Object Recognition by Deep Learning

By: Mohsen Valizade

Supervisor: Dr.Shanbehzadeh

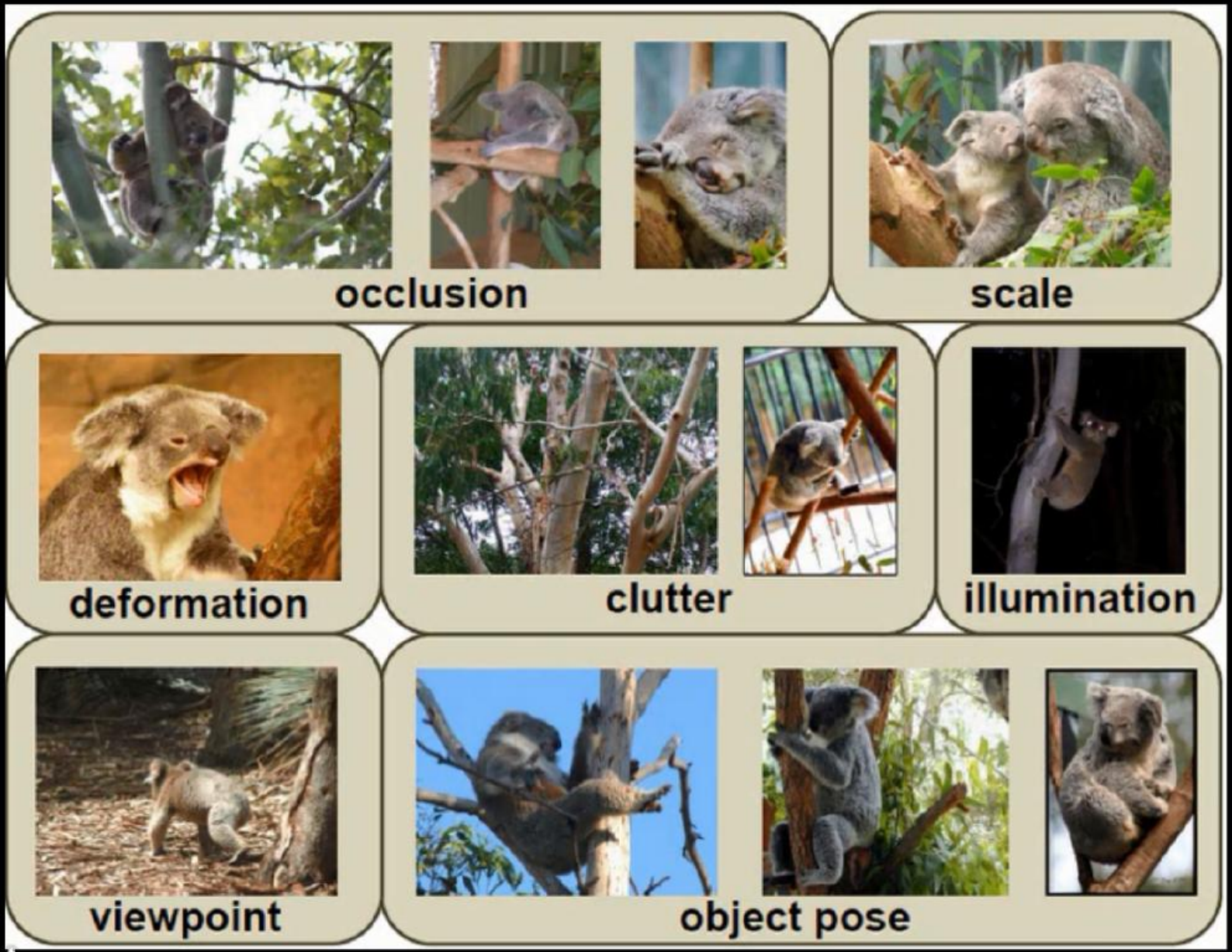
2015

Outline

- introduction
- challenges
- shallow methods
- Deep methods
- conclusion

introduction

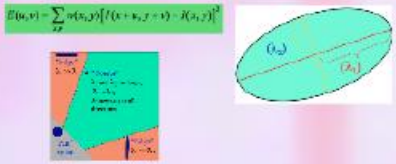
challenges




Outline
Prezi

shallow methods

Harris



Harris, Chris, and Mike Stephens. "A combined corner and edge detector." Alvey vision conference. Vol. 15. 1988.

4/14

2004

HOG
(Histogram Of Gradient)

Dalal, Navneet, and Bill Triggs. "Histograms of oriented gradients for human detection." Computer Vision and Pattern Recognition, 2005. CVPR 2005. IEEE Computer Society Conference on. Vol. 1. IEEE, 2005.

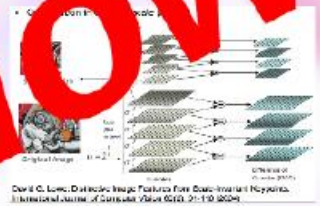
6/14

2008

1988

2005

SIFT



David G. Lowe. "Distinctive image features from scale-invariant keypoints." International journal of computer vision 60.2 (2004): 91-110.

5/14

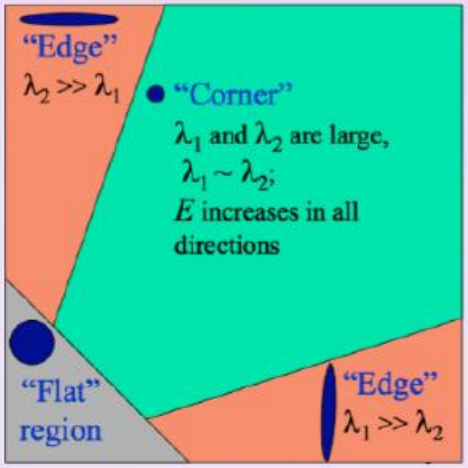
DPM
(Deformable Part Model)

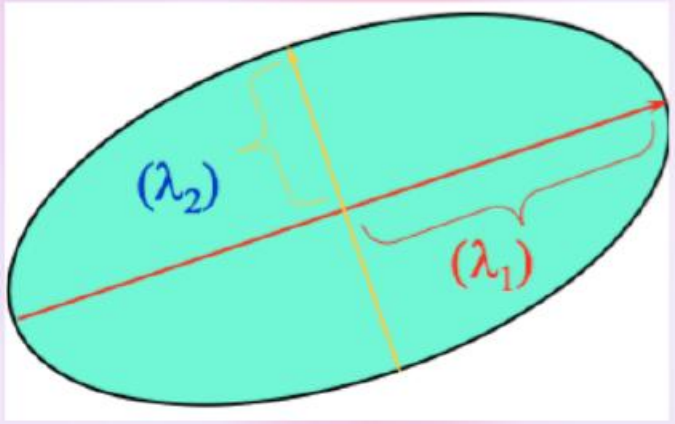
Felzenszwalb, Pedro, David McAllester, and Deva Ramanan. "A discriminatively trained, multiscale, deformable part model." Computer Vision and Pattern Recognition, 2008. CVPR 2008. IEEE Conference on. IEEE, 2008.

