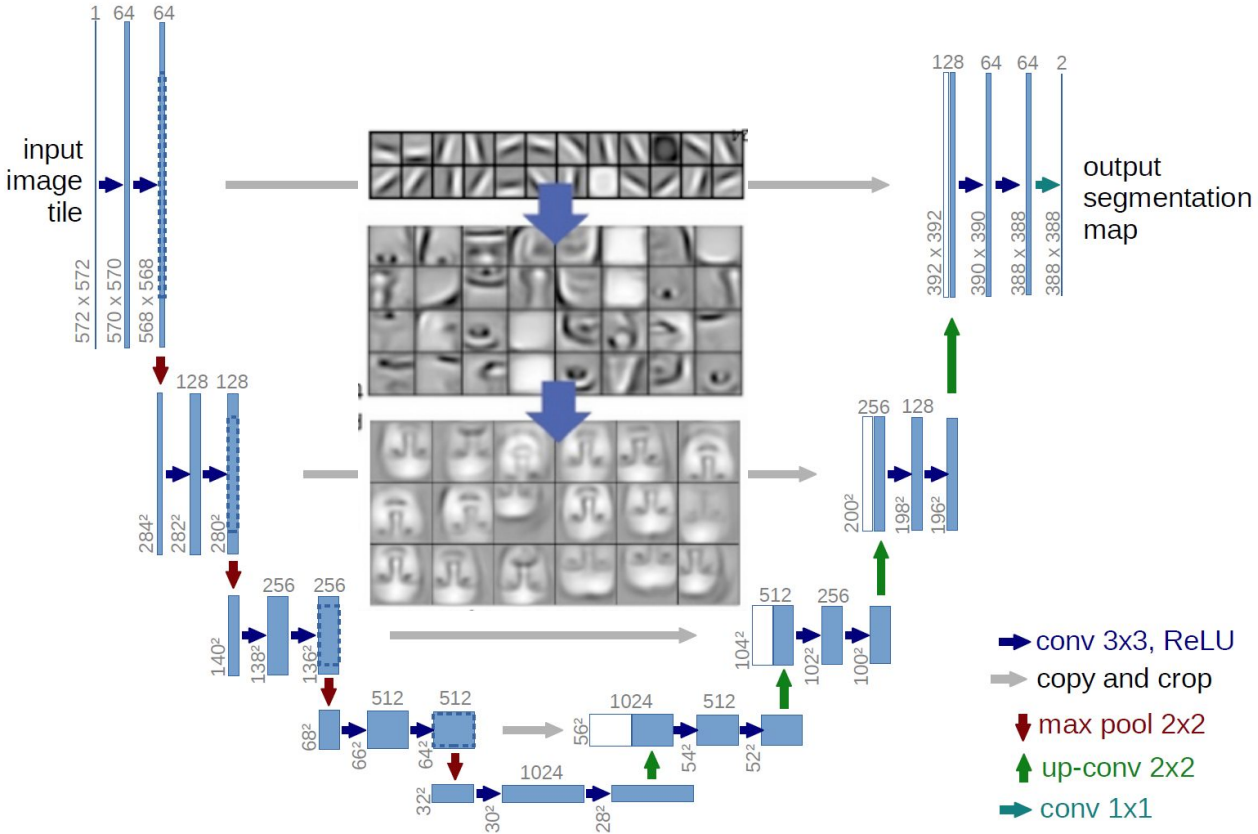


Feature hierarchy



Prior: underlying factors & concepts compactly expressed w/ multiple levels of abstraction

Features in a U-Net



Semantic Segmentation

Learning Deep Representations for Semantic Image Parsing: a Comprehensive Overview

Lili Huang, Jiefeng Peng, Ruimao Zhang, Guanbin Li, Liang Lin

School of Data and Computer Science, Sun Yat-Sen University

- **Approaches based on CNNs**
- **Approaches based on RNNs**

  Instance segmentation
- **Evaluation metrics and benchmarks**
- **Public datasets**

Efficient Semantic Segmentation in Videos

- **What is Semantic Segmentation?**
- **How to we make it fast?**
  - Reuse information from neighbouring frames!

Efficient Semantic Segmentation in Videos

- **How to we make it fast?**
  - Reuse information from neighbouring frames!
    - **Using optical flow**
    - [predict optical flow]
    - Reuse information from video encoding internals

Deep Feature Flow for Video Recognition

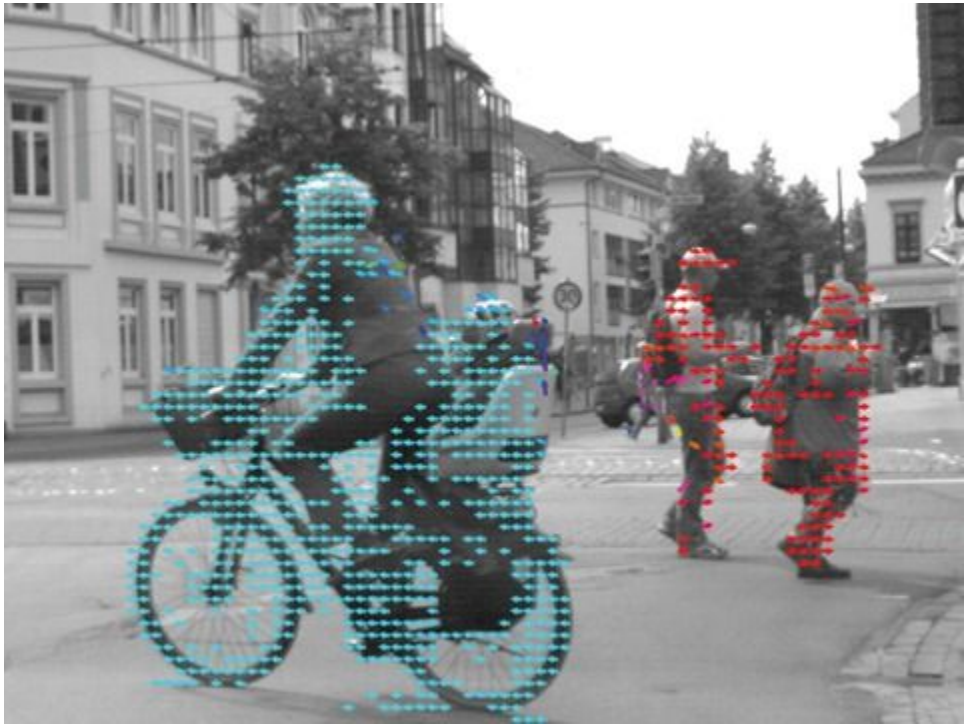
Deep Feature Flow for Video Recognition

Xizhou Zhu[1,2*] Yuwen Xiong[2*] Jifeng Dai[2] Lu Yuan[2] Yichen Wei[2]

