

(Slide intentionally left blank.)

Hello 

Hello 

**My name is**

Hello 

My name is  
**Sebastian**

Hello 

My name is  
**Sebastian Muszyński**

# **Breaking News in ML**

# **Breaking News in ML**

**from last week**

# Breaking News in ML

from last weeks

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# Machine learning

Machine learning is the practice of teaching a computer to learn. The concept uses pattern recognition, as well as other forms of predictive algorithms, to make judgments on incoming data. This field is closely related to artificial intelligence and computational statistics.

Wikipedia Suggest edits

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## keras-team / keras

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		Latest commit 5e79743 6 hours ago
	taehoonlee and fchollet Clean up conv backend tests (#9478)	
	.github stale bot specifies 30 days when it posts (#6735)	9 months ago
	docker Update cuda & cudnn version for tensorflow 1.5 (#9237)	27 days ago
	docs #9287 Fix most of the file-handle resource leaks. (#9309)	21 days ago
	examples Remove word "shuffled" from comments in examples (#9453)	3 days ago
	keras Refactoring of ConvLSTM2D. Added ConvRNN2D and ConvLSTM2DCell. (#9094)	23 hours ago
	tests Clean up conv backend tests (#9478)	6 hours ago
	.coveragerc Increase test coverages by excluding several lines (#9428)	5 days ago
	.gitignore .gitignore visual studio code IDE excluded (#7070)	8 months ago
	.travis.yml Speed up Travis tests (#9386)	10 days ago
	CONTRIBUTING.md Update strings from Python 3.5 to 3.6 (#9062)	a month ago
	ISSUE_TEMPLATE.md updated links to point to the new new github repo (#8790)	2 months ago
	LICENSE Corrected copyright years (#9375)	13 days ago



# Machine Learning

## Authors and titles for recent submissions

- Fri, 23 Feb 2018
- Thu, 22 Feb 2018
- Wed, 21 Feb 2018
- Tue, 20 Feb 2018
- Mon, 19 Feb 2018

[ total of 173 entries: 1–25 | 26–50 | 51–75 | 76–100 | ... | 151–173 ]

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### Fri, 23 Feb 2018 (showing first 25 of 29 entries)

[1] [arXiv:1802.08246](#) [pdf, other]

#### Characterizing Implicit Bias in Terms of Optimization Geometry

Suriya Gunasekar, Jason Lee, Daniel Soudry, Nathan Srebro

Subjects: Machine Learning (stat.ML); Learning (cs.LG)

[2] [arXiv:1802.08183](#) [pdf, other]

#### Projection-Free Online Optimization with Stochastic Gradient: From Convexity to Submodularity

Lin Chen, Christopher Harshaw, Hamed Hassani, Amin Karbasi

Subjects: Machine Learning (stat.ML); Artificial Intelligence (cs.AI); Data Structures and Algorithms (cs.DS); Learning (cs.LG)

[3] [arXiv:1802.08167](#) [pdf, other]

#### Learning Causally-Generated Stationary Time Series

Wessel Bruinsma, Richard E. Turner

Comments: 13 pages, 7 figures, 2 tables, includes appendices

Subjects: Machine Learning (stat.ML)

[86] [arXiv:1802.07088](#) (cross-list from cs.LG) [[pdf](#), [other](#)]

### **i-RevNet: Deep Invertible Networks**

[Jörn-Henrik Jacobsen](#) (lvl), [Arnold Smeulders](#) (lvl), [Edouard Oyallon](#) (CVN, GALEN, SEQUEL, DI-ENS)

Journal-ref: ICLR 2018 – International Conference on Learning Representations, Apr 2018, Vancouver, Canada. 2018, \&

Subjects: [Learning](#) (cs.LG); Computer Vision and Pattern Recognition (cs.CV); Machine Learning (stat.ML)

## ***i*-REVNET: DEEP INVERTIBLE NETWORKS**

**Jörn-Henrik Jacobsen** <sup>†‡</sup>, **Arnold Smeulders** <sup>†</sup>, **Edouard Oyallon** <sup>§</sup>

<sup>†</sup>University of Amsterdam

[joern.jacobsen@bethgelab.org](mailto:joern.jacobsen@bethgelab.org)

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## i-RevNet Pytorch Code

2 commits

1 branch

0 releases

1 contributor

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Branch: master ▾

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Latest commit 9a93eb5 5 days ago

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# Inspiration: reversible residual network (RevNet)

Gomez et al. (2017)