7/14

Harris

$$E(u,v) = \sum_{x,y} w(x,y)\left[I(x+u, y+v) - I(x,y)\right]^2$$





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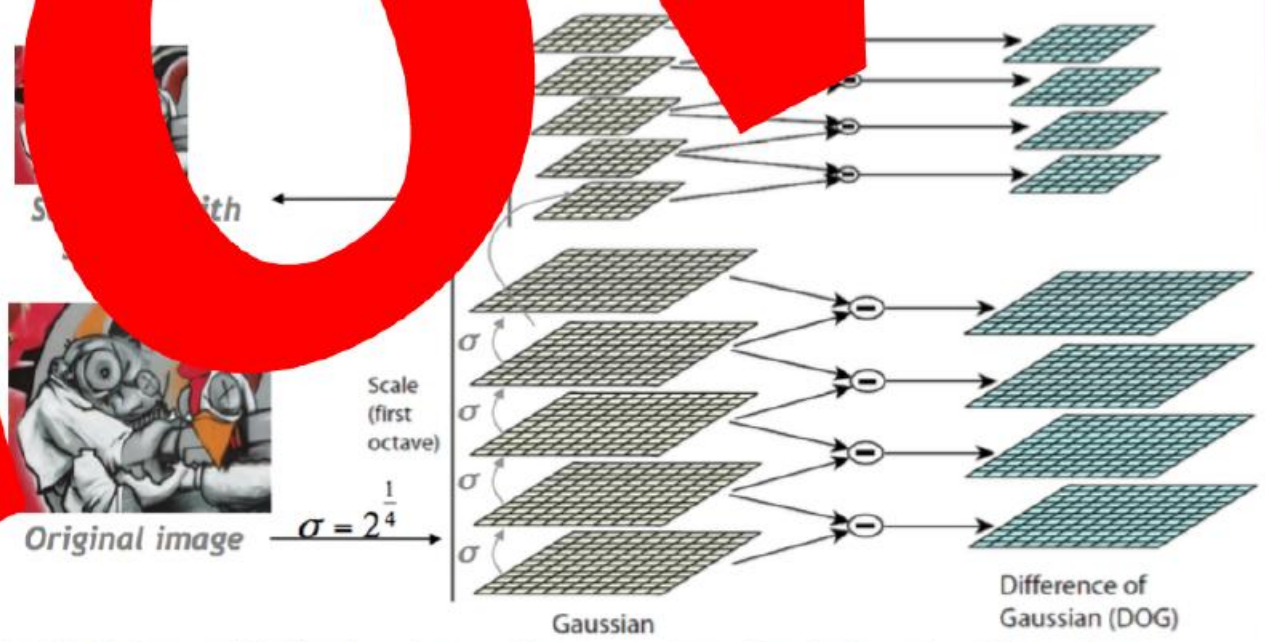
- Co…tion in …scale p…



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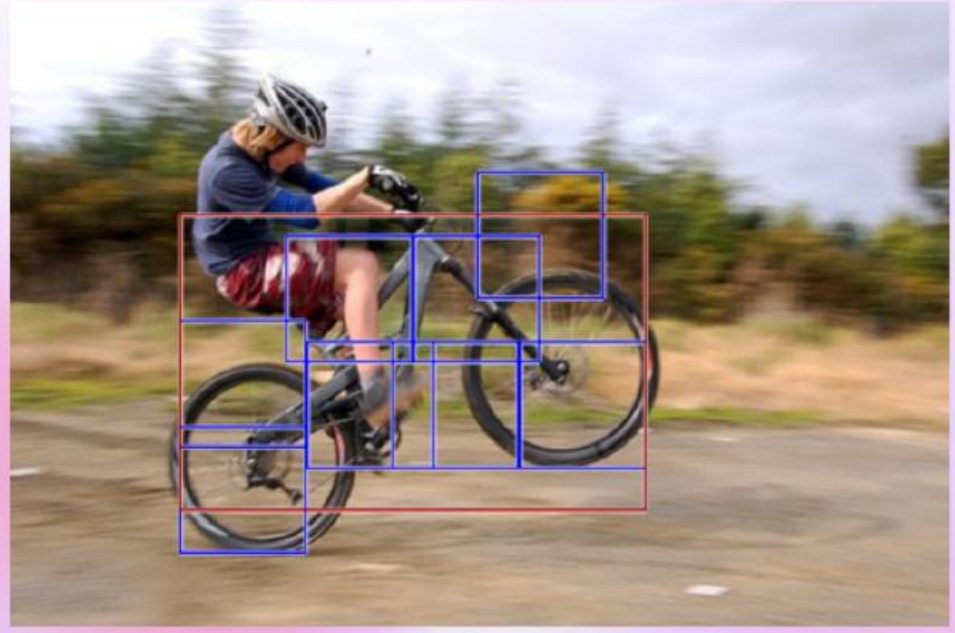

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shallow methods

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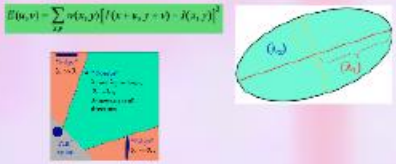

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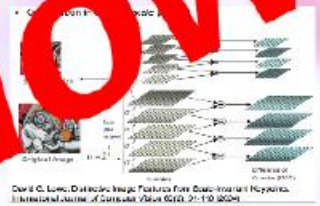

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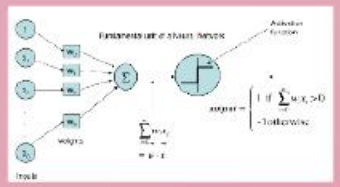
7/14


