Idea Factory Intensive Program #2

딥러닝 홀로서기

#1

이론강의/PyTorch실습/코드리뷰

딥러닝(Deep Learning)에 관심이 있는 학생 발굴을 통한
딥러닝의 이론적 배경 강의 및 오픈소스 딥러닝 라이브러리 PyTorch를 활용한 실습

Learning Assistant Information

JaeYoung Jo (School of Computing)
Developed KAIST Job Alarm Service
IR&NLP Lab. Research Intern

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https://github.com/heartcored98

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Acknowledgement

Sung Kim's 모두를 위한 머신러닝/딥러닝 강의
- https://hunkim.github.io/ml/
- https://www.youtube.com/playlist?list=PLlMkM4tgfjnLSOjrEJN31gZATbcj_MpUm

Andrew Ng's and other ML tutorials
- https://class.coursera.org/ml-003/lecture
- http://www.holehouse.org/mlclass/ (note)
- Deep Learning Tutorial
- Andrej Karpathy's Youtube channel

WooYeon Kim & SeongOk Ryu's KAIST CH485 Artificial Intelligence and Chemistry
- https://github.com/SeongokRyu/CH485---Artificial-Intelligence-and-Chemistry

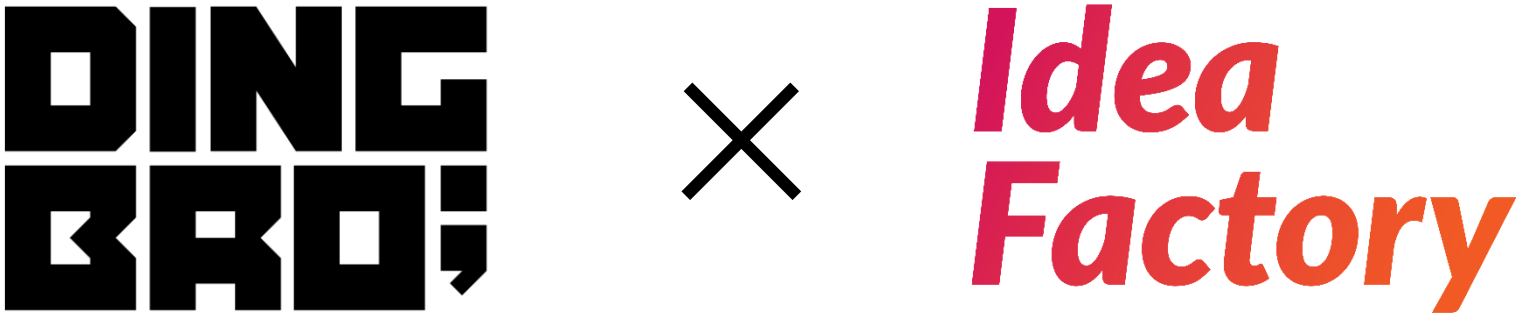
SungJu Hwang's KAIST CS492 Deep Learning Course Material

Many insightful articles, blog posts and Youtube channels

Facebook community
- Tensorflow KR (https://www.facebook.com/groups/TensorFlowKR/)
- Pytorch KR (https://www.facebook.com/groups/PyTorchKR/)

Medium Channel and Writers
- Toward Data Science (https://towardsdatascience.com/)

Acknowledgement

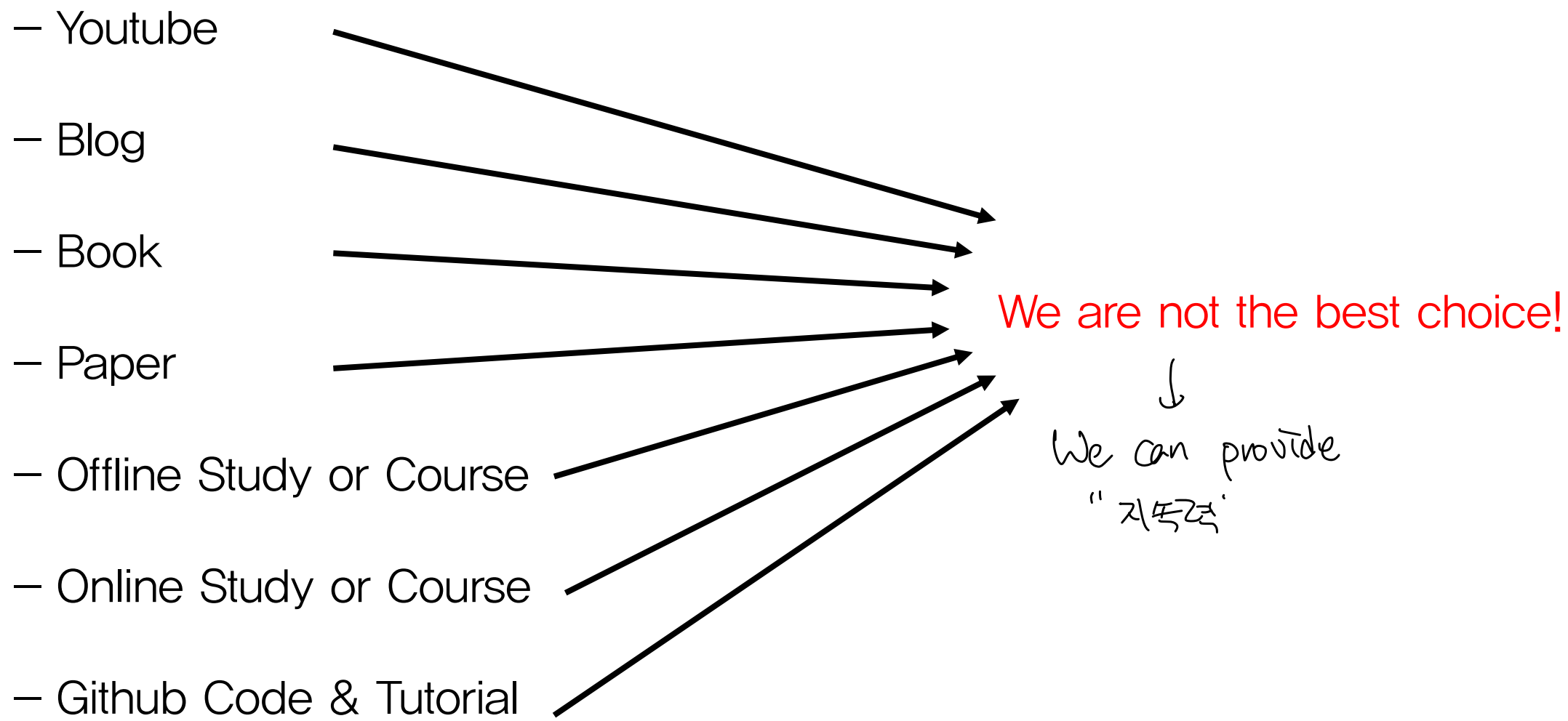


Flood of Deep Learning Course & Material

Flood of Deep Learning Course & Material

- Youtube
- Blog
- Book
- Paper
- Offline Study or Course
- Online Study or Course
- Github Code & Tutorial

Flood of Deep Learning Course & Material



Why Did We Start this Course?

Why Did We Start this Course?

- Two of our team lost their internship opportunity
- Deep Learning is getting more important → More Specifically?
- We need to train them so they can train neural net!
- Let's make study course for beginner
- Why don't we just make this course public?

하는김에.