[1]University of Science and Technology of China [2]Microsoft Research

ezra0408@mail.ustc.edu.cn {v-yuxio,jifdai,luyuan,yichenw}@microsoft.com

Optical Flow



Deep Feature Flow for Video Recognition

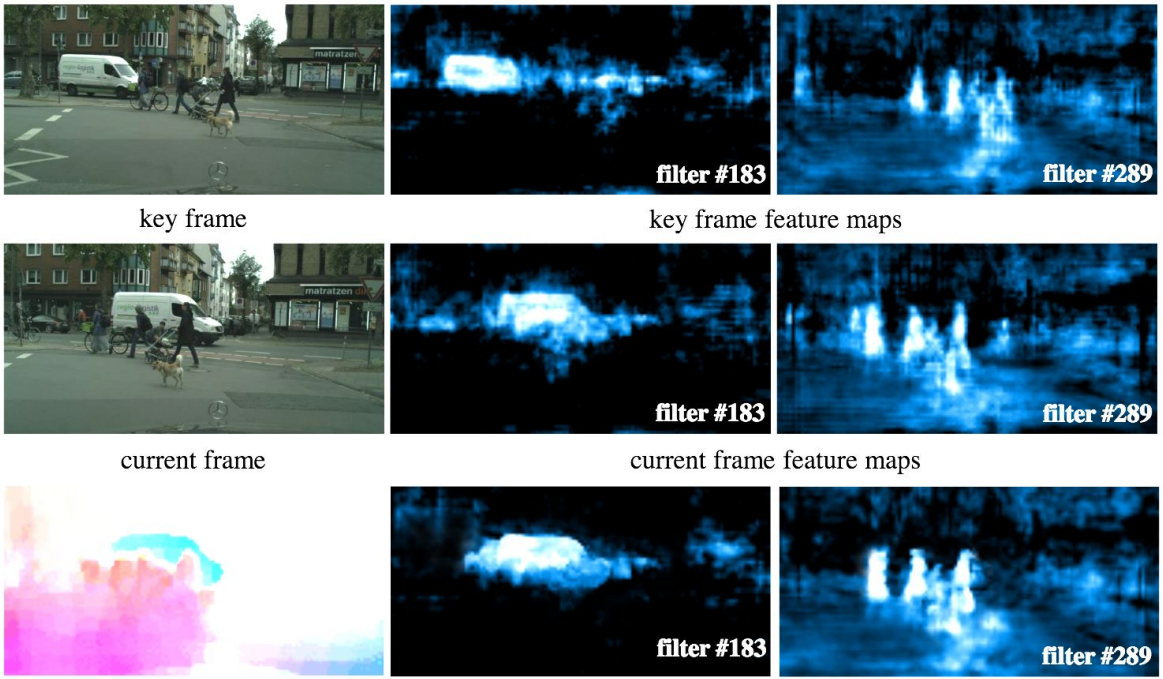
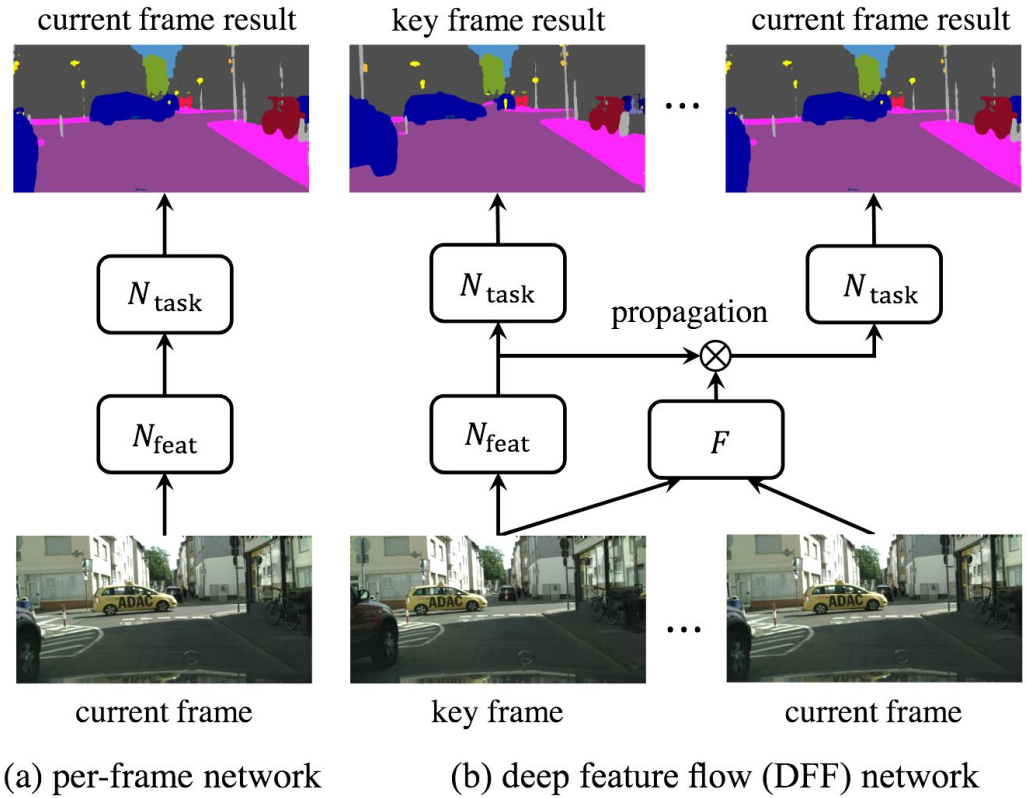