Outline
Prezi

Deep methods

Perceptron

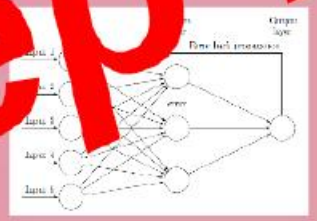


8/14

1957

1980

ckpr gation



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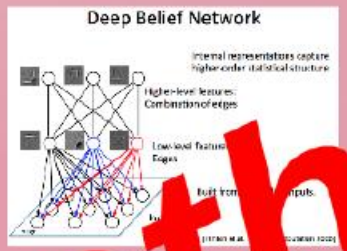
2006

DBN



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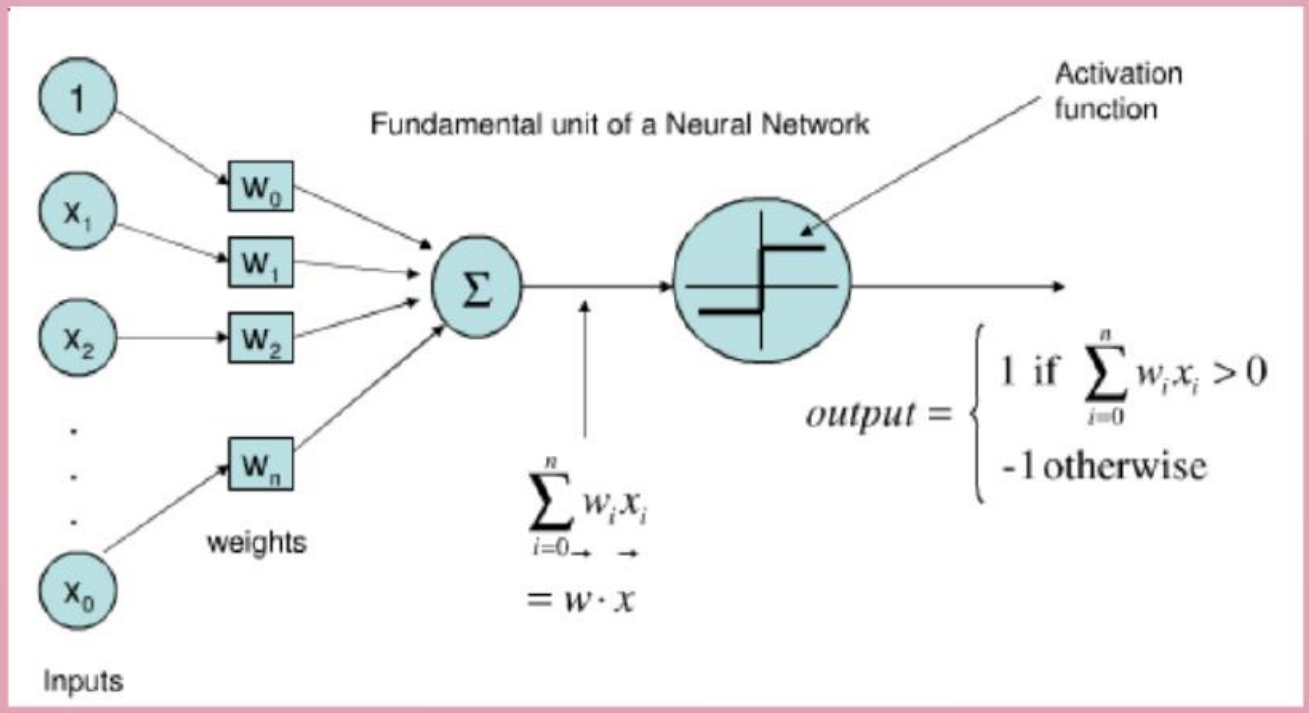
2012

CNN
(convolutional neural network)