**Problem with RevNet:  
the use of multiple non-invertible operators**

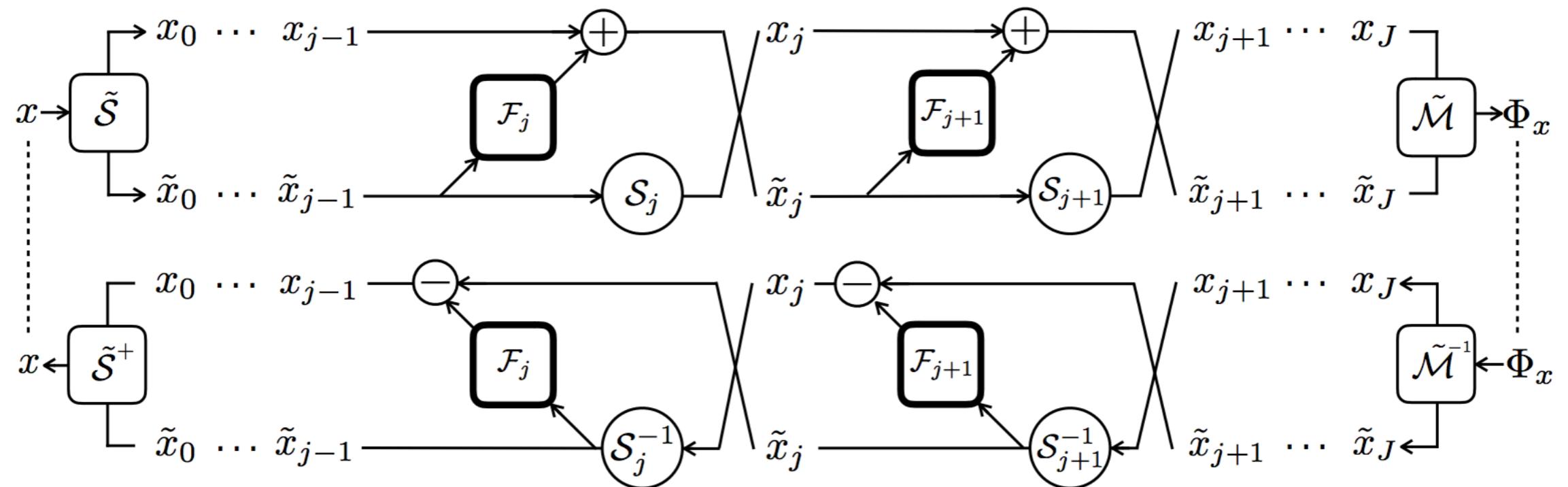
# **Problem with RevNet: the use of multiple non-invertible operators**

e.g. max-pooling, downsampling

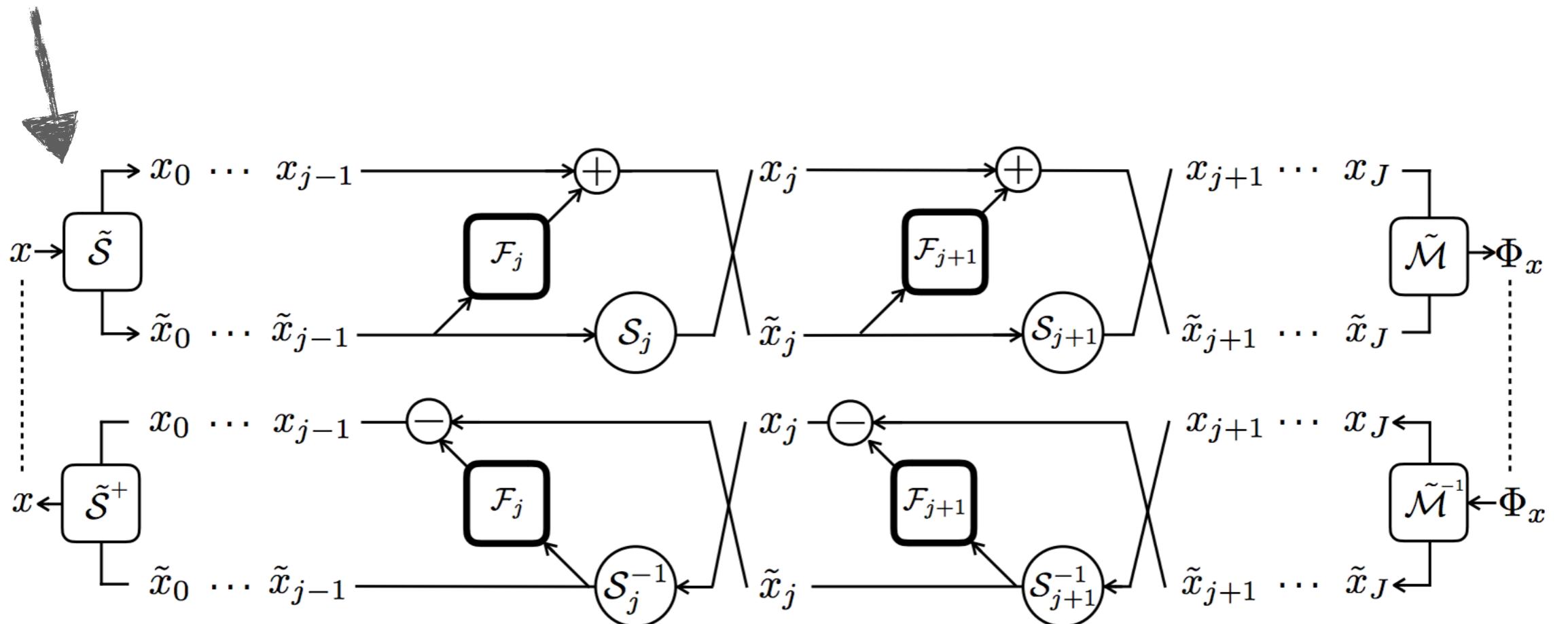
**RevNets are not invertible by construction**