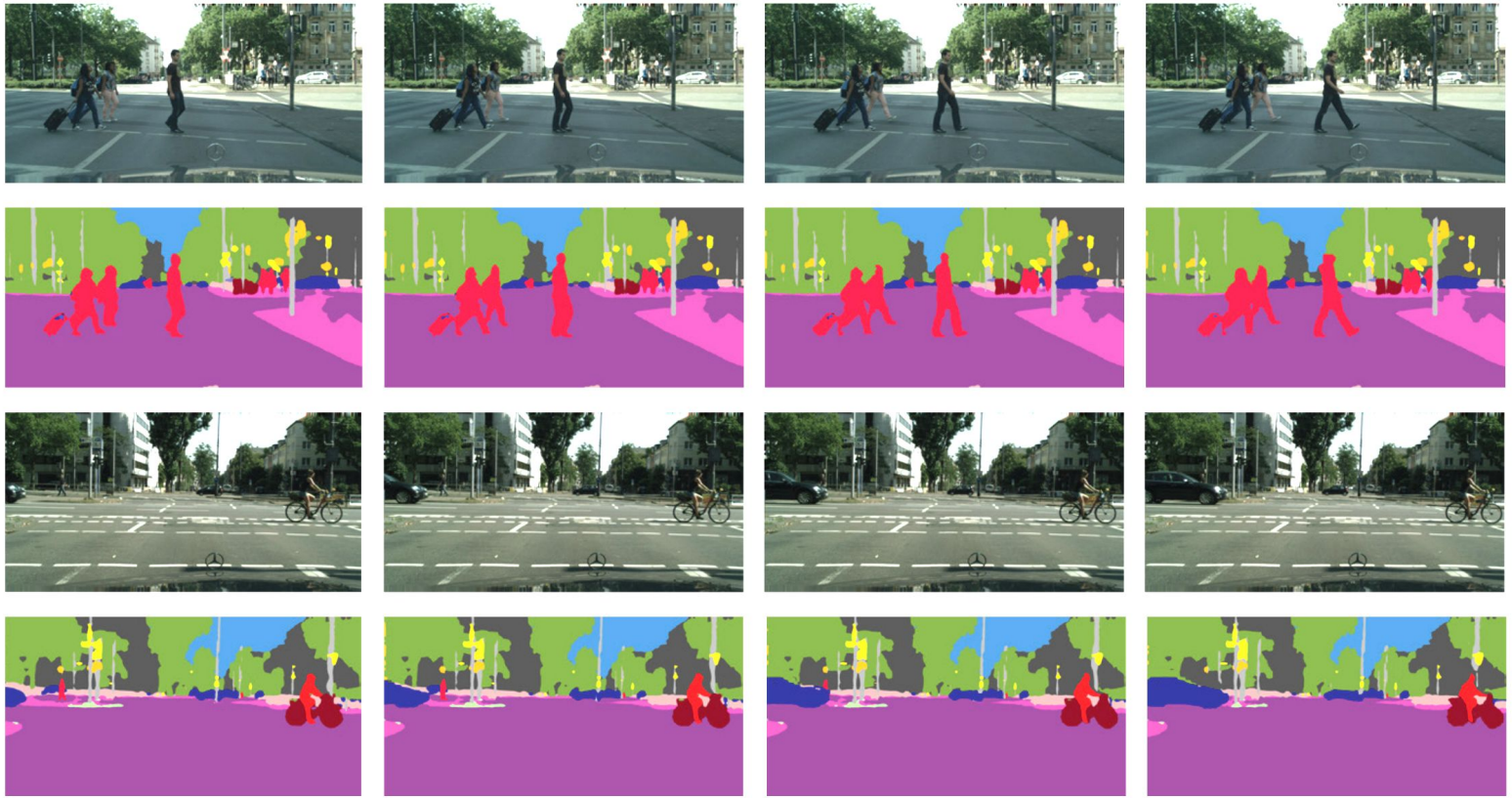
Figure 1. Motivation of proposed *deep feature flow* approach. Here we visualize the two filters' feature maps on the last convolutional layer of our ResNet-101 model (see Sec. 4 for details). The convolutional feature maps are similar on two nearby frames. They can be cheaply propagated from the key frame to current frame via a flow field.