11/14

Perceptron



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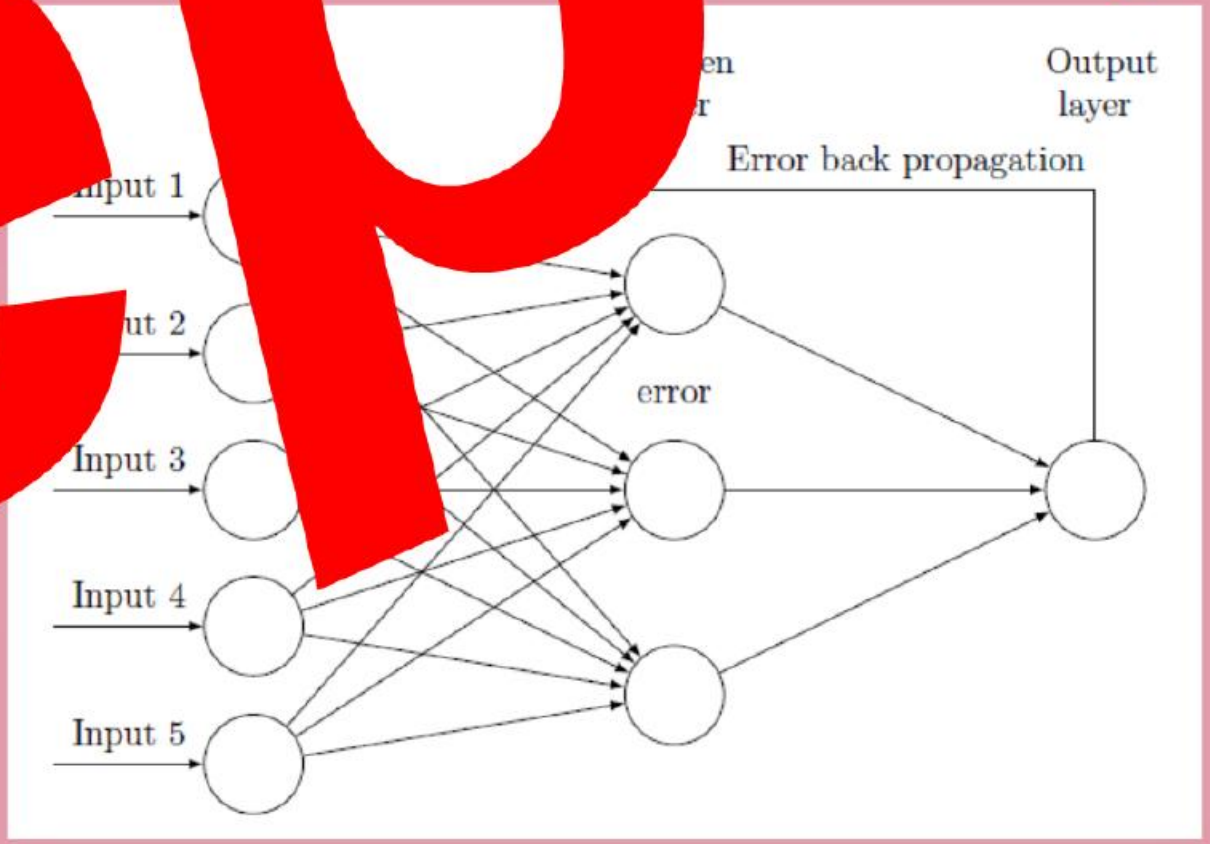
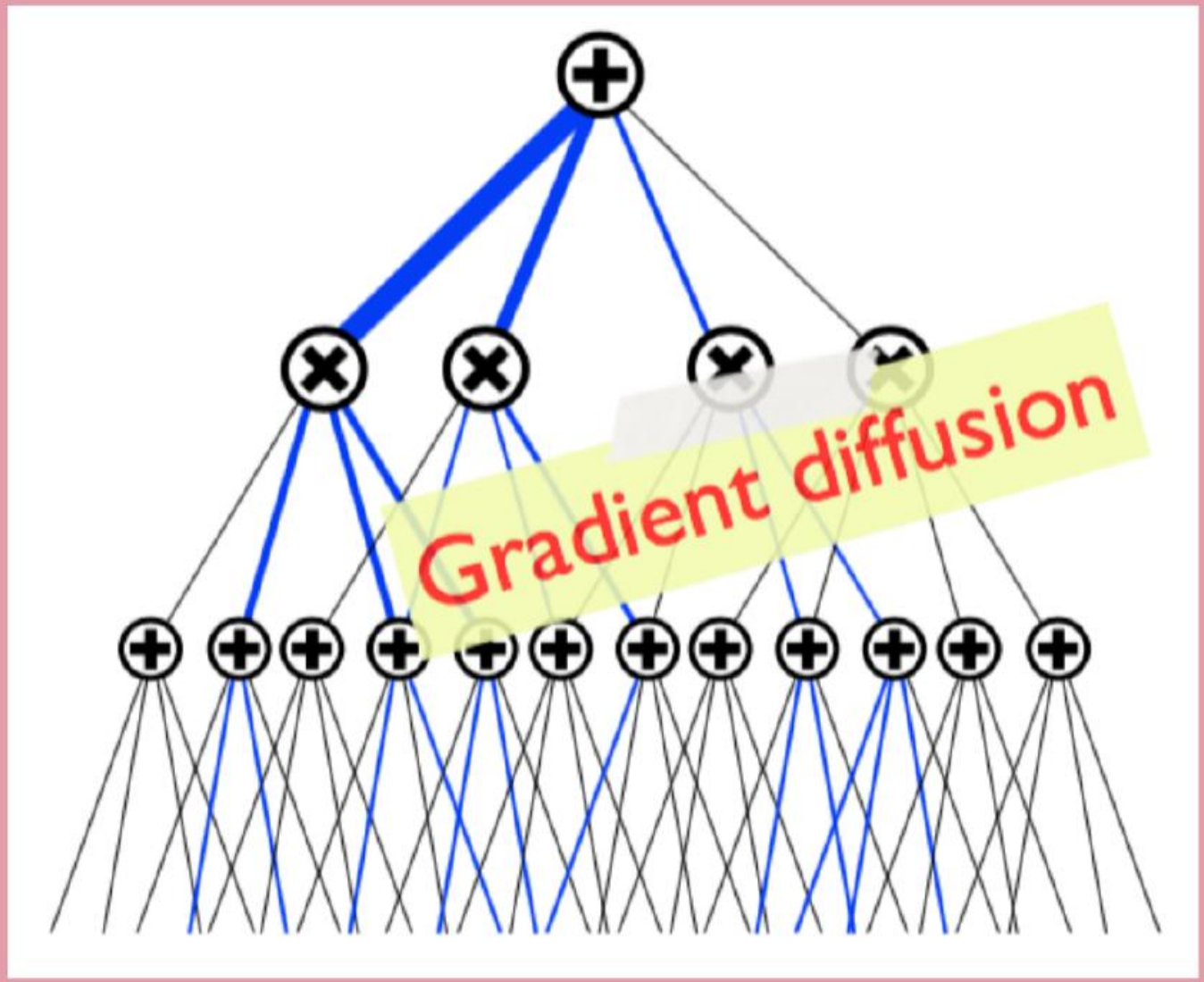
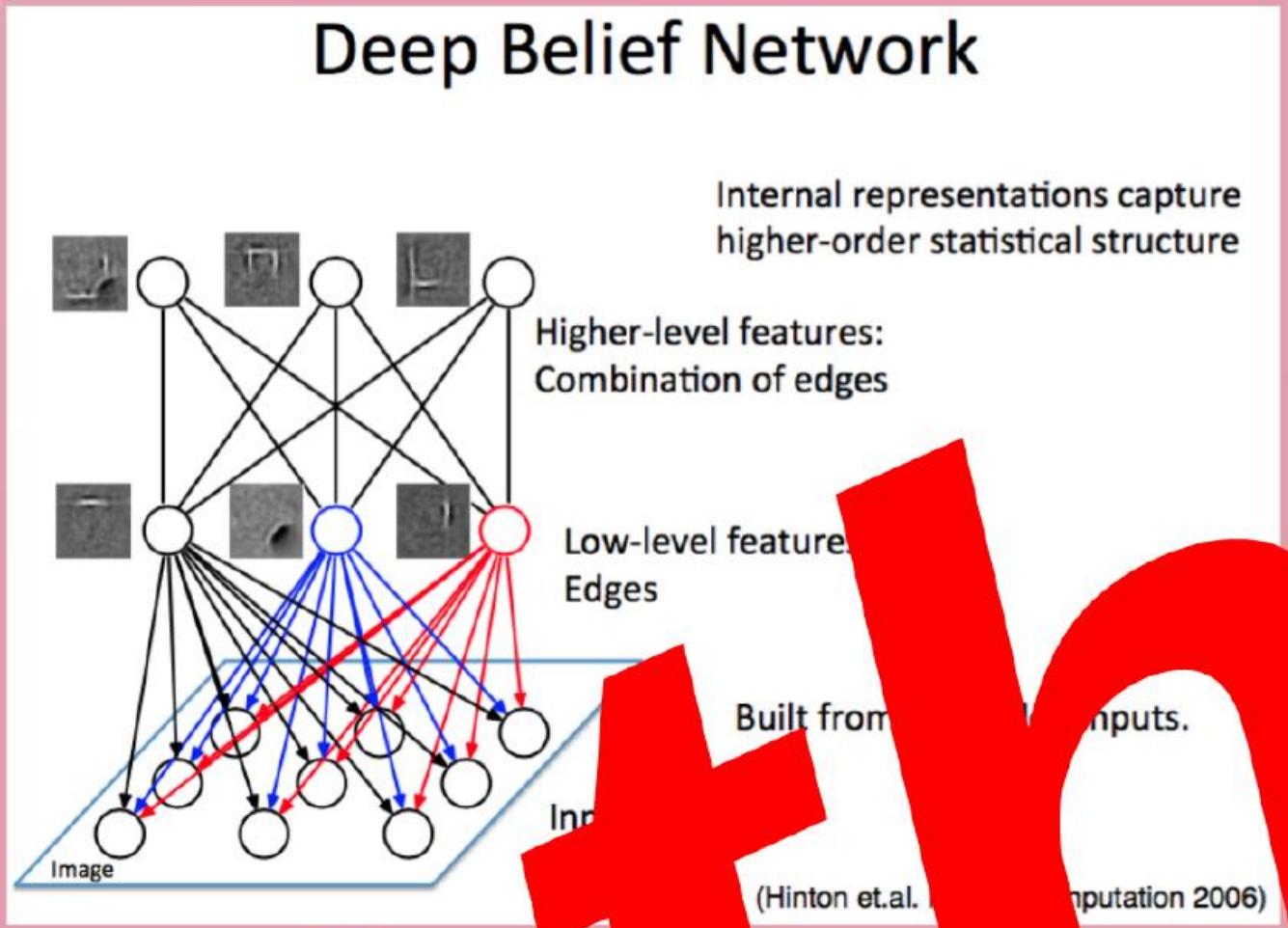