Why Deep Learning is Important

Why Deep Learning is Important

- Everyone trains their neural net!
- DL seems to be a magic power! → Solve many Real-world problems
- Full of successful stories using DL

Why Deep Learning is Important

ImageNet Challenge

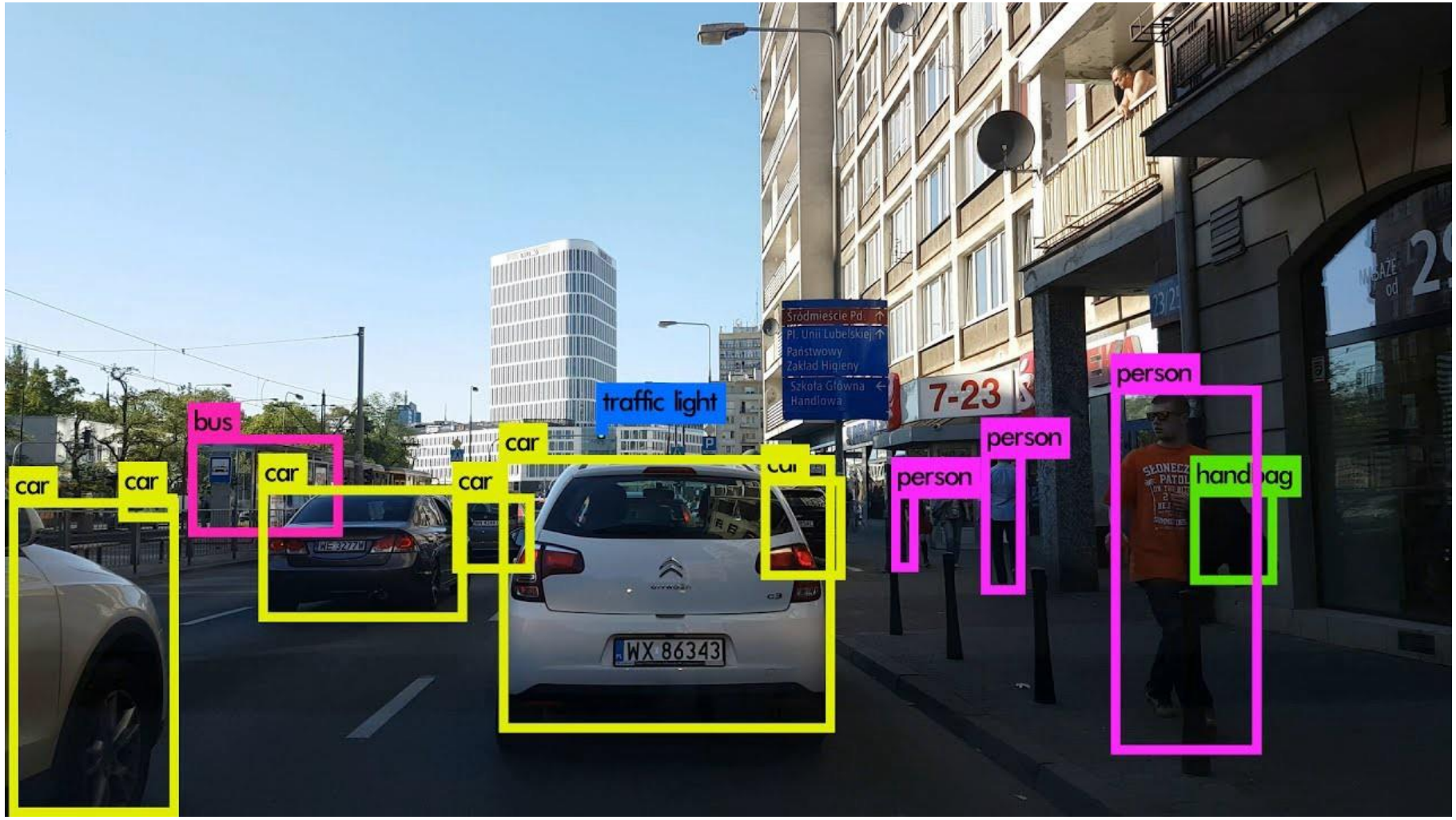
IMAGENET

- 1,000 object classes (categories).
- Images:
  - 1.2 M train
  - 100k test.

Image Classification [ResNet]

http://www.image-net.org/

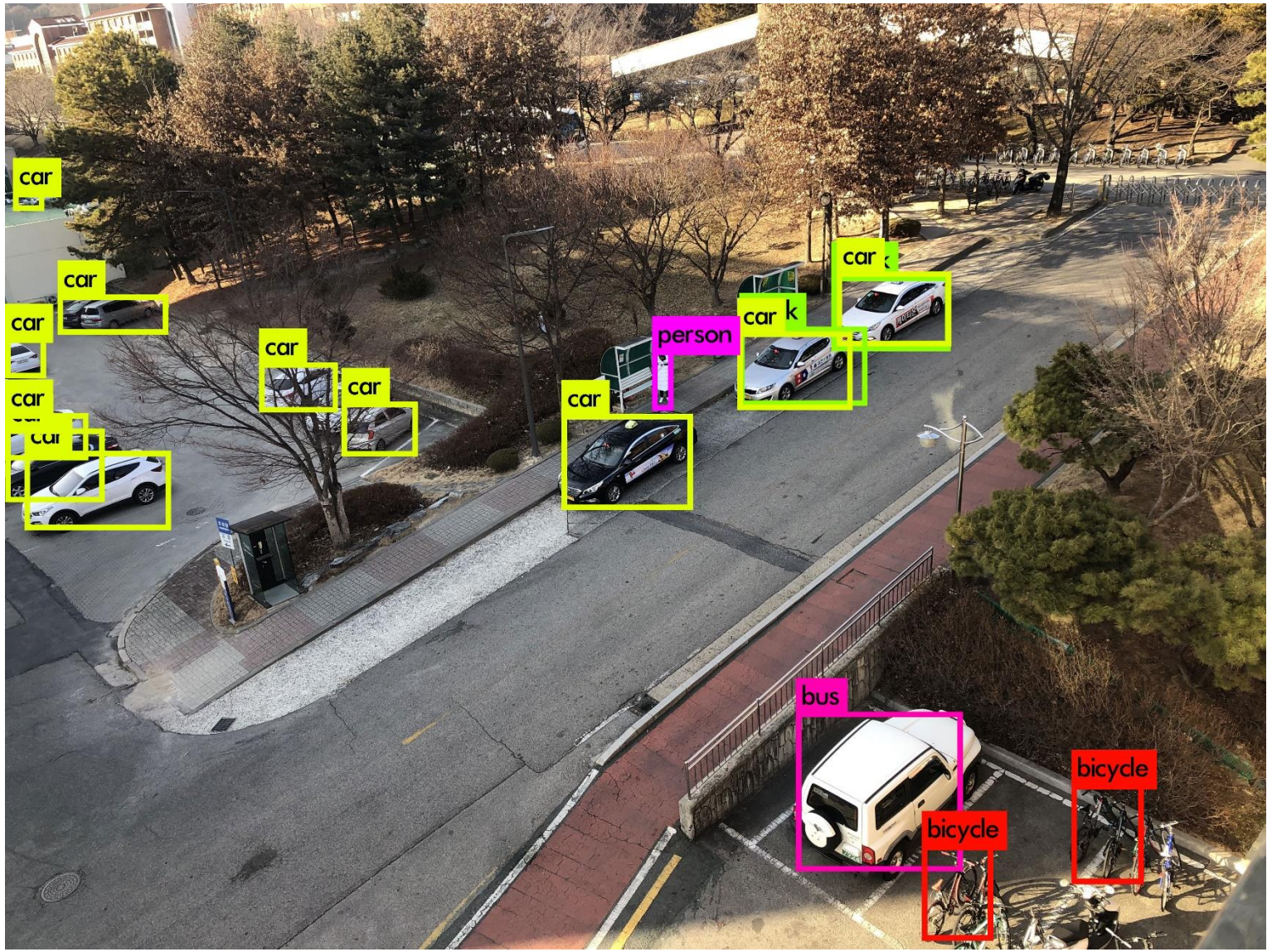
Why Deep Learning is Important



Object Detection [Yolo V3]