Deep Feature Flow for Video Recognition

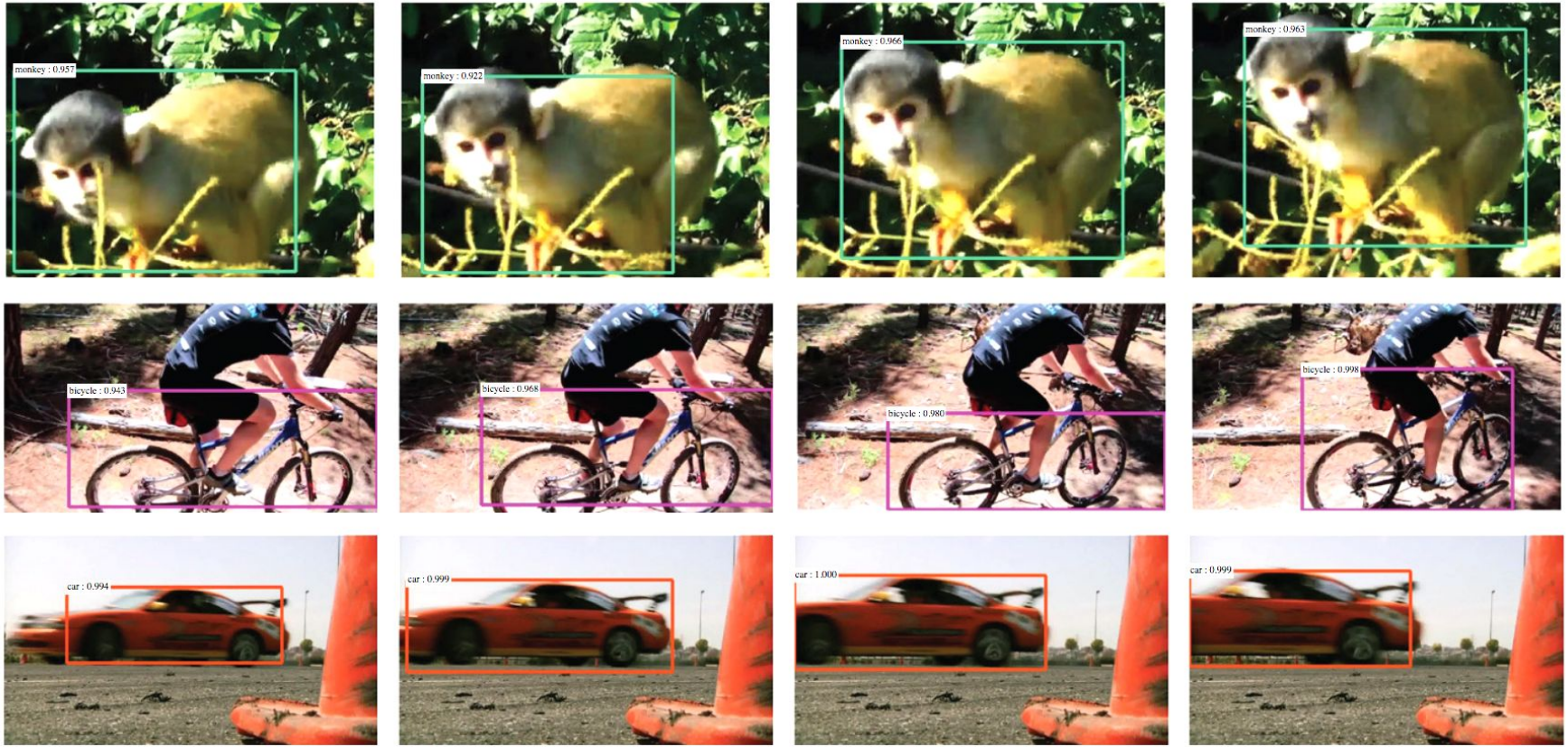


(a) per-frame network (b) deep feature flow (DFF) network

Deep Feature Flow for Video Recognition



Deep Feature Flow for Video Recognition



Efficient Semantic Segmentation in Videos

- **How to we make it fast?**
  - Reuse information from neighbouring frames!
    - Using optical flow
    - **[predict optical flow]**
    - Reuse information from video encoding internals

FlowNet: Learning Optical Flow with Convolutional Networks

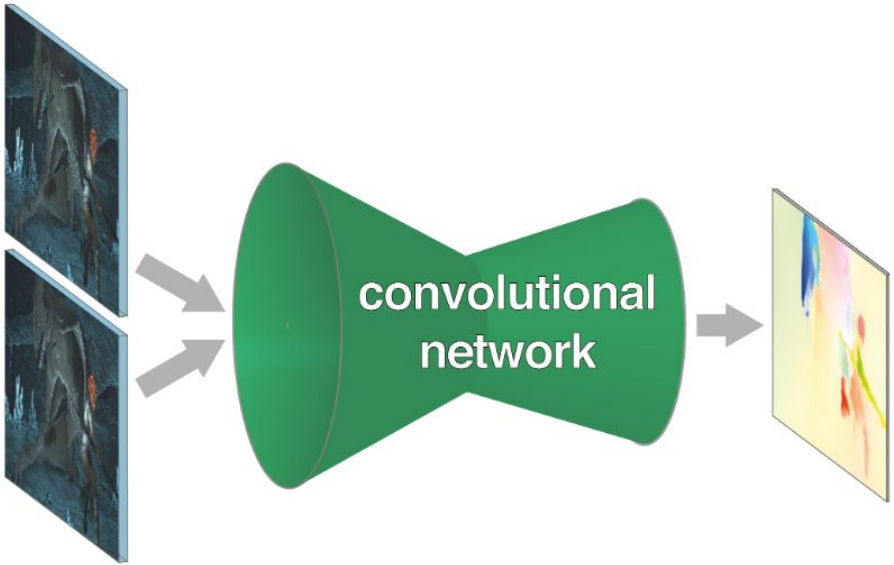
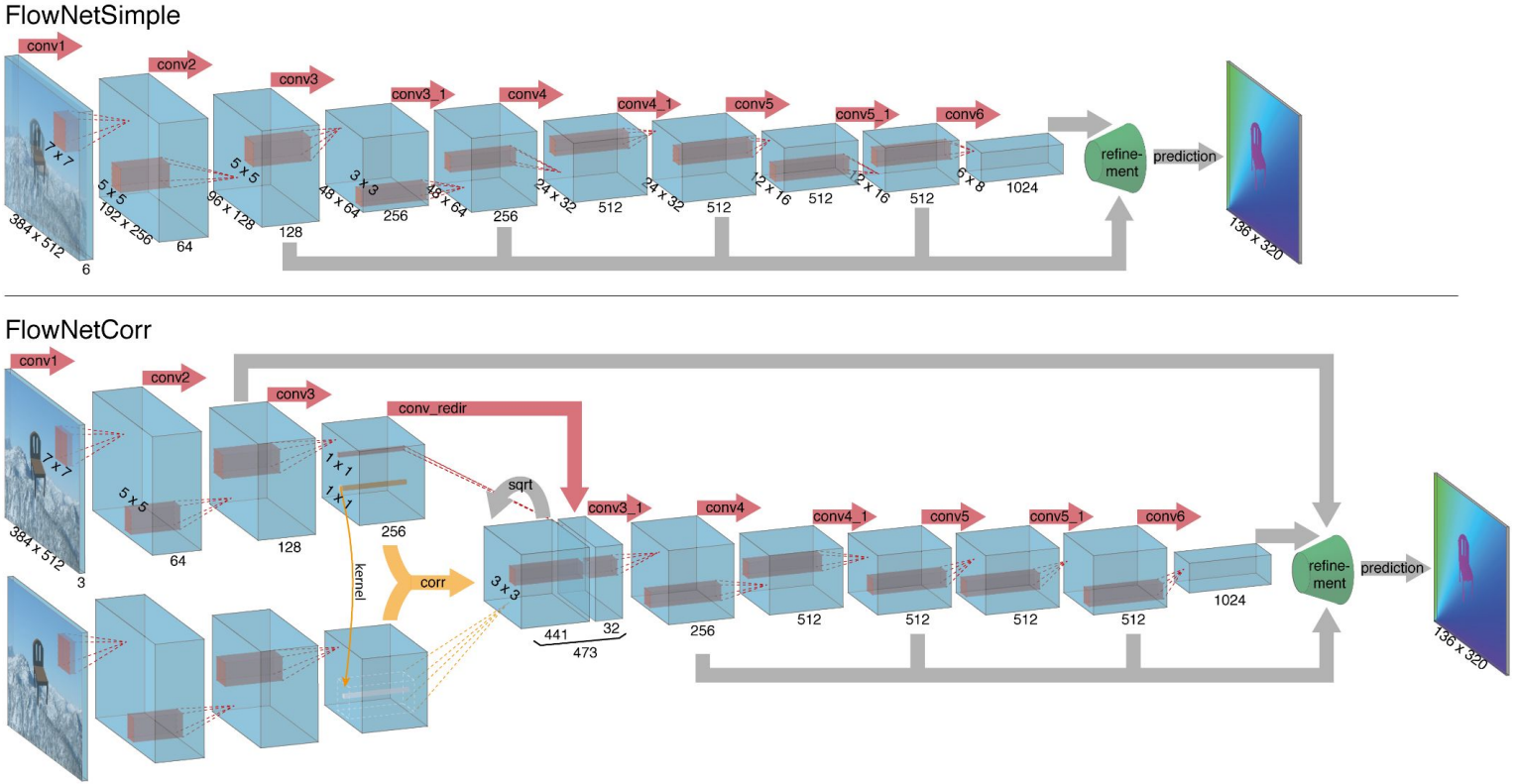


Figure 1. We present neural networks which learn to estimate optical flow, being trained end-to-end. The information is first spatially compressed in a contractive part of the network and then refined in an expanding part.