Why stop algorithm?

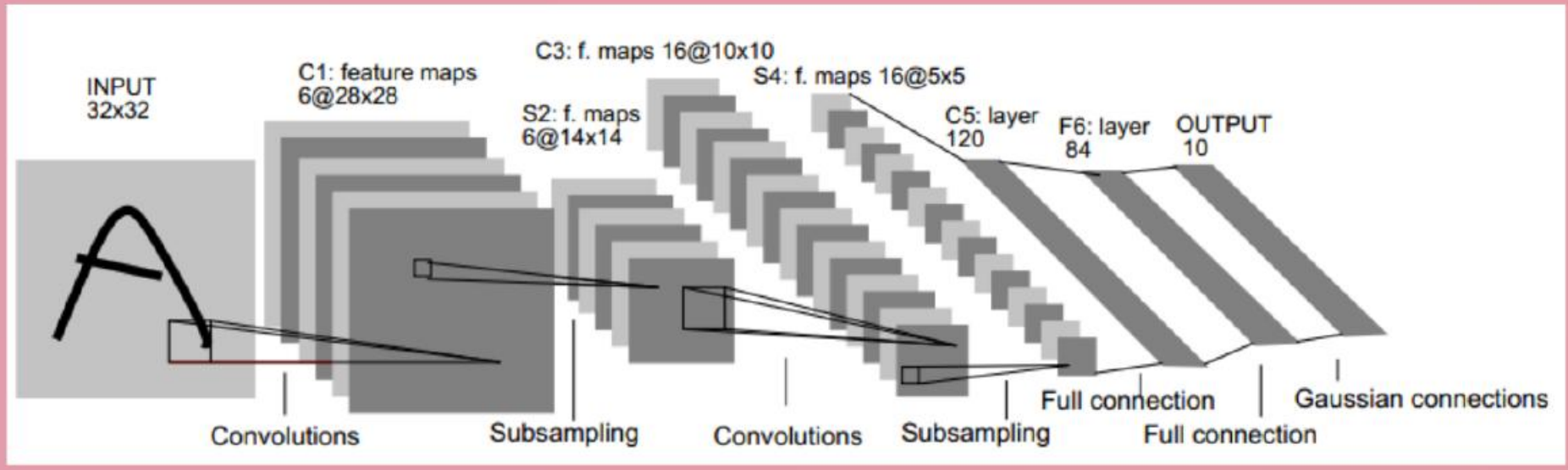


DBN

Deep Belief Network



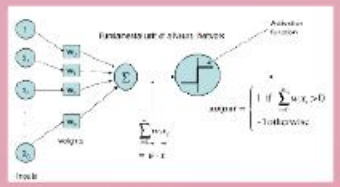
CNN
(convolutional neural network)



Krizhevsky, Alex, Ilya Sutskever, and Geoffrey E. Hinton. "Imagenet classification with deep convolutional neural networks." Advances in neural information processing systems. 2012.