**i**-RevNets are ~~not~~ invertible by construction

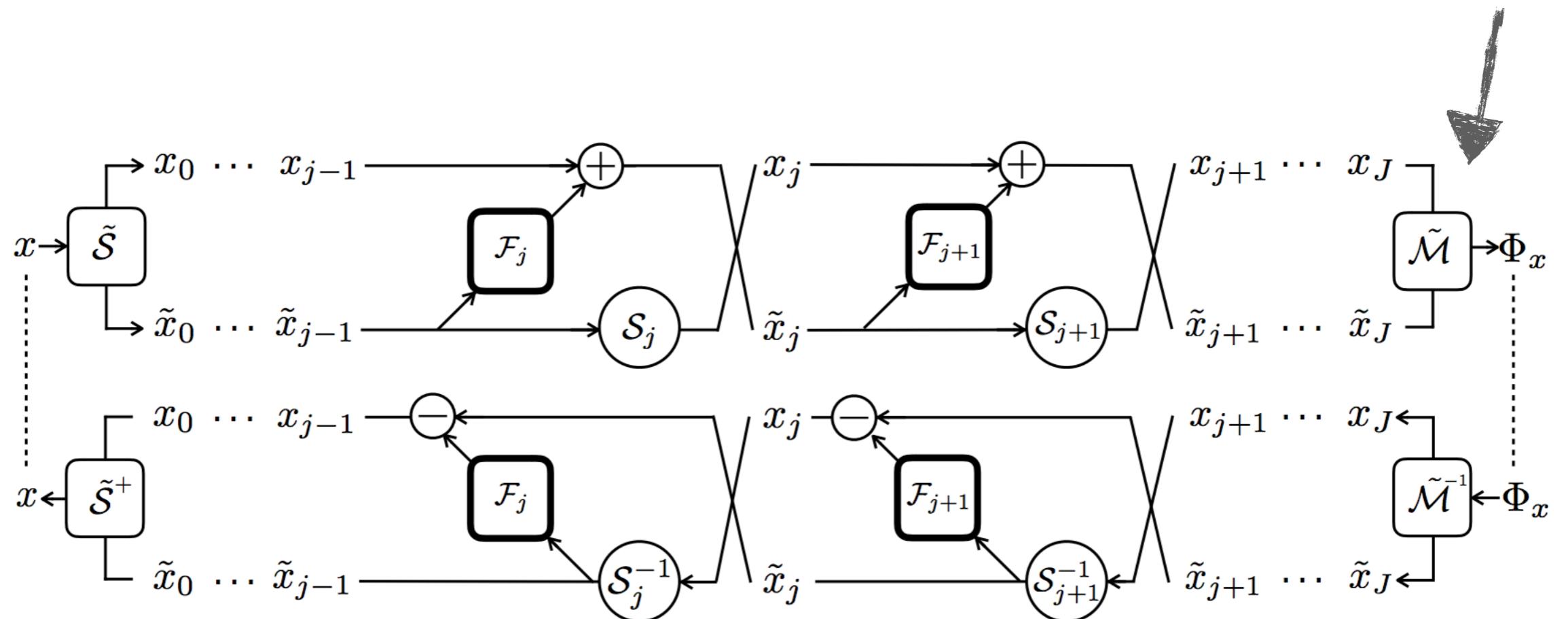
## The architecture of i-RevNet:



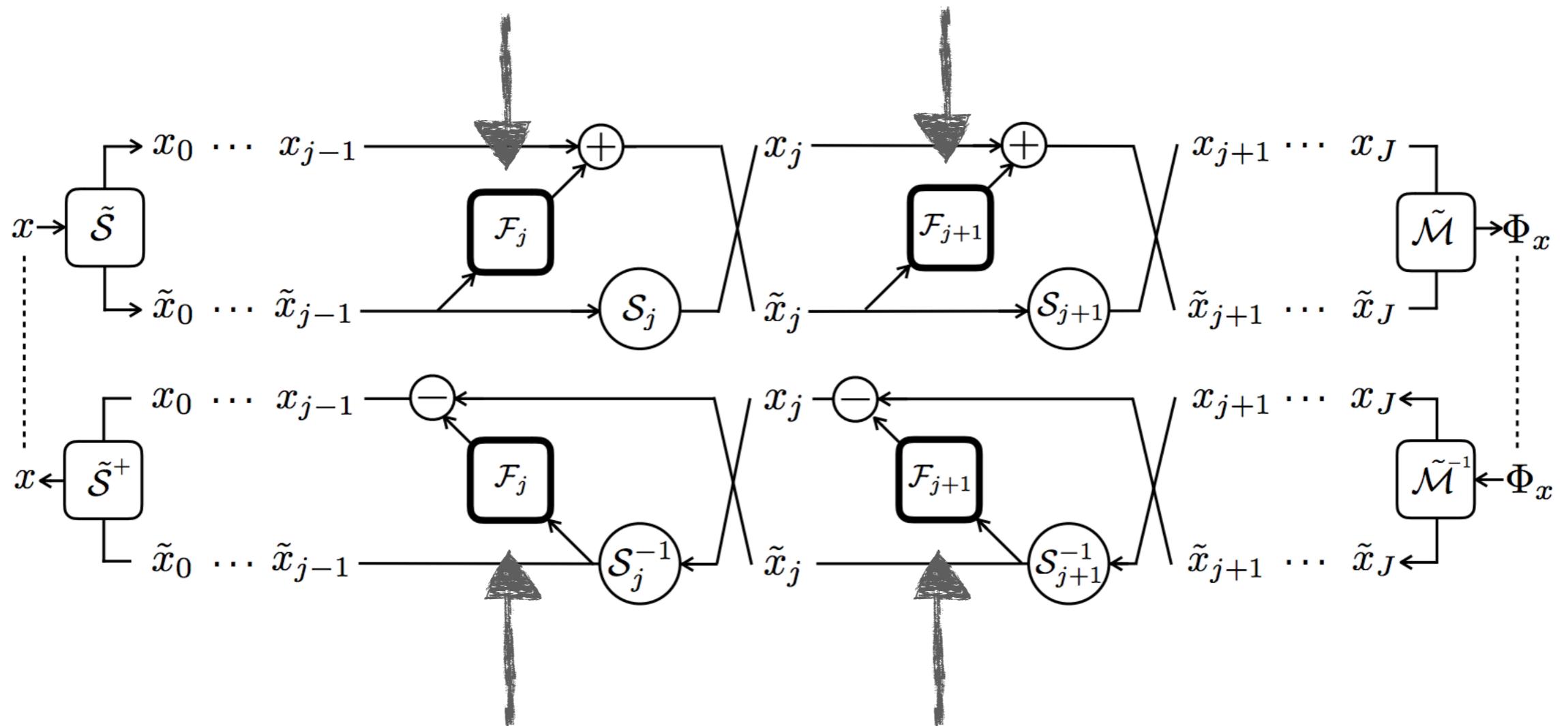
**input** is processed through  
a splitting operator