FlowNet: Learning Optical Flow with Convolutional Networks



FlowNet: Learning Optical Flow with Convolutional Networks

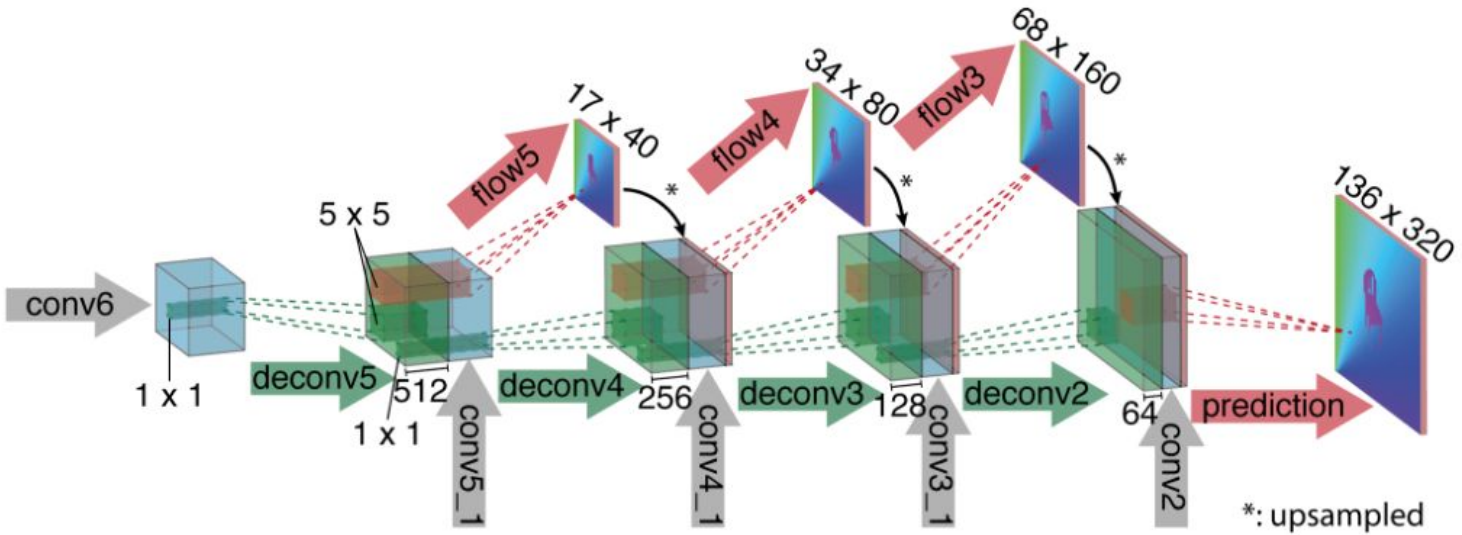
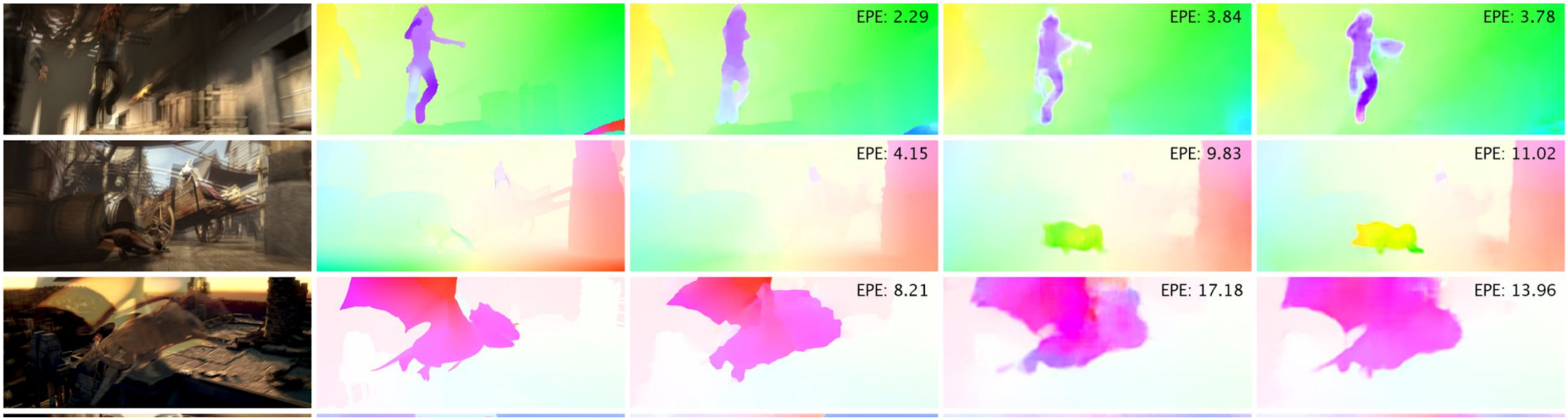


Figure 3. Refinement of the coarse feature maps to the high resolution prediction.