https://pjreddie.com/darknet/yolo/

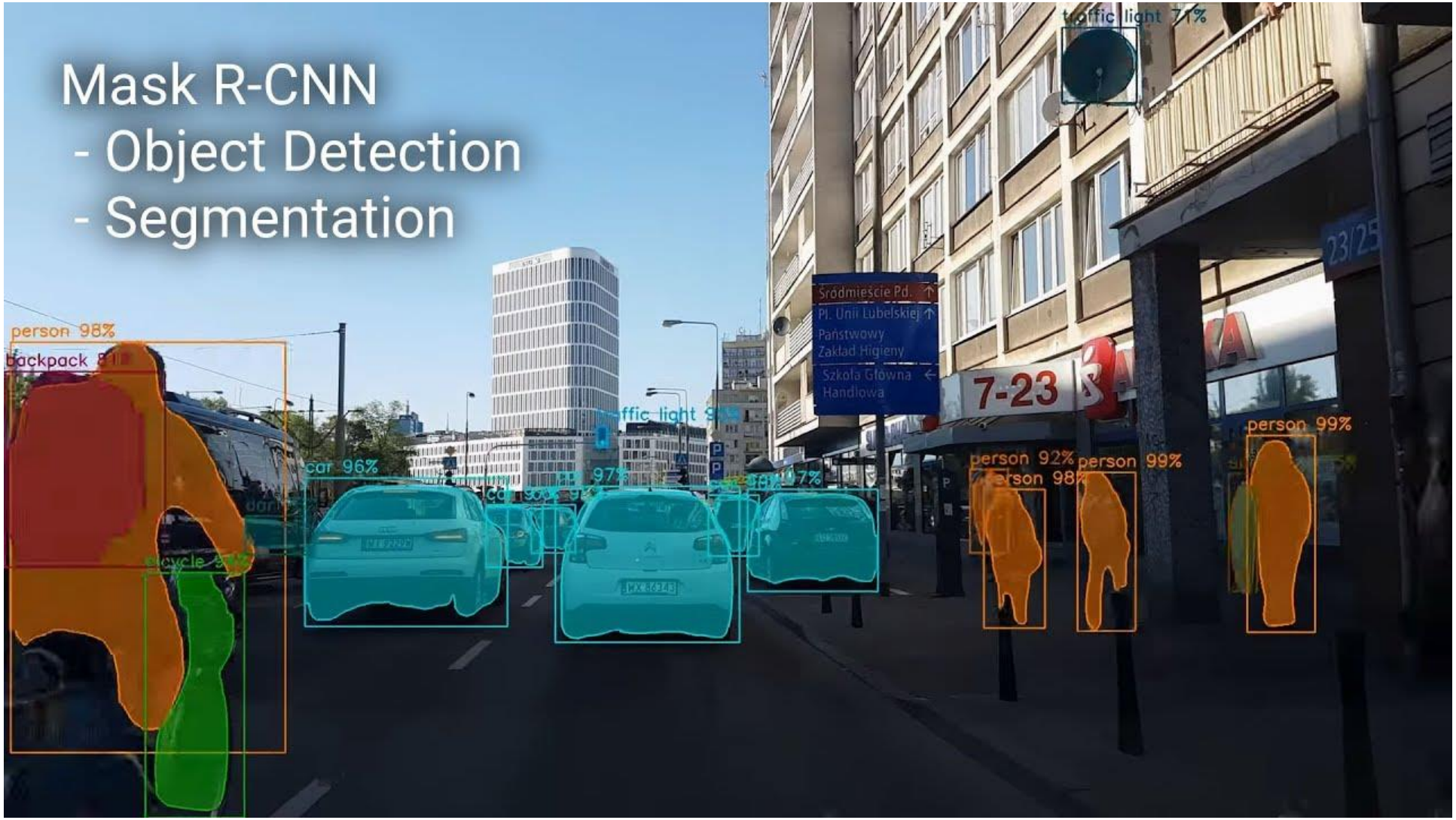
Why Deep Learning is Important



Object Detection [Yolo V3]

https://pjreddie.com/darknet/yolo/

Why Deep Learning is Important



Object Detection + Segmentation [Mask R-CNN]

https://arxiv.org/abs/1703.06870

Why Deep Learning is Important

Image Generation [Style-Transfer]

https://www.cv-foundation.org/openaccess/content_cvpr_2016/papers/Gatys_Image_Style_Transfer_CVPR_2016_paper.pdf

Why Deep Learning is Important

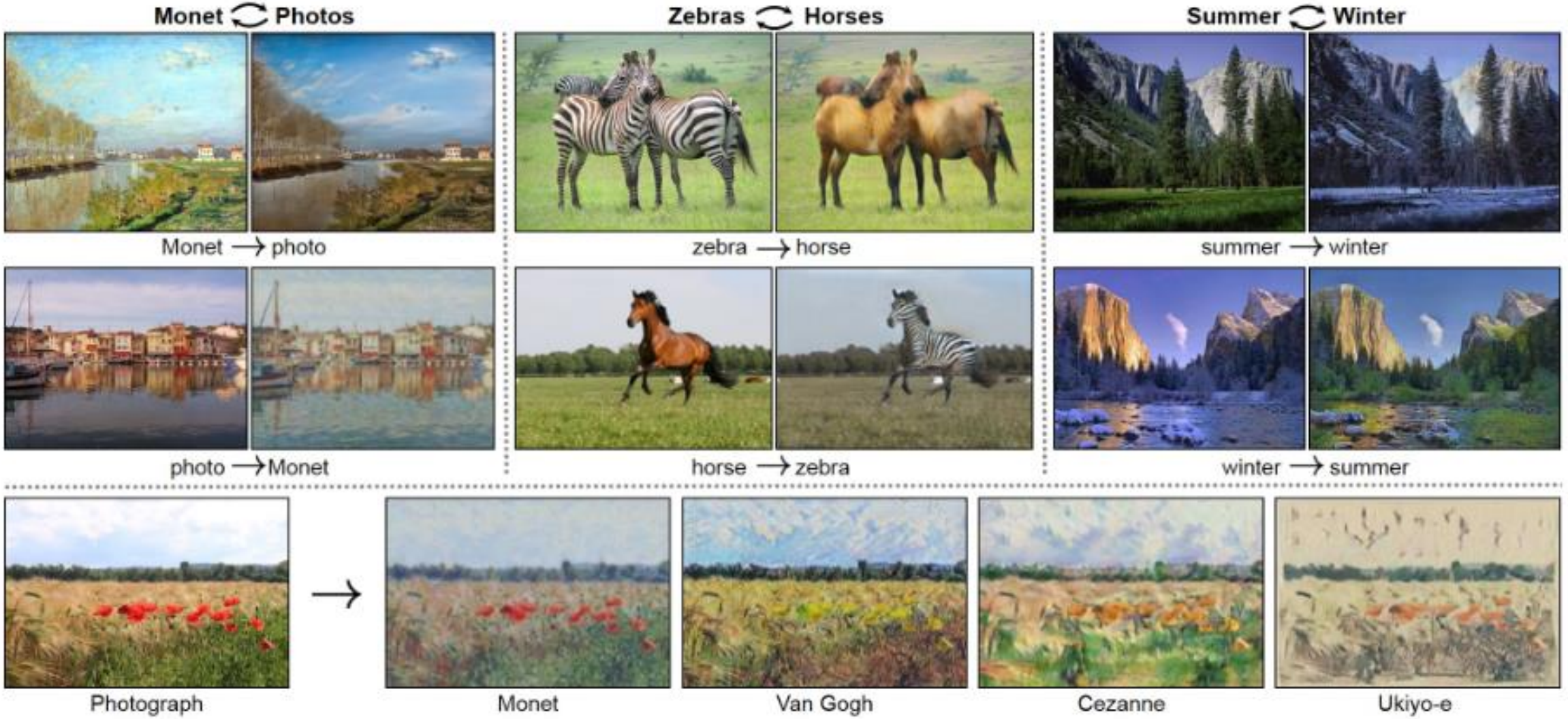


Image Generation [CycleGAN]