**output** is merged through  
a merging operator

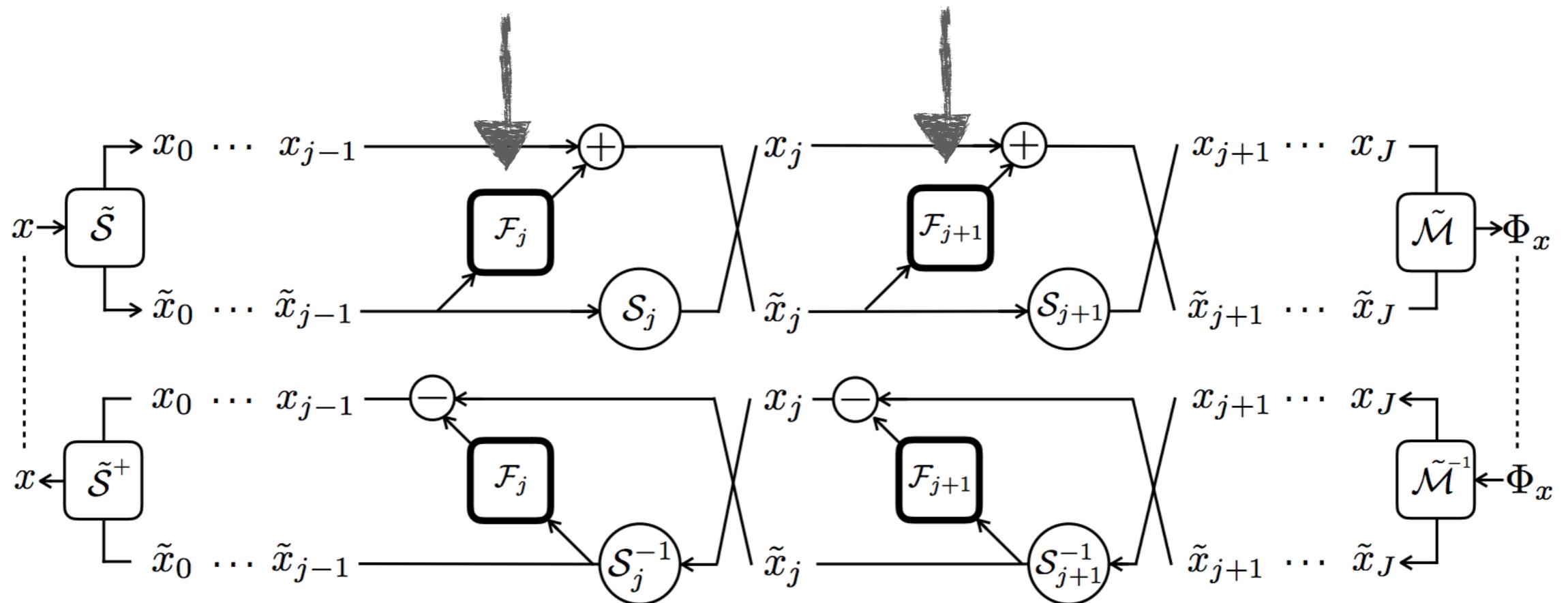


## convolutional bottlenecks



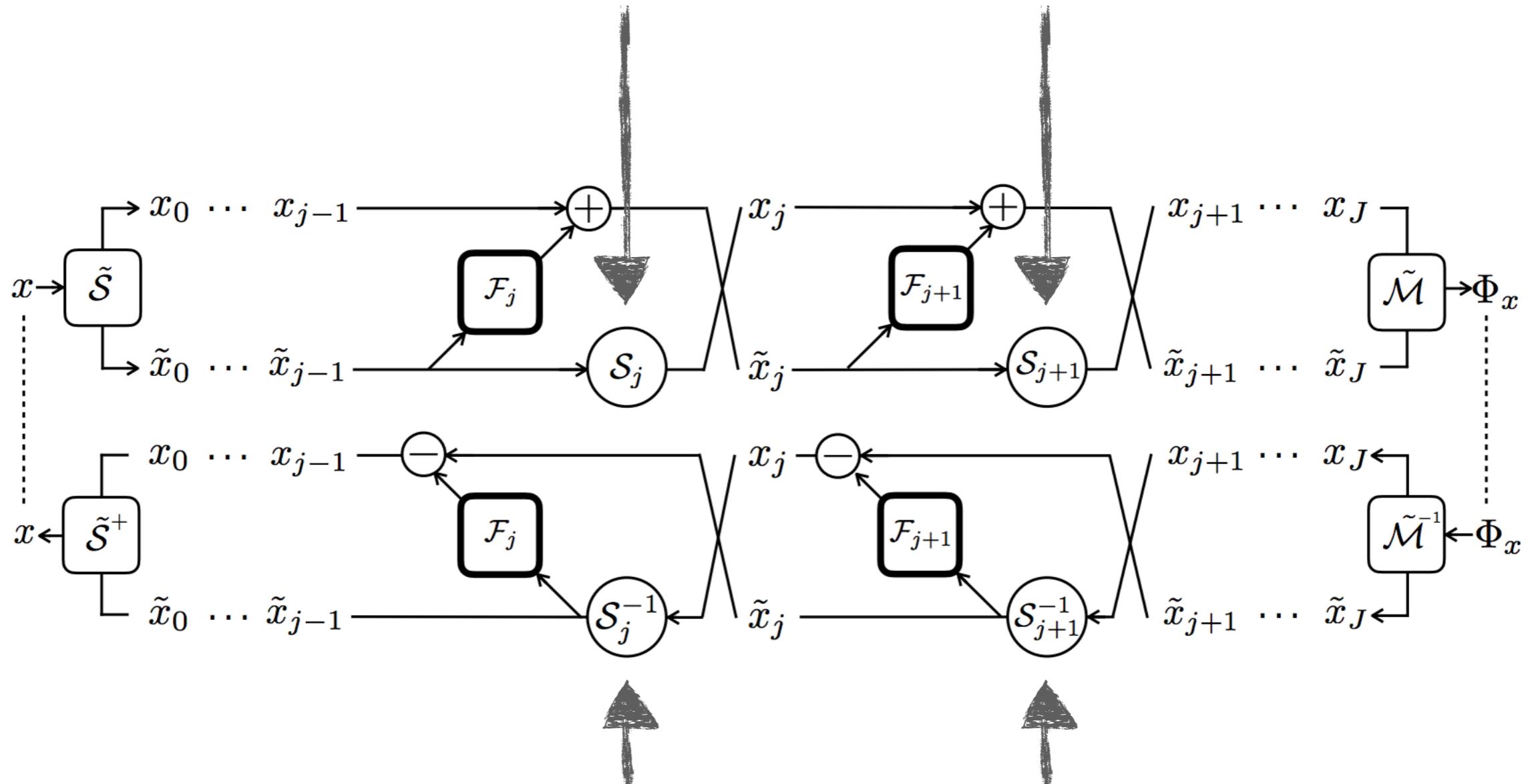
convolutional bottlenecks