Deep methods

Perceptron



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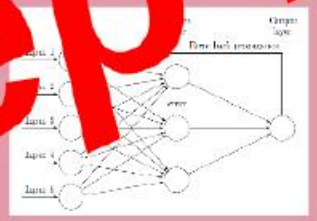

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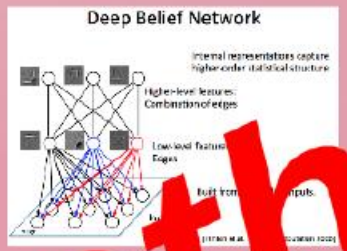

9/14

2012

CNN
(convolutional neural network)

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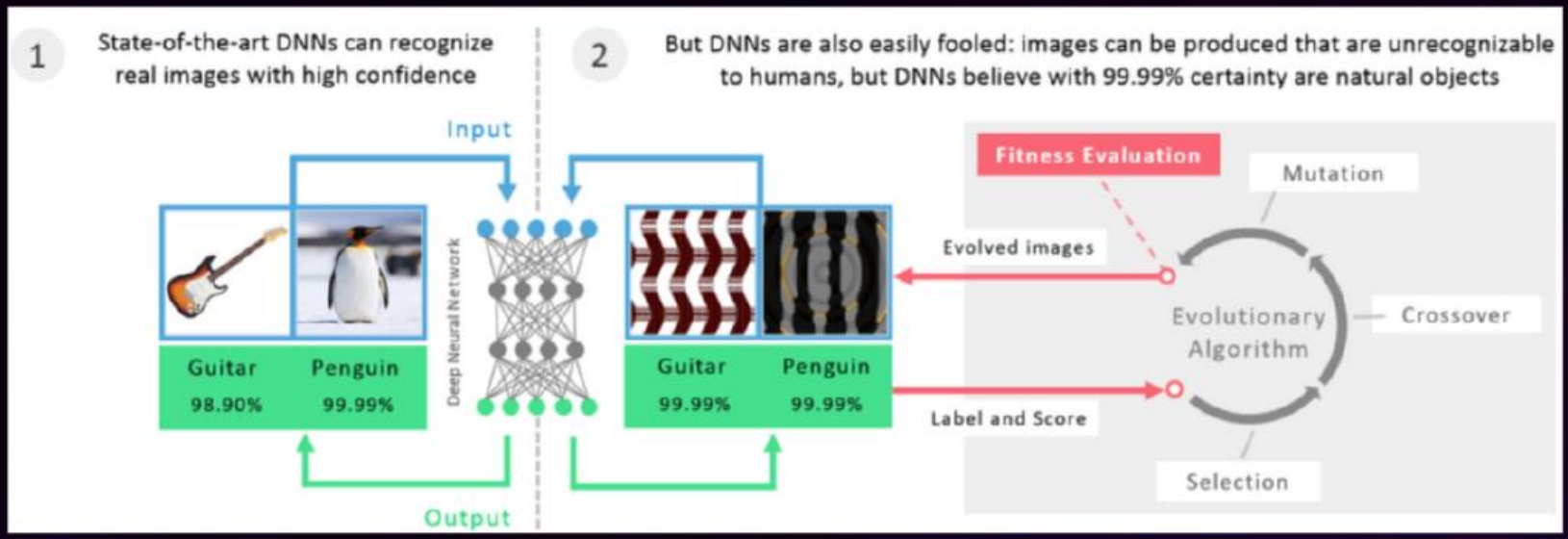
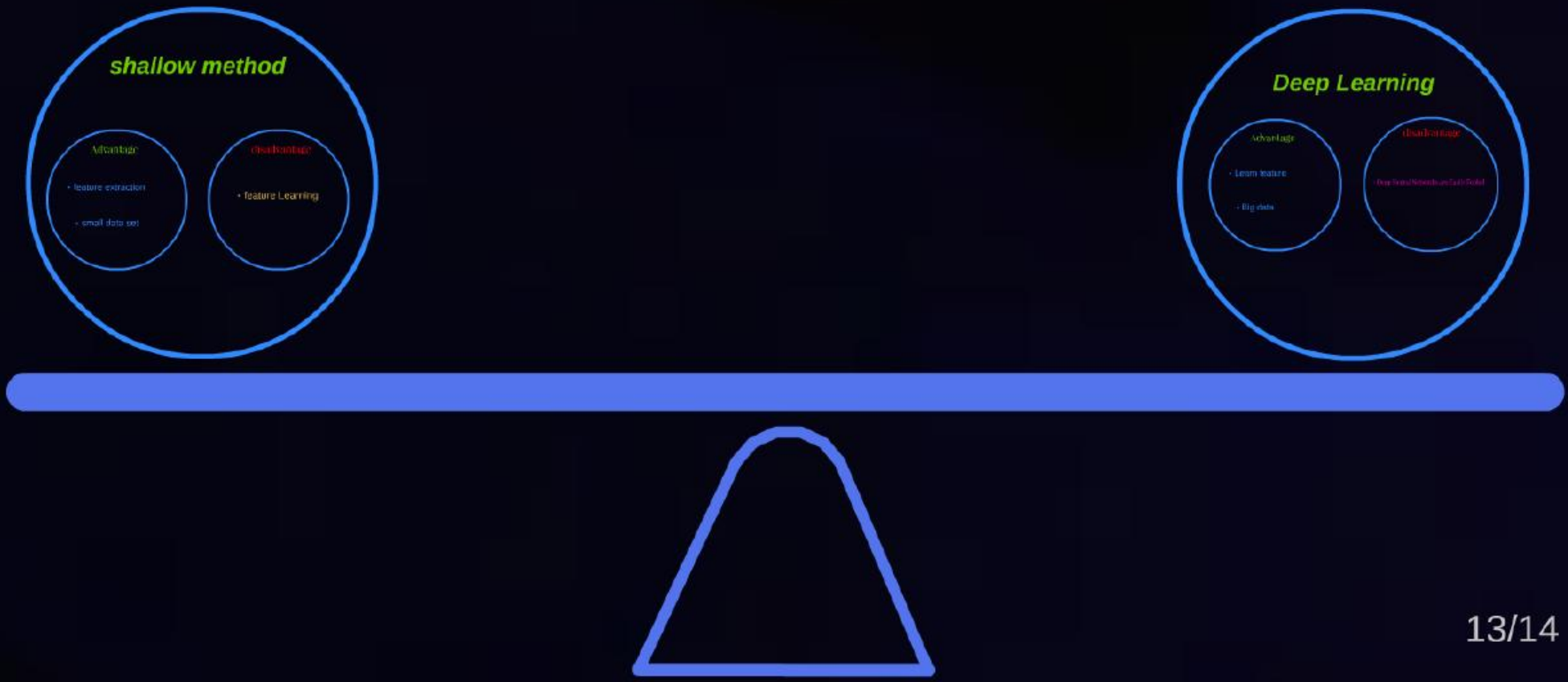
Future works & Open Issues