FlowNet: Learning Optical Flow with Convolutional Networks



Efficient Semantic Segmentation in Videos

- **How to we make it fast?**
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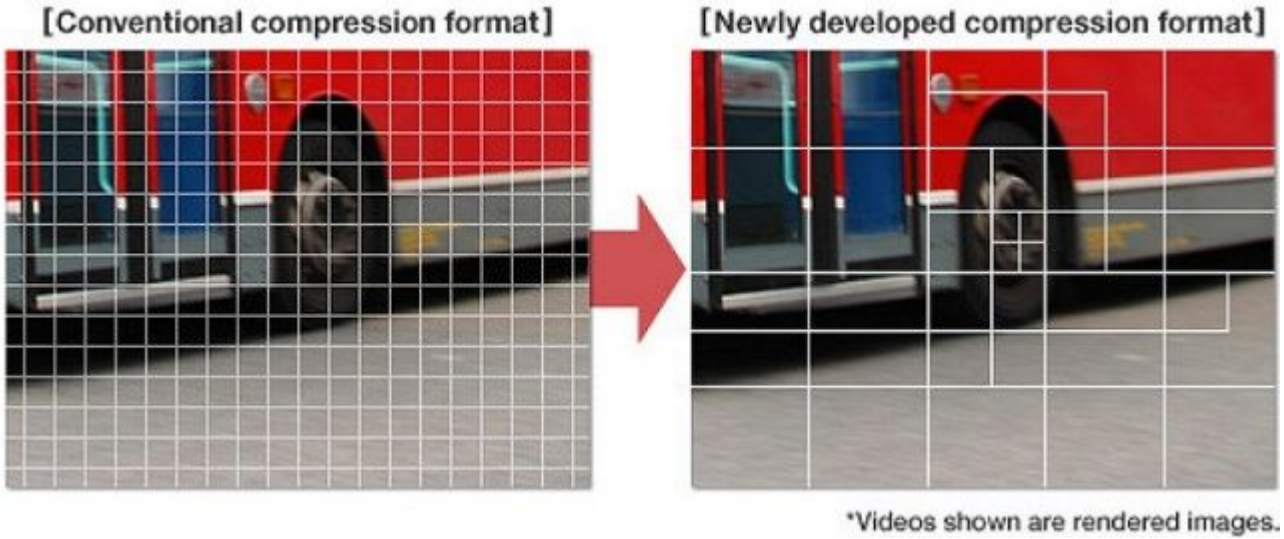
    - Using optical flow
    - [predict optical flow]
    - **Reuse information from video encoding internals**

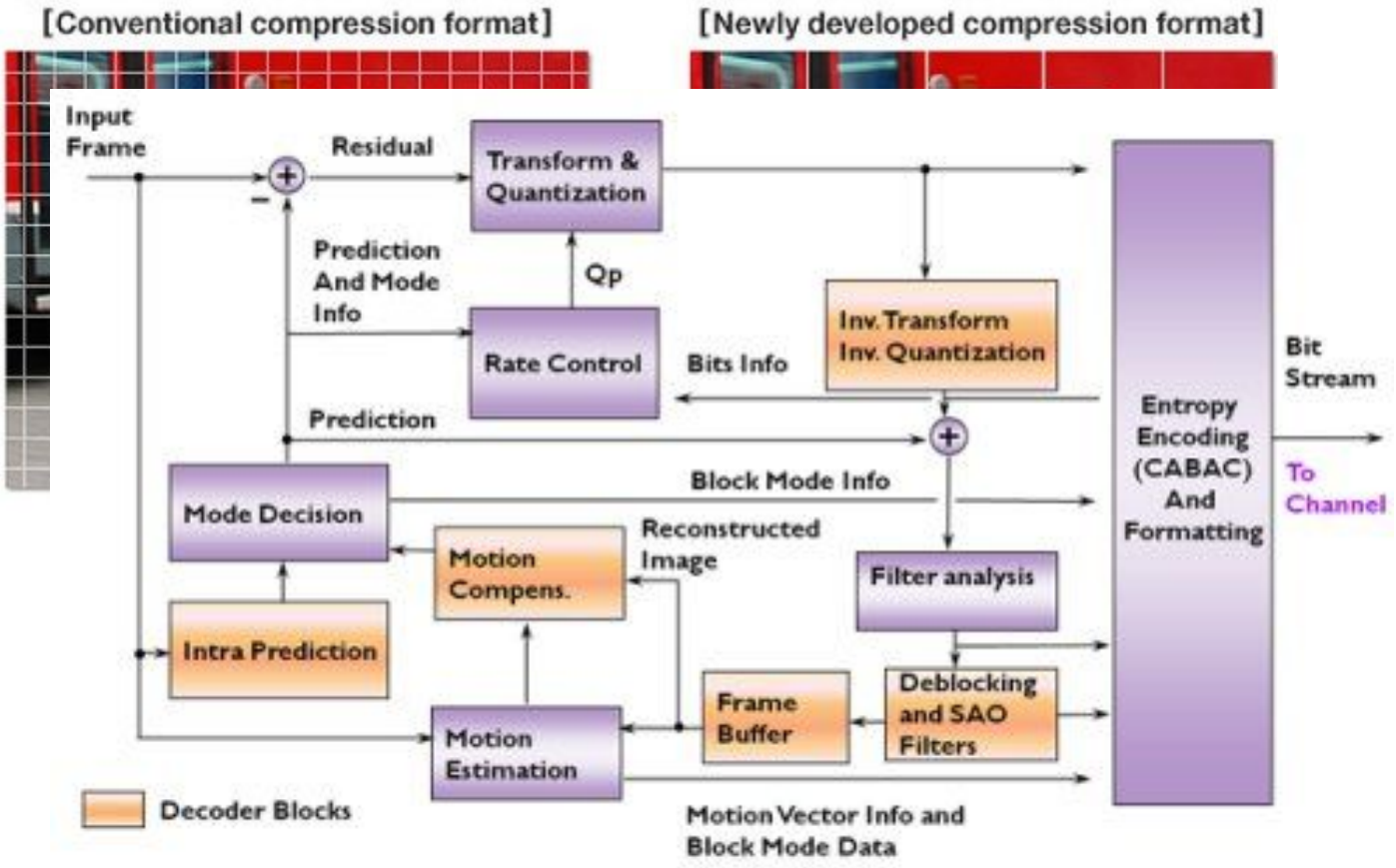
INTER-BMV: INTERPOLATION WITH BLOCK MOTION VECTORS FOR FAST SEMANTIC SEGMENTATION ON VIDEO

Samvit Jain & Joseph E. Gonzalez
Department of Computer Science
University of California, Berkeley
{samvit,jegonzal}@eecs.berkeley.edu