## convolutional bottlenecks



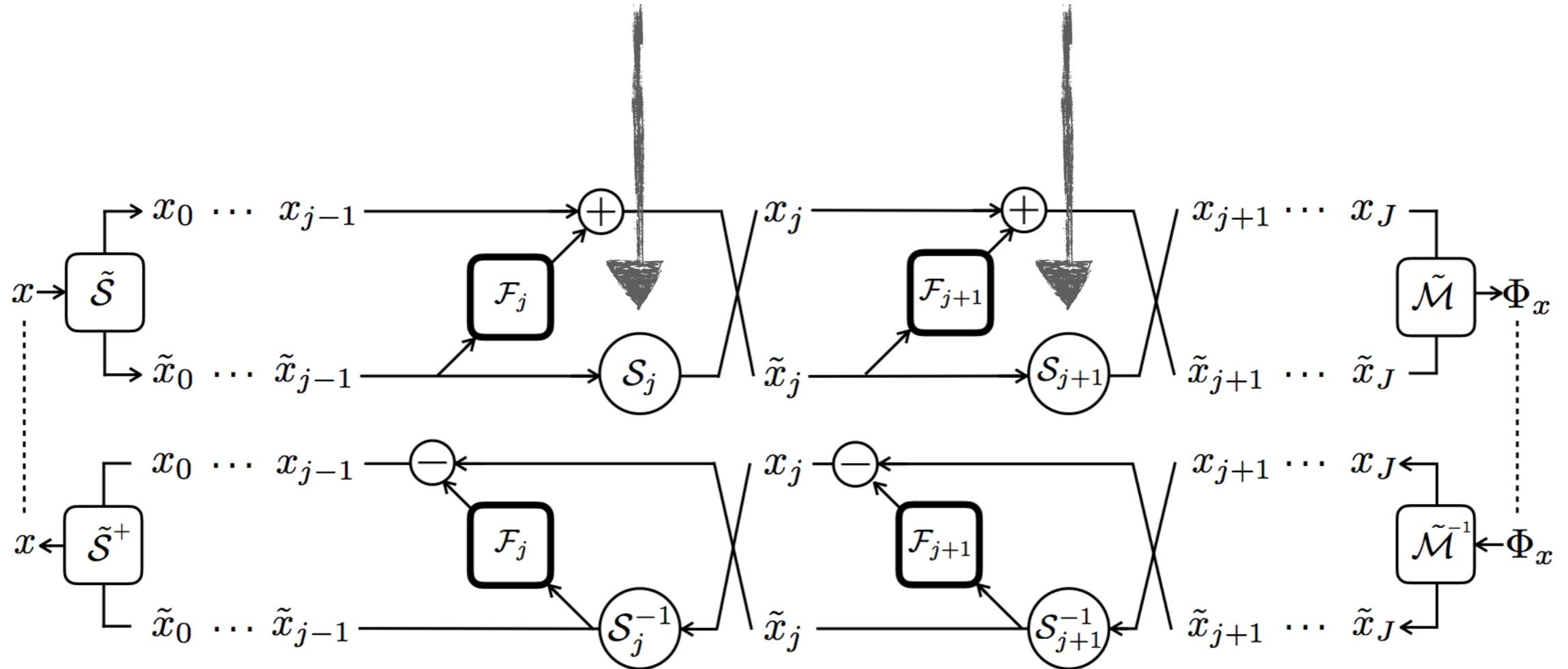
a succession of **3 convolutional operators**, each preceded by  
**Batchnormalization** (Ioffe & Szegedy, 2015) and **ReLU** non-linearity