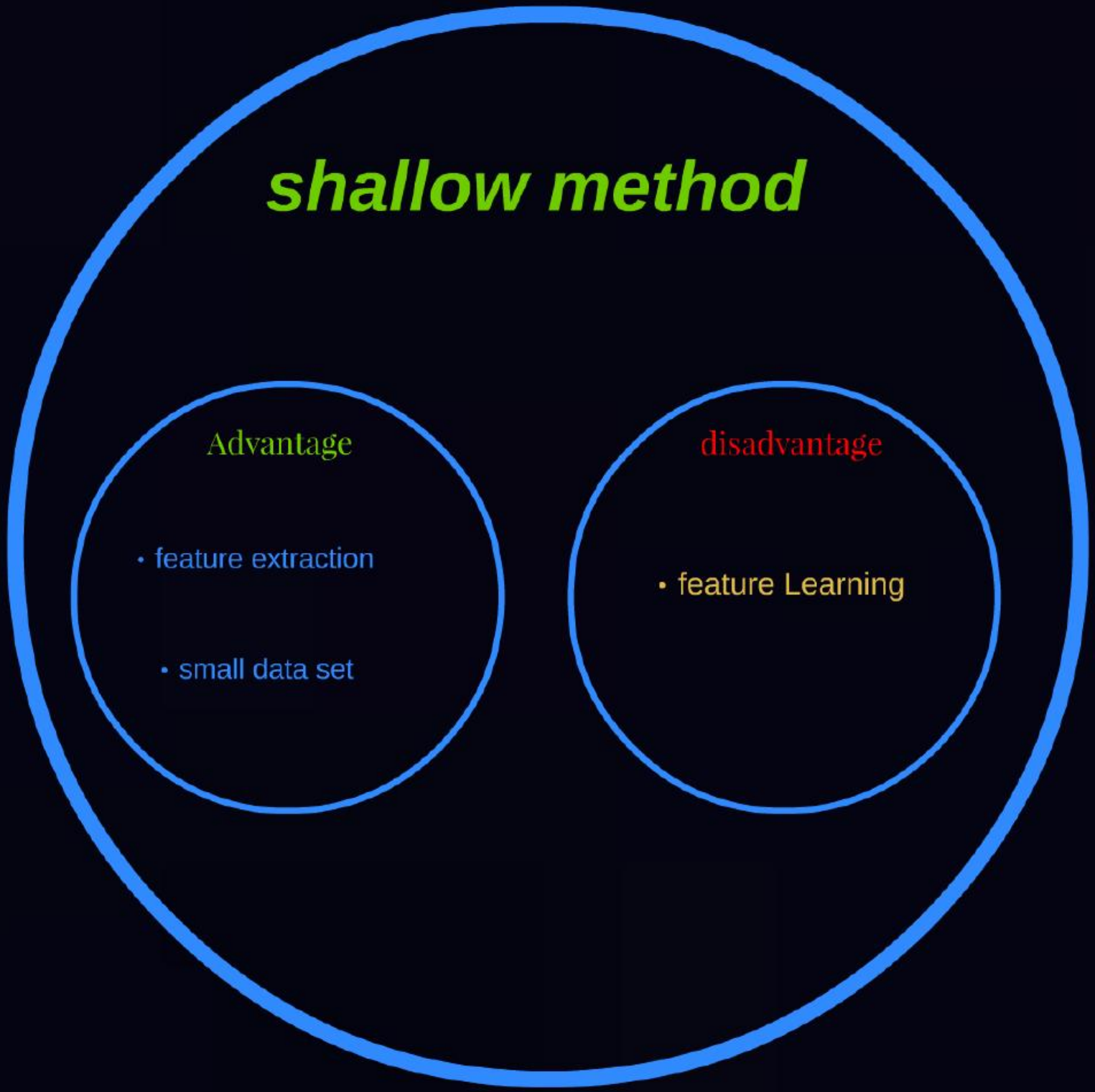
- Machine can see
- Using Deep Learning for various applications
- Deep Neural Networks are Easily Fooled



Nguyen, Anh, Jason Yosinski, and Jeff Clune. "Deep Neural Networks Are Easily Fooled: High Confidence Predictions for Unrecognizable Images-Nguyen_Deep_Neural_Networks_2015_CVPR." (2015).