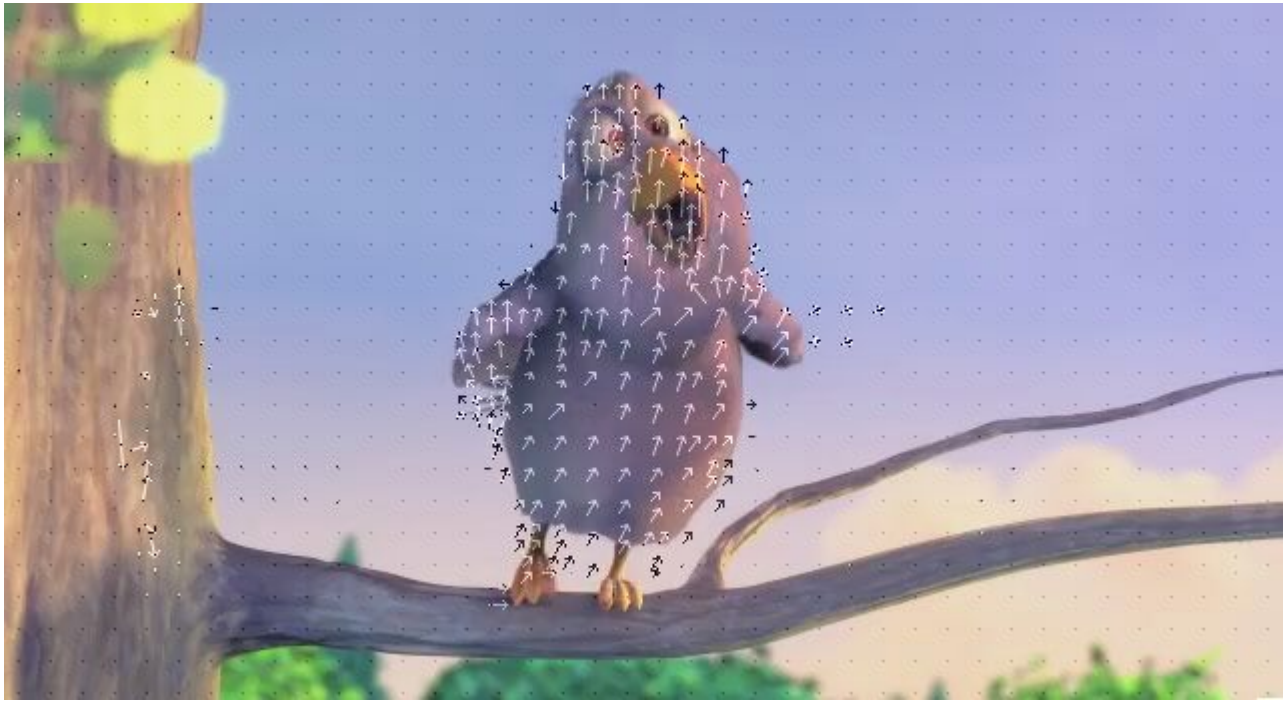
Modern video codes (e.g. h.265)



Interpolation with block-motion vectors



Interpolation with block-motion vectors



Interpolation with block-motion vectors

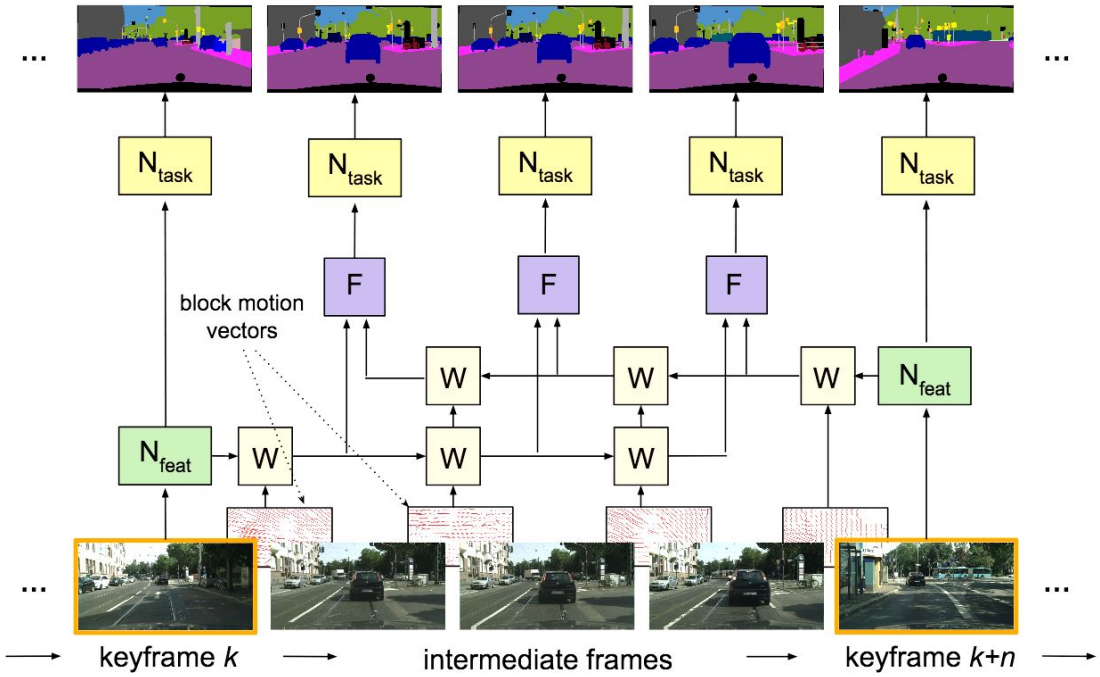


Figure 1: Inter-BMV warps and fuses the features of enclosing keyframes to generate accurate feature estimates for intermediate frames, using block motion vectors present in compressed video.