## reshuffling operations

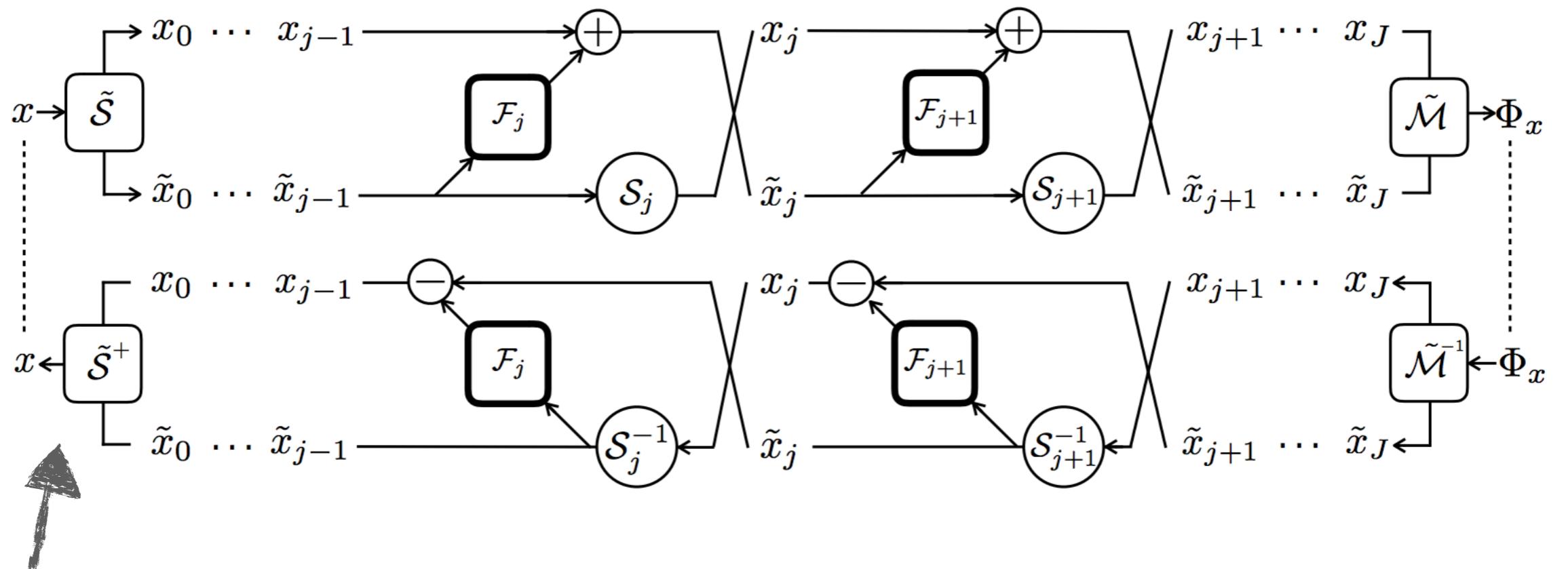


reshuffling operations

## reshuffling operations

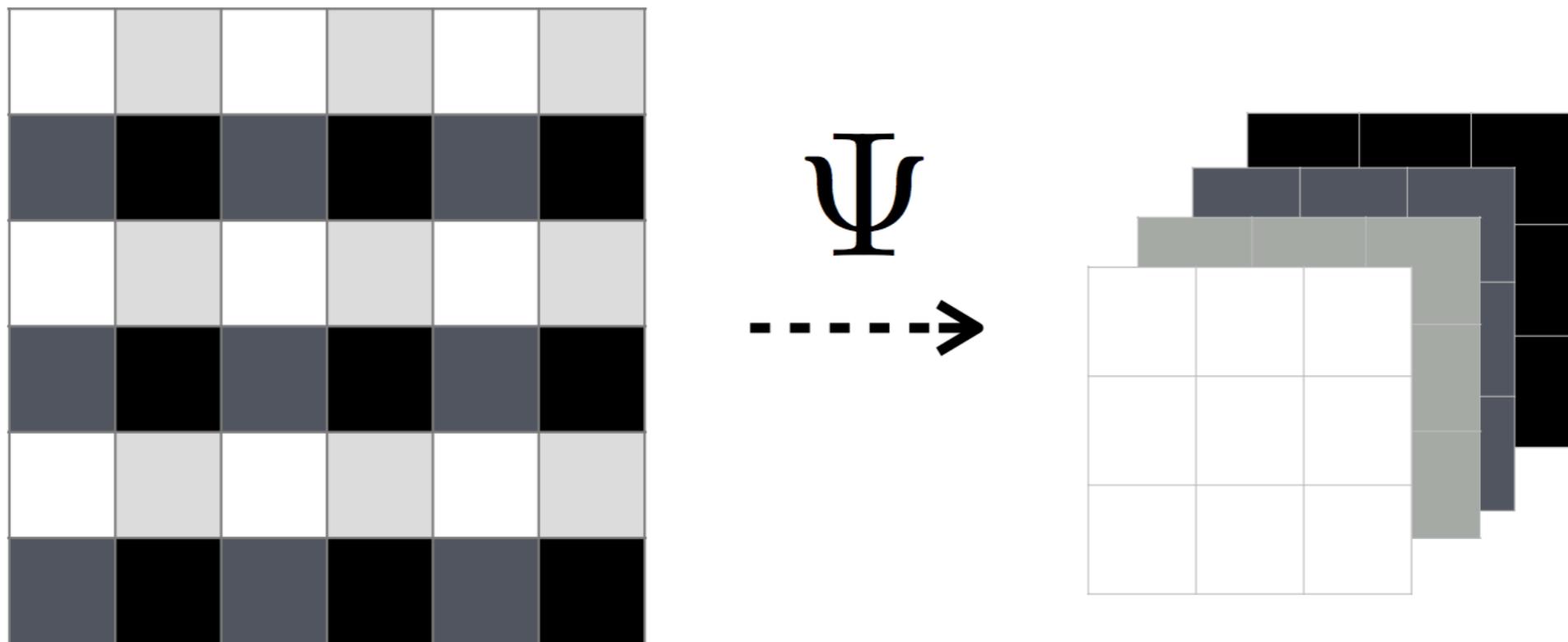


used to ensure **invertibility** of the architecture  
and **computational efficiency**