conclusion



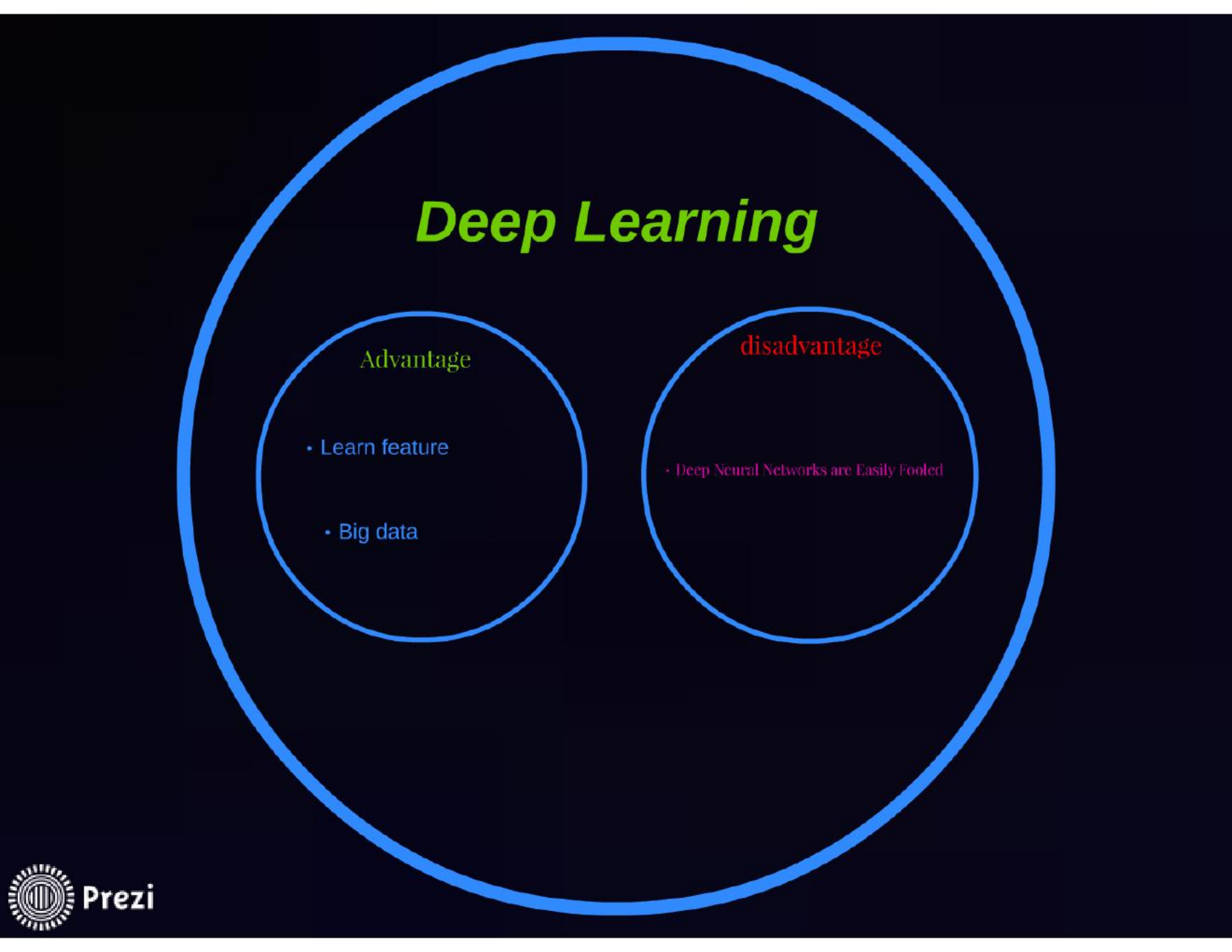

shallow method
Advantage
• feature extraction
• small data set
disadvantage
• feature Learning

Advantage

- feature extraction
- small data set

disadvantage

- feature Learning


Deep Learning
Advantage
• Learn feature
• Big data
disadvantage
• Deep Neural Networks are Easily Fooled

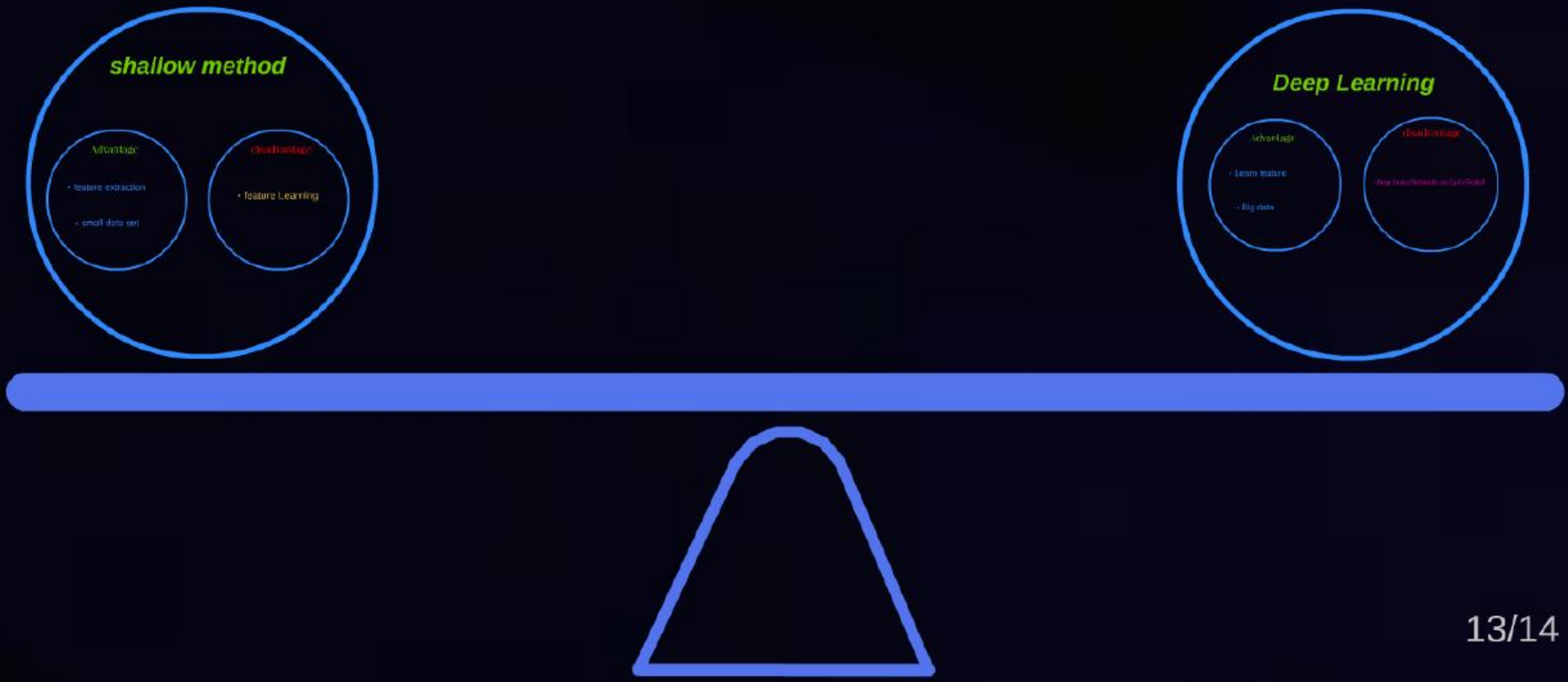
Advantage

- Learn feature
- Big data

disadvantage

- Deep Neural Networks are Easily Fooled

conclusion

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References

[1] Andreopoulos, Alexander, and John K. Tsotsos. "50 Years of object recognition: Directions forward." Computer Vision and Image Understanding 117.8 (2013): 827-891.

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[3] Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends® in Machine Learning 2.1 (2009): 1-127.

[4] Salakhutdinov, Ruslan. Learning deep generative models. Diss. University of Toronto, 2009.

[5] Nguyen, Anh, Jason Yosinski, and Jeff Clune. "Deep Neural Networks Are Easily Fooled: High Confidence Predictions for Unrecognizable Images-Nguyen_Deep_Neural_Networks_2015_CVPR." (2015).

[6] Felzenszwalb, Pedro F., Ross B. Girshick, and David McAllester. "Cascade object detection with deformable part models." Computer vision and pattern recognition (CVPR), 2010 IEEE conference on. IEEE, 2010.

- survey
- Book
- Thesis
- Paper

Thank you


Outline
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