https://junyanz.github.io/CycleGAN/

Why Deep Learning is Important

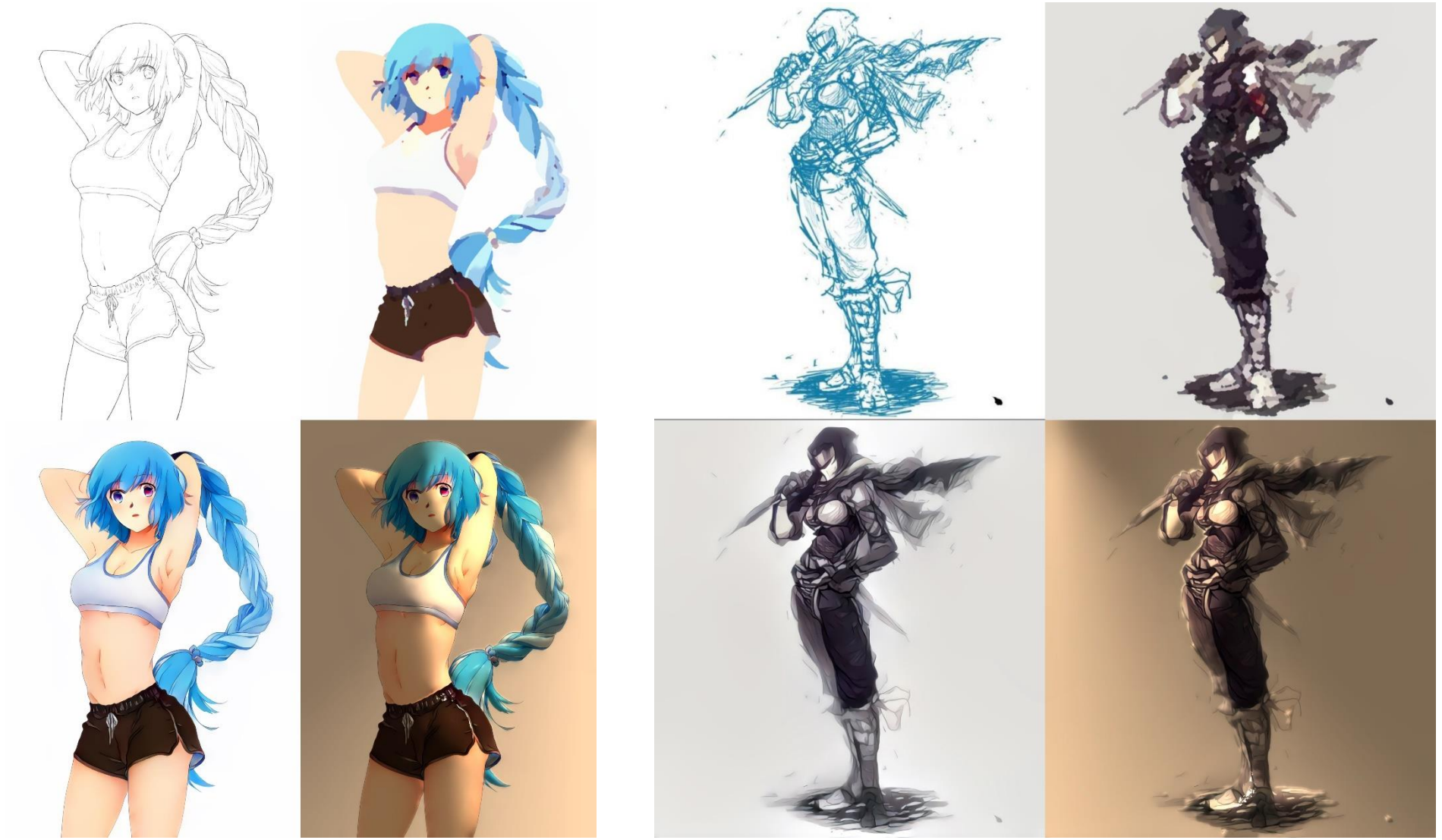
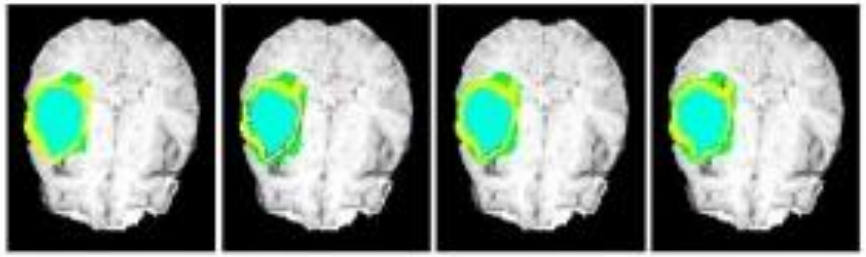


Image Generation [Style2Paints]

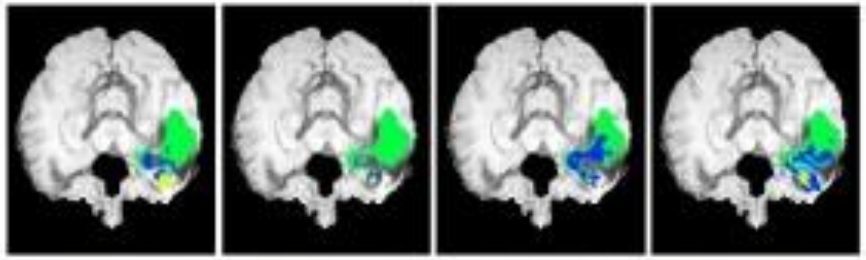
https://github.com/lllyasviel/style2paints

Why Deep Learning is Important

Segmentation: brain tumor segmentation

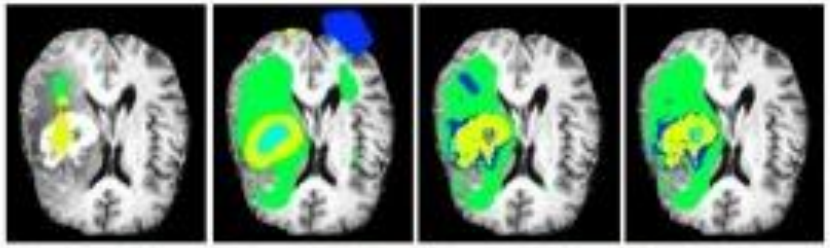


(a) 3DNet_1 (b) 3DNet_2 (c) 3DNet_3 (d) Ground truth



(e) 3DNet_1 (f) 3DNet_2 (g) 3DNet_3 (h) Ground truth

The importance of skip connections



(a) 3DNet_1 Single-resolution (b) 3DNet_2 Single-resolution (c) 3DNet_3 Single-resolution (d) Ground-truth