Interpolation with block-motion vectors

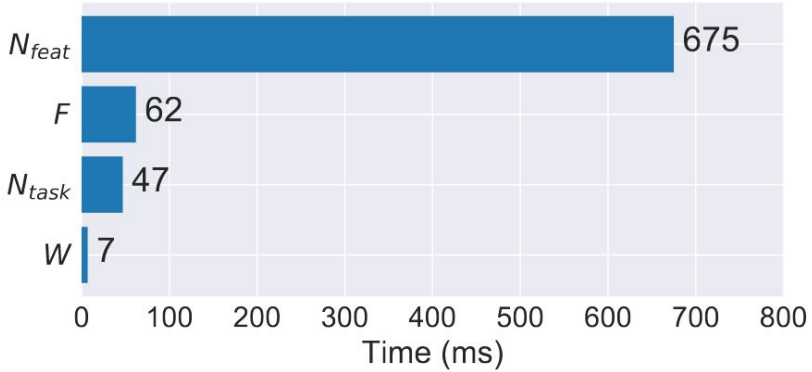
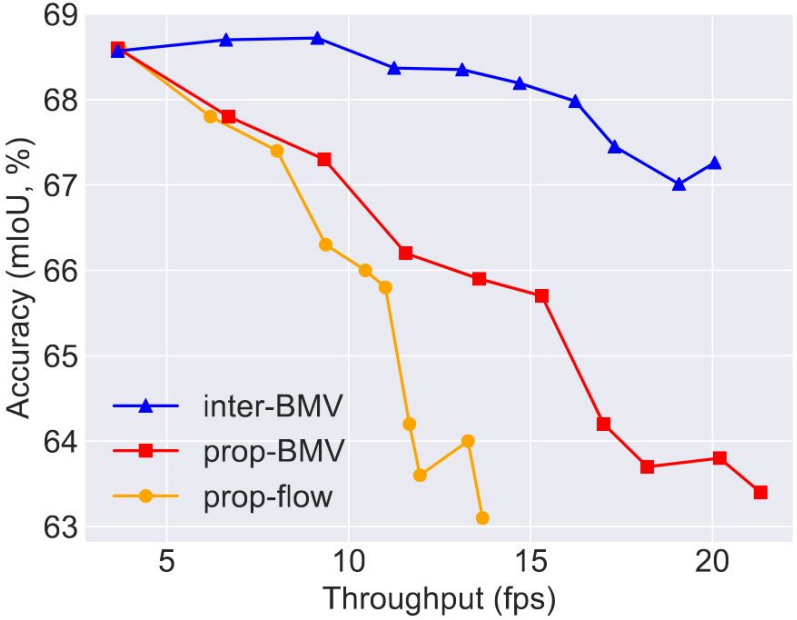
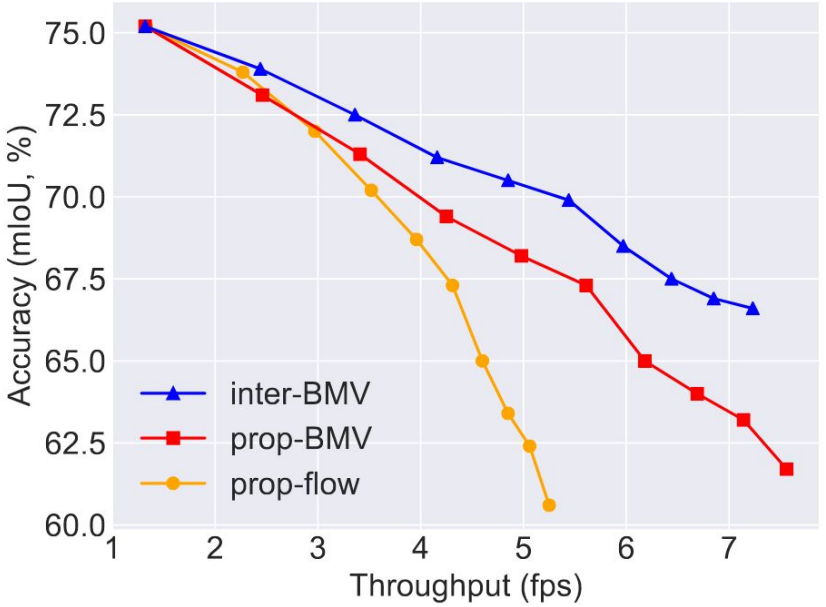


Figure 2: A sample runtime breakdown for a ResNet-101 DeepLab network. F is the optical flow net from Dosovitskiy et al. (2015). W is the warp operator. GPU: Tesla K80. Dataset: Cityscapes.

Interpolation with block-motion vectors



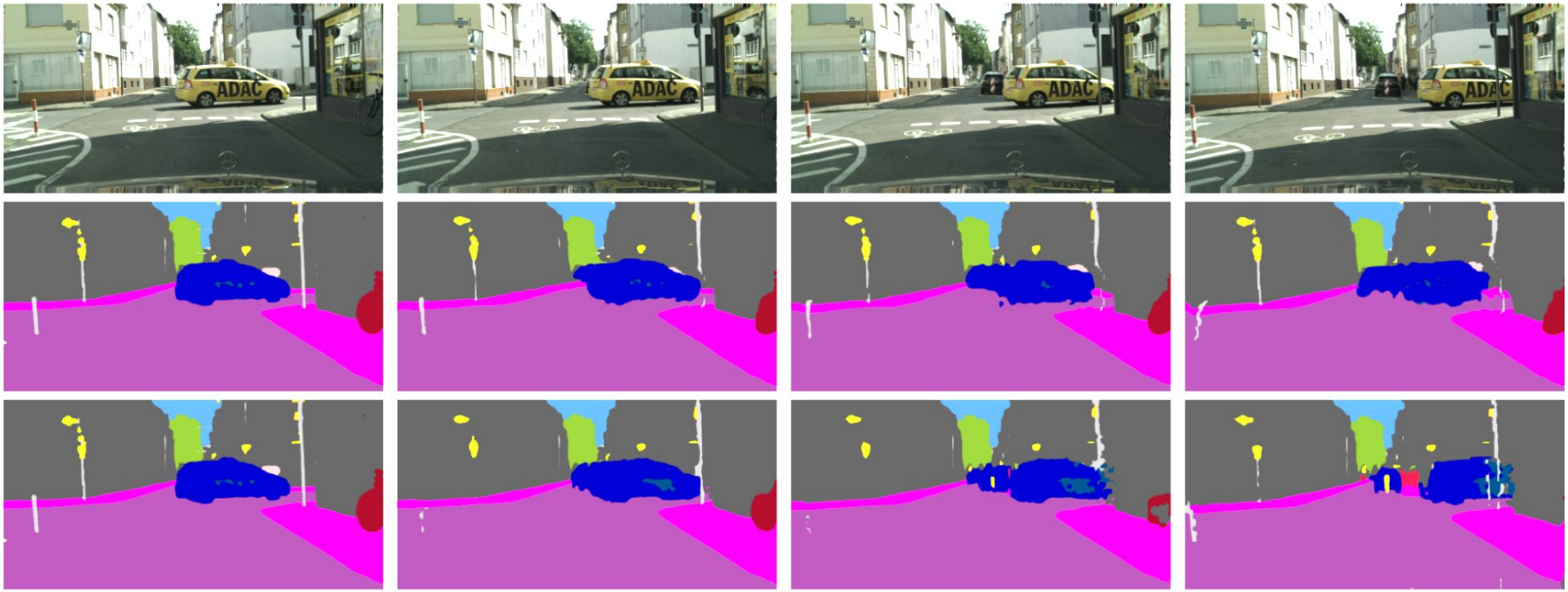
(a) **CamVid**. Data from Table 1.



(b) **Cityscapes**. Data from Table 3 (Appendix).

Figure 3: Accuracy (**avg.**) vs. throughput for all schemes on CamVid and Cityscapes.

Interpolation with block-motion vectors



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Next Meetup

Vienna Deep Learning Meetup

Save the date! (sign up tomorrow)

November 12, 2018
@ A1

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