a pseudo-inverse operator  
is used for inversion

# Invertible down-sampling



# Training on ImageNet

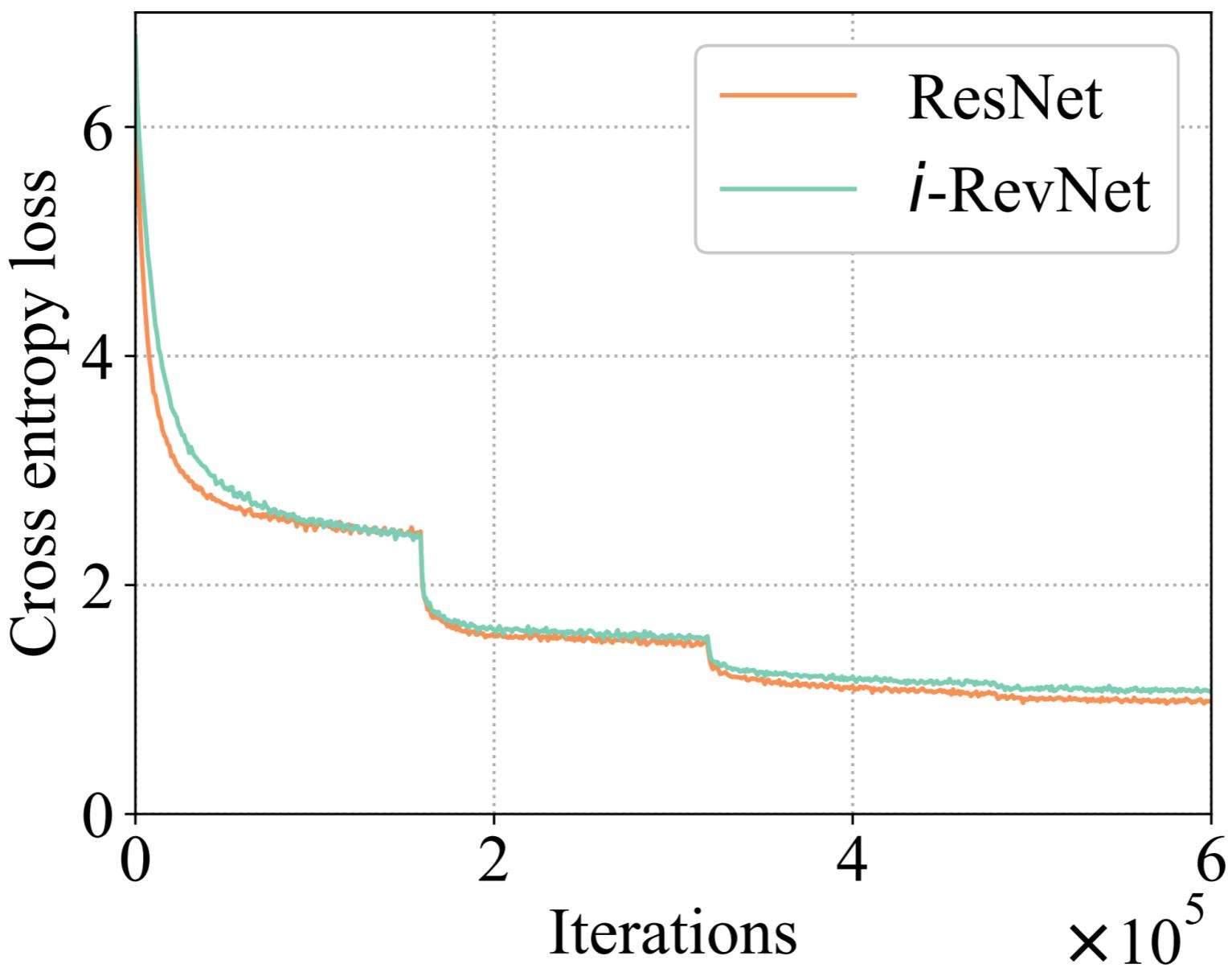




Figure 5: This graphic displays several reconstructed sequences  $\{x^t\}_t$ . The left image corresponds to  $x^0$  and the right image to  $x^1$ .

# Imagenet ILSVRC-2012 Results

i-RevNets perform on par with baseline RevNet and ResNet.

Model:	ResNet	RevNet	i-RevNet (a)	i-RevNet (b)
Val Top-1 Error:	24.7	25.2	24.7	26.0