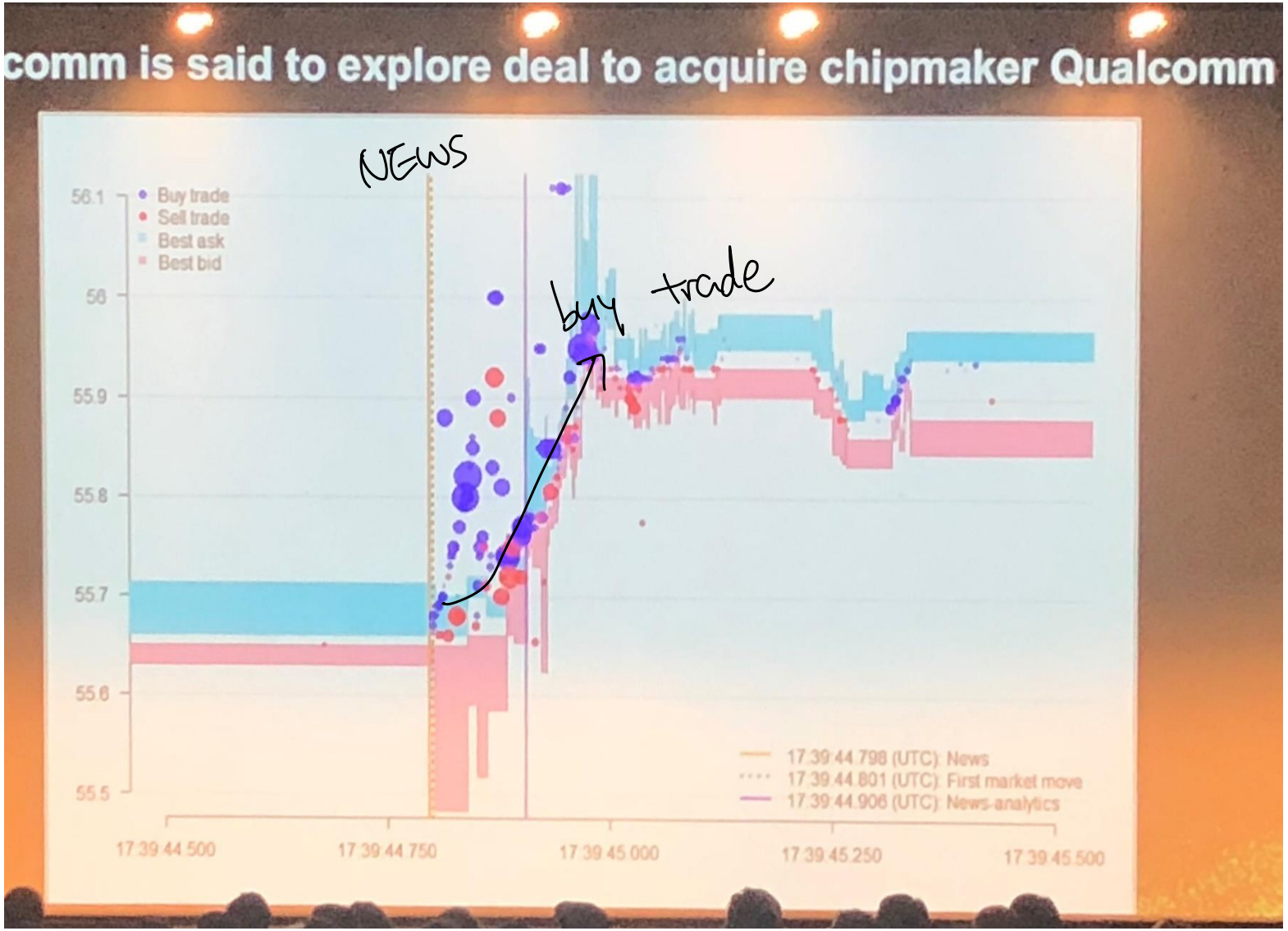
	Accuracy	Dice score		
		Whole	Core	Active
3DNet_1	99.69	89.64	76.87	63.12
3DNet_2	**99.71**	91.59	69.90	73.89
3DNet_3	**99.71**	**91.74**	**83.61**	**76.82**

	Precision					Recall				
	1-Nec	2-Edm	3-NEnh	4-Enh	0-Else	1-Nec	2-Edm	3-NEnh	4-Enh	0-Else
3DNet_1	65.33	81.49	28.40	66.94	**99.95**	44.71	74.09	28.40	66.94	**99.95**
3DNet_2	**75.21**	79.07	43.57	**82.65**	99.92	41.10	**84.16**	32.35	73.38	99.93
3DNet_3	67.45	**85.06**	**49.44**	74.06	99.90	**51.29**	77.50	**37.61**	**87.29**	**99.95**

Table 3: Results for our validation set from BRATS2015 training set.

Tumor Segmentation

Why Deep Learning is Important



News(Event) Based Trading Algorithm

EMNLP 2018. Bloomberg KeyNote Speech

Why Deep Learning is Important

The first recorded travels by Europeans to China and back date from this time. The most famous traveler of the period was the Venetian Marco Polo, whose account of his trip to "Cambaluc," the capital of the Great Khan, and of life there astounded the people of Europe. The account of his travels, Il milione (or, The Million, known in English as the Travels of Marco Polo), appeared about the year 1299. Some argue over the accuracy of Marco Polo's accounts due to the lack of mentioning the Great Wall of China, tea houses, which would have been a prominent sight since Europeans had yet to adopt a tea culture, as well the practice of foot binding by the women in capital of the Great Khan. Some suggest that Marco Polo acquired much of his knowledge through contact with Persian traders since many of the places he named were in Persian.

How did some suspect that Polo learned about China instead of by actually visiting it?

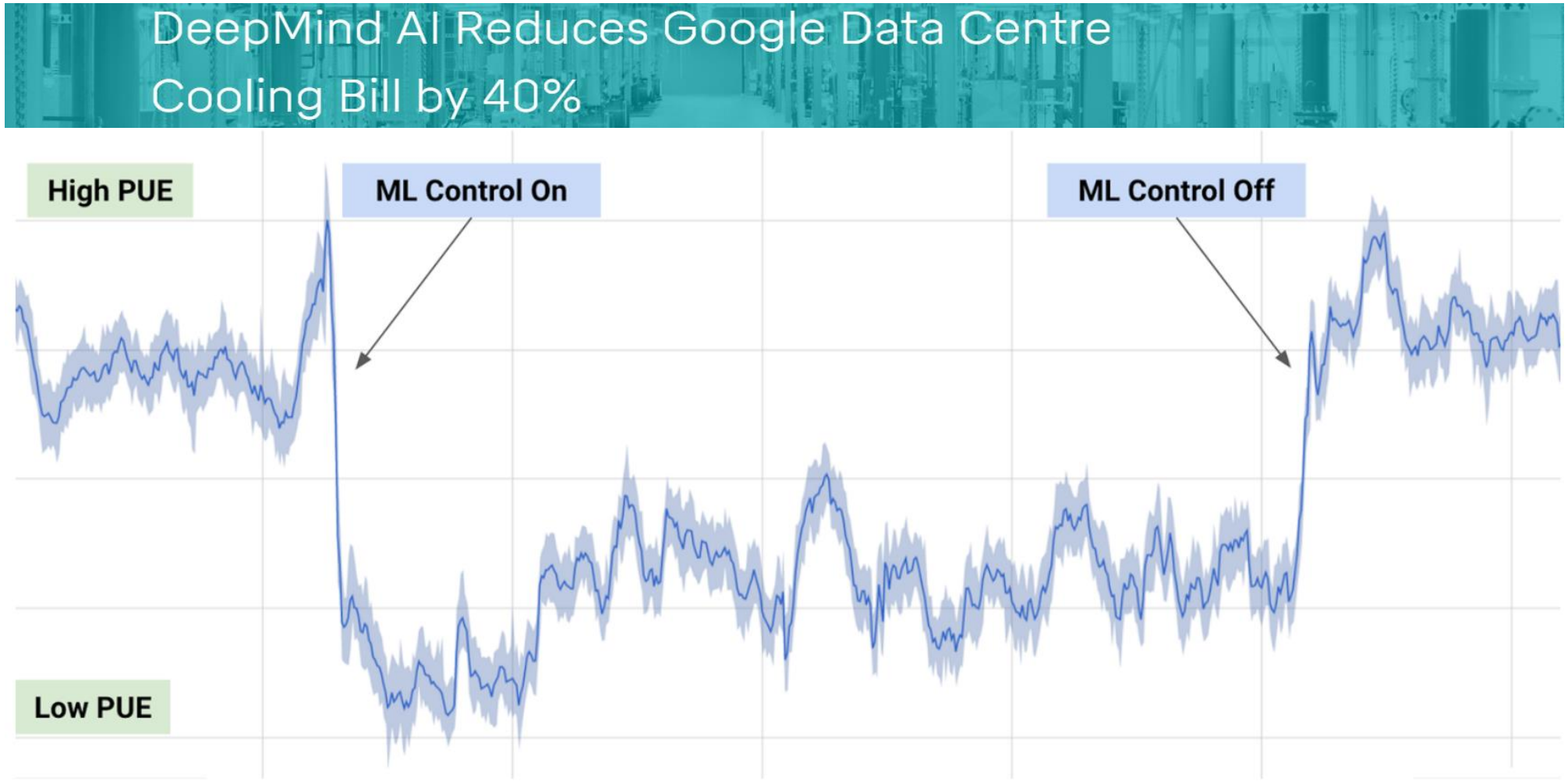
Answer: through contact with Persian traders

Rank	Model	EM	F1
	Human Performance *Stanford University* (Rajpurkar & Jia et al. '18)	86.831	89.452
1 Jan 10, 2019	BERT + Synthetic Self-Training (ensemble) *Google AI Language* https://github.com/google-research/bert	**84.292**	**86.967**
2 Dec 21, 2018	PAML+BERT (ensemble model) *PINGAN GammaLab*	83.457	86.122
2 Dec 16, 2018	Lunet + Verifier + BERT (ensemble) *Layer 6 AI NLP Team*	83.469	86.043

Question Answering [BERT]

https://rajpurkar.github.io/SQuAD-explorer/

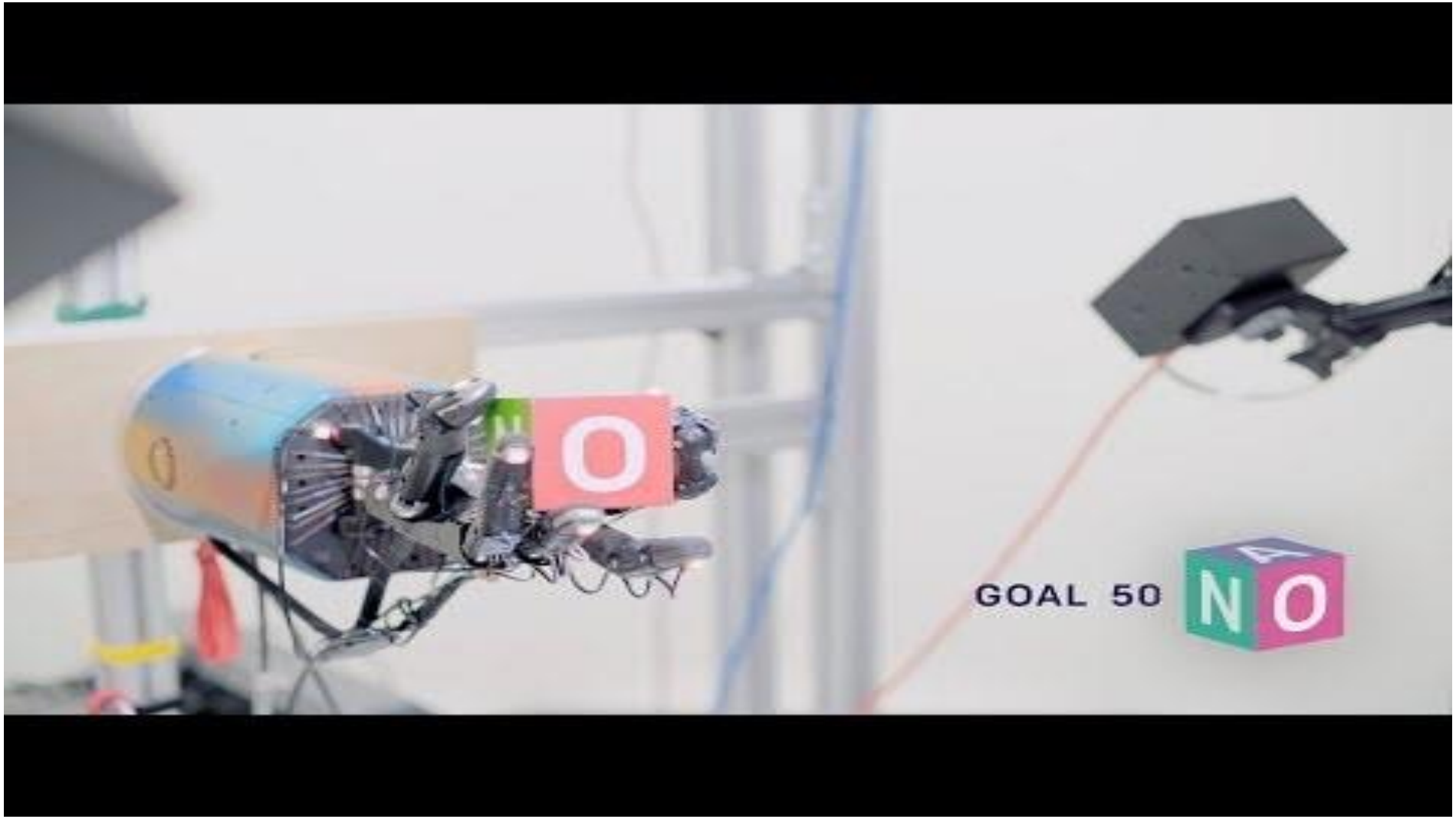
Why Deep Learning is Important



Data Center Cooling Control [DeepMind]

https://deepmind.com/blog/deepmind-ai-reduces-google-data-centre-cooling-bill-40/