reconstructed from final representation

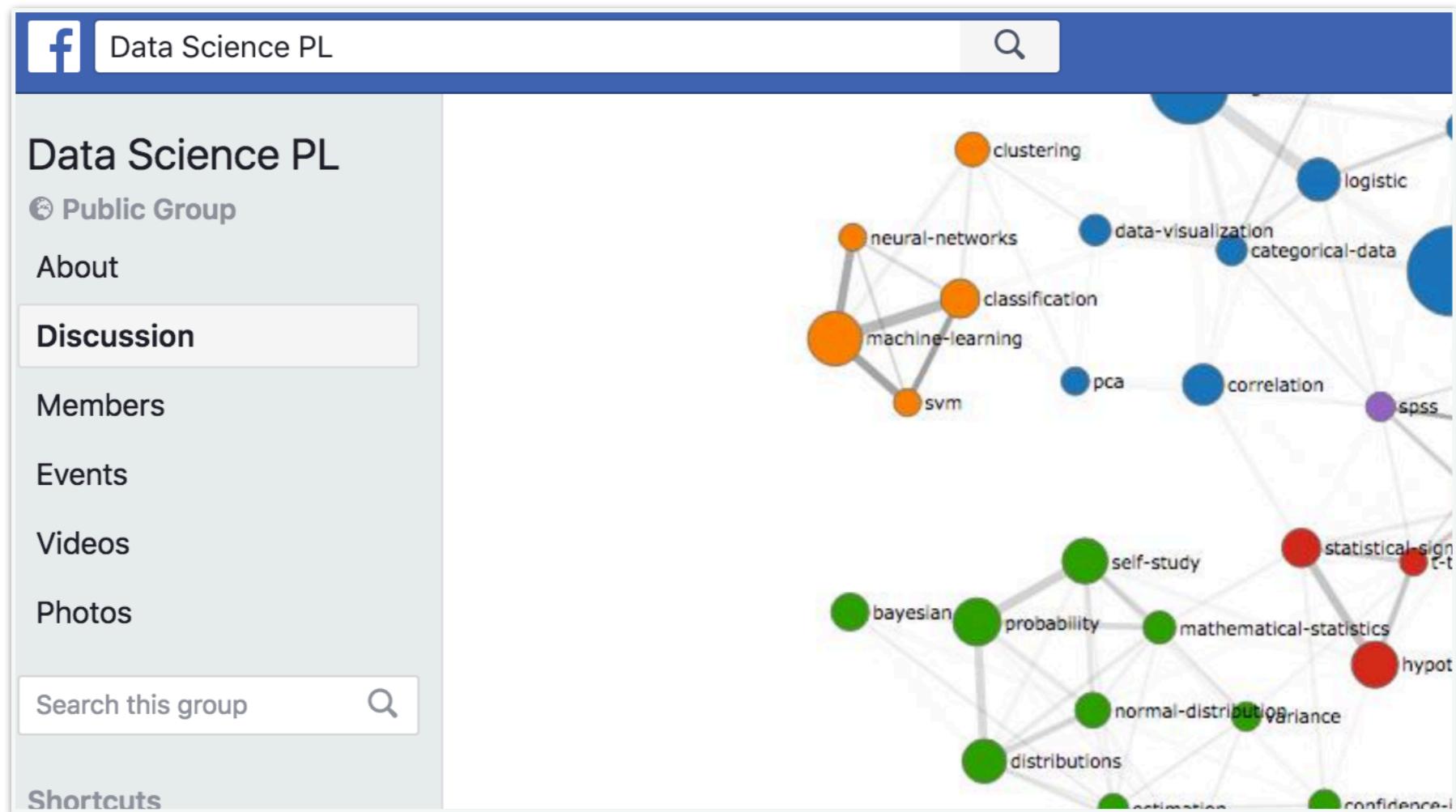
# Imagenet ILSVRC-2012 Results

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Model:	ResNet	RevNet	i-RevNet (a)	i-RevNet (b)
Val Top-1 Error:	24.7	25.2	24.7	26.0



reconstructed from final representation



shared a link.

February 16 at 12:04pm

...

Ogadaliście kiedyś seriale CSI? Kojarzycie hasło "enhance a reflection"?

W TEONITE zrobiliśmy aplikację (na podstawie badań naukowych o machine learning), która pozwala na powiększanie zdjęć i zachowanie dobrej jakości.

Framework: Keras (API wysokiego poziomu napisane w Python dla splotowych sieci neuronowych TensorFlow i Theano)

#python #machinelearning



## TEONITE | Deep Image - powiększ grafikę i zachowaj dobrą jakość

Stworzyliśmy aplikację Deep Image. Dzięki zastosowaniu machine learning powiększysz grafikę z zachowaniem dobrej jakości

TEONITE.COM

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58

DEEP IMAGE

POWERED BY:  
TEONITE



Enhancer



How it's done?



My images



## » ENHANCE AN IMAGE «

SELECT IMAGE FILE

CHOOSE ONE OR MORE FILTERS:

x Resize

x ▾

RESIZE FACTOR:

2x

x ▾

E-MAIL (OPTIONAL):

GO!



## **MANUAL: 0.5X RESIZE**





UNPROCESSED IMAGE (MAGNIFIED BY BROWSER)

PROCESSED IMAGE (RESIZE 2X)



```
);c.prototype.setPinnedOffset=c.prototype.getPinnedOffset=
```

## **MANUAL: 0.25X RESIZE**







[letsenhance.io](https://letsenhance.io)

# Machine learning for visual content

State of art neural networks to help your work



## Fix the JPEG

Got only JPEG original? All blocky noise is detected and removed automatically

## Upscale images 4 times

Boost resolution 4x times, keep edges and features sharp and crisp.

## Add missing image details

Neural network hallucinates missing details to make image look natural.









# Resources:

- **i-REVNET: DEEP INVERTIBLE NETWORKS**  
<https://arxiv.org/pdf/1802.07088.pdf>
- <https://github.com/jhjacobsen/pytorch-i-revnet>
- FB Group: **Data Science PL**
- **DEEP IMAGE**  
<https://deep-image.teonite.com>
- <https://github.com/alexjc/neural-enhance>
- <https://letsenhance.io>
- **Accelerating the Super-Resolution Convolutional Neural Network**  
<https://arxiv.org/pdf/1608.00367.pdf>

Thank you.