Why Deep Learning is Important

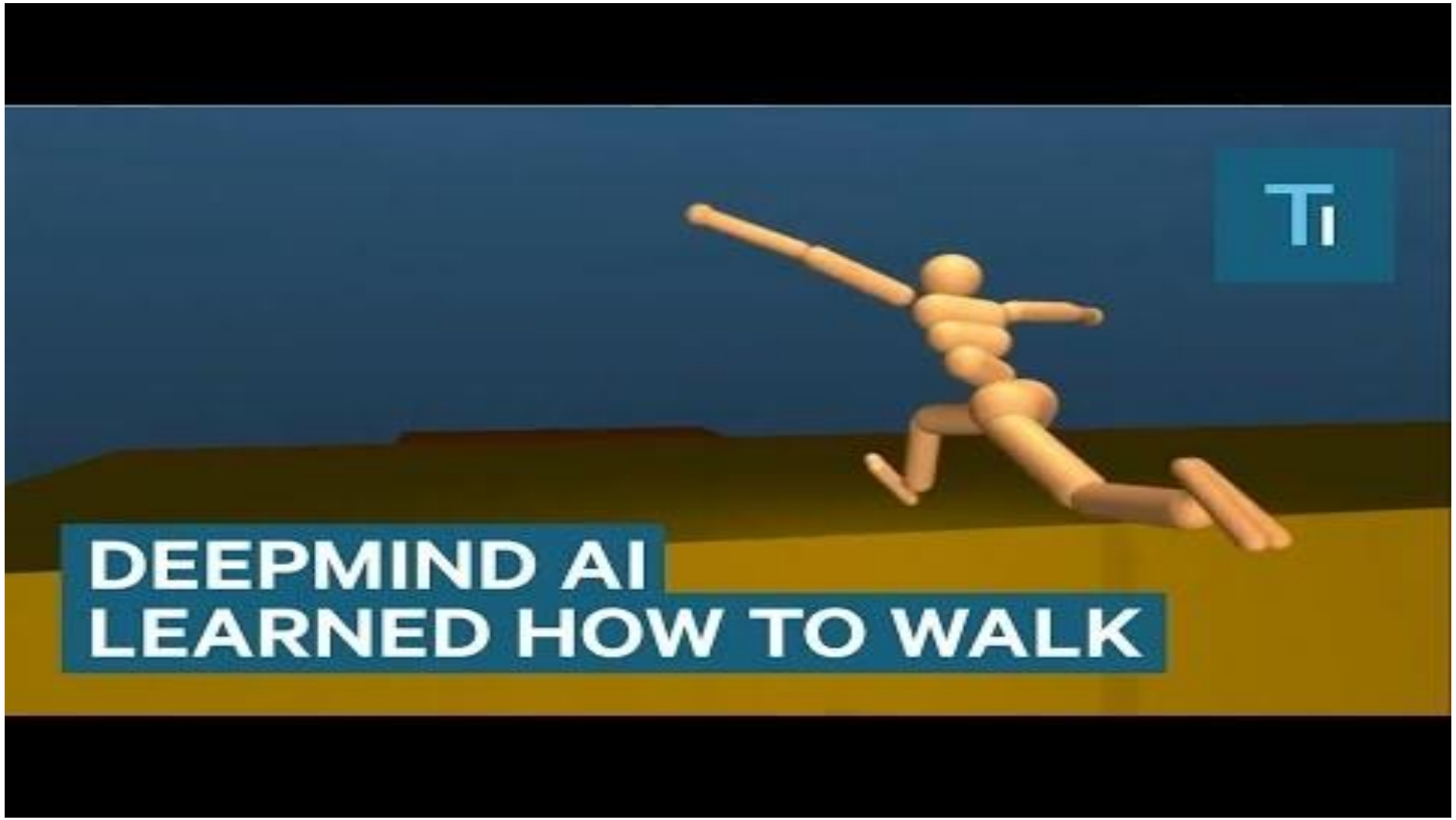


Robot Hand Control [OpenAI]

Goal에 맞춰 손의 움직임

https://www.youtube.com/watch?time_continue=98&v=DKe8FumoD4E

Why Deep Learning is Important



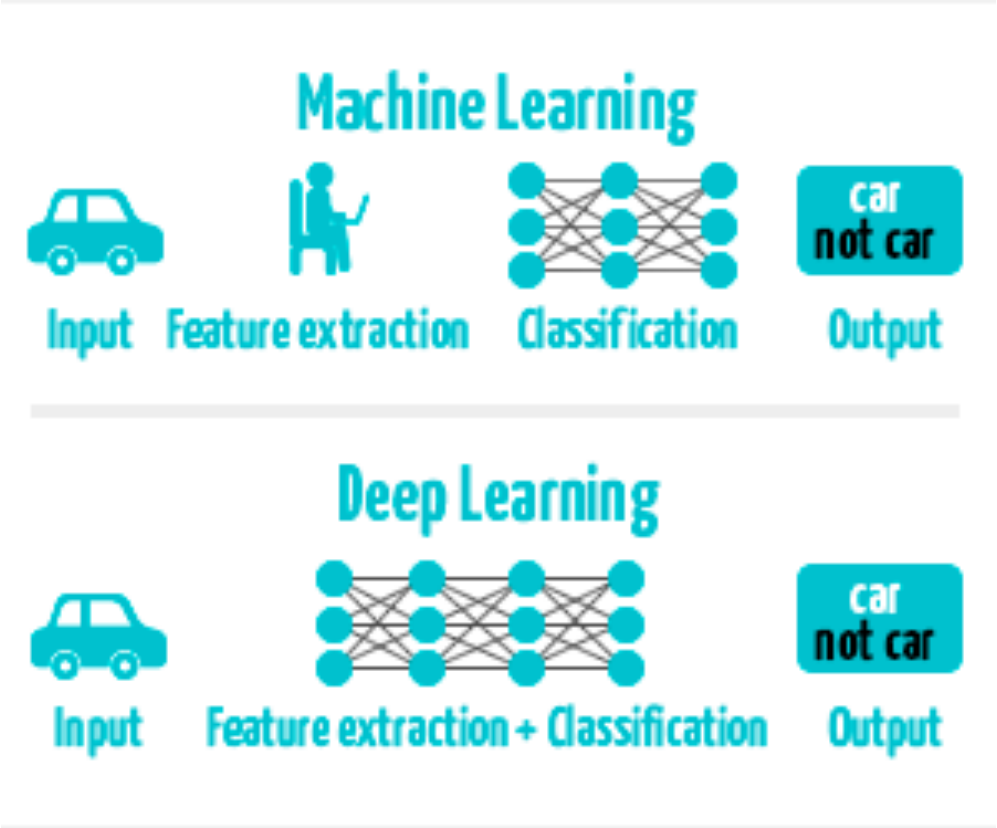
How to learn move [DeepMind]

https://www.youtube.com/watch?v=gn4nRCC9TwQ

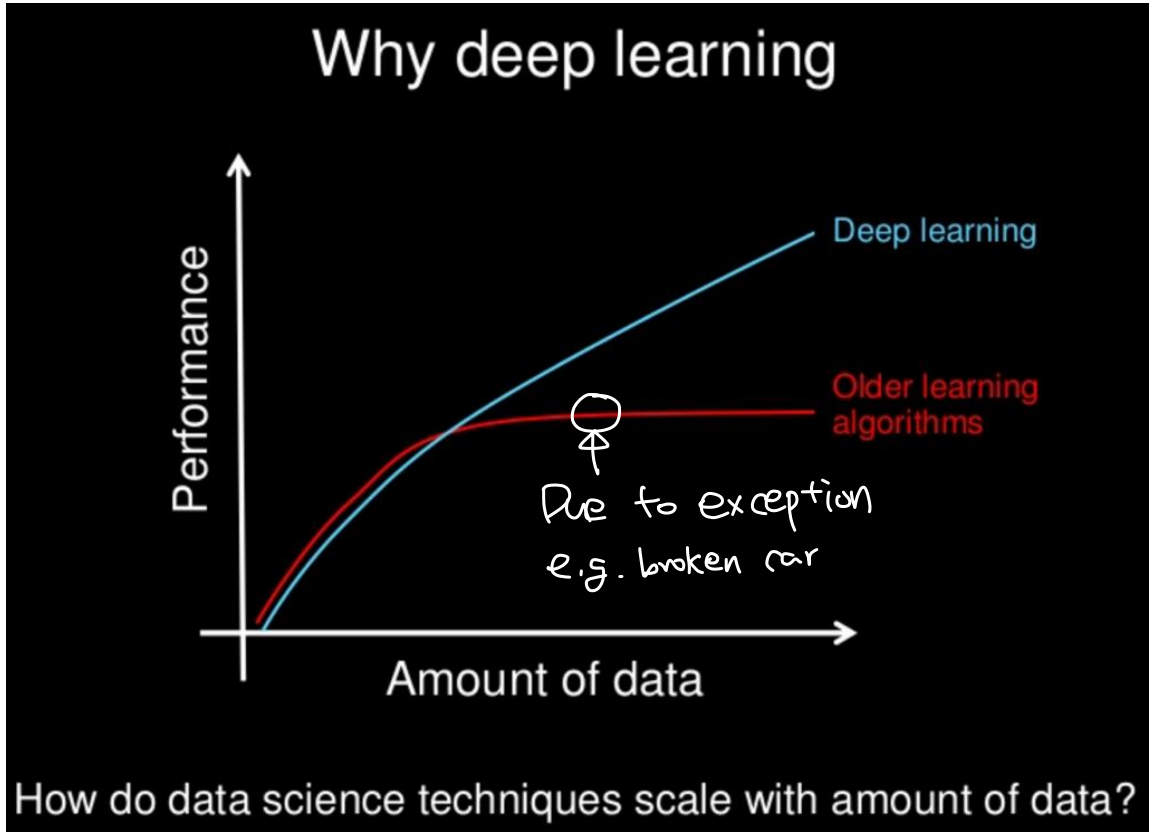
More Projects on.. (How to find)

- 30 Amazing Machine Learning Projects
- Really Awesome GAN
- Awesome Deep Learning

Why Deep Learning is Important



Get rid of feature engineering



Limitless performance improvement

https://www.mysimpleshow.com/deep-learning/
https://machinelearningmastery.com/what-is-deep-learning/

Why **Learning** Deep Learning is Important

Why Learning Deep Learning is Important

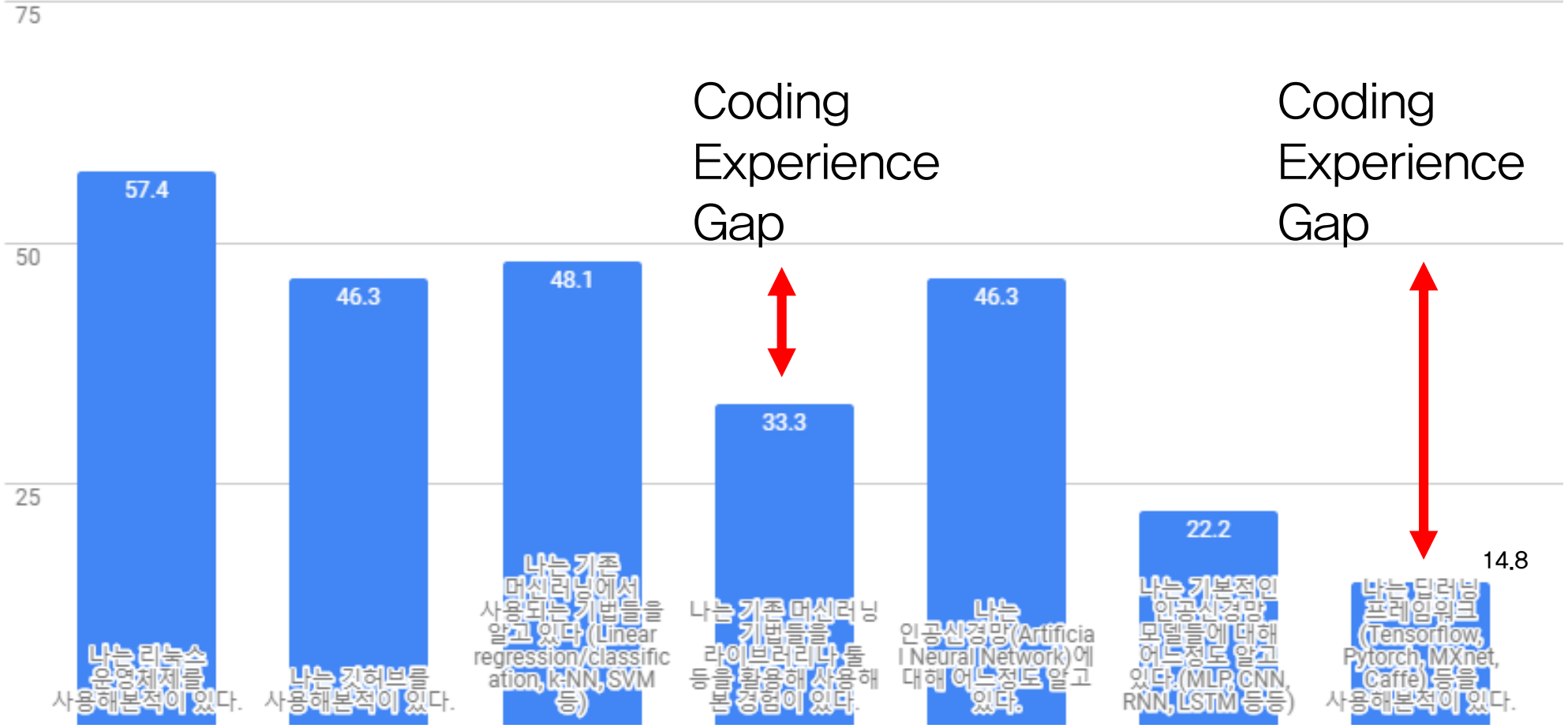
- Understanding how other solve the problems
- Survive from AI invasion
- Utilize available techniques or source code
- Solve your own problem with nice performance
- To get a job and make money

Audience Statics

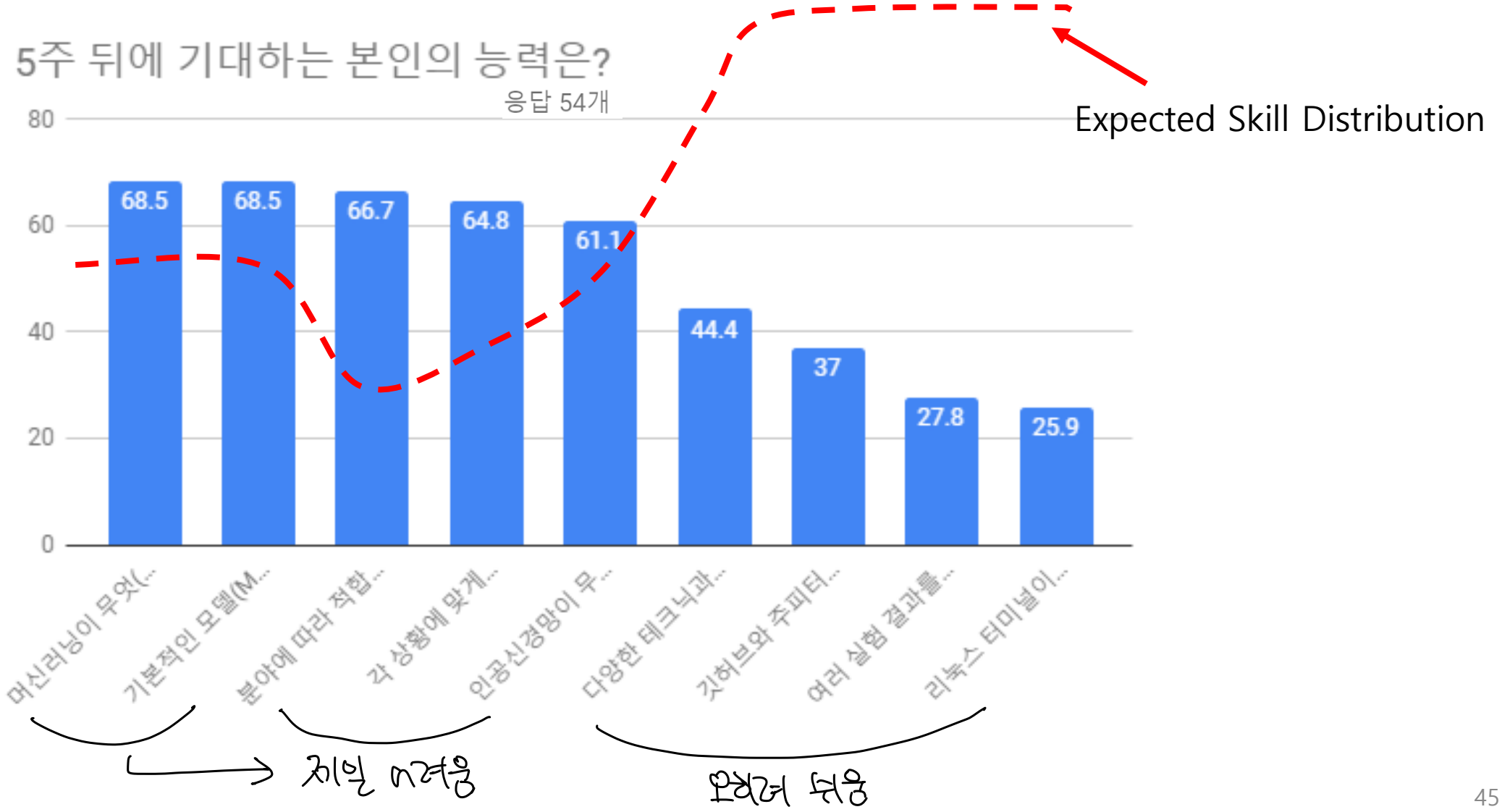
Audience Statics

아래 항목 중 해당되는 것을 모두 고르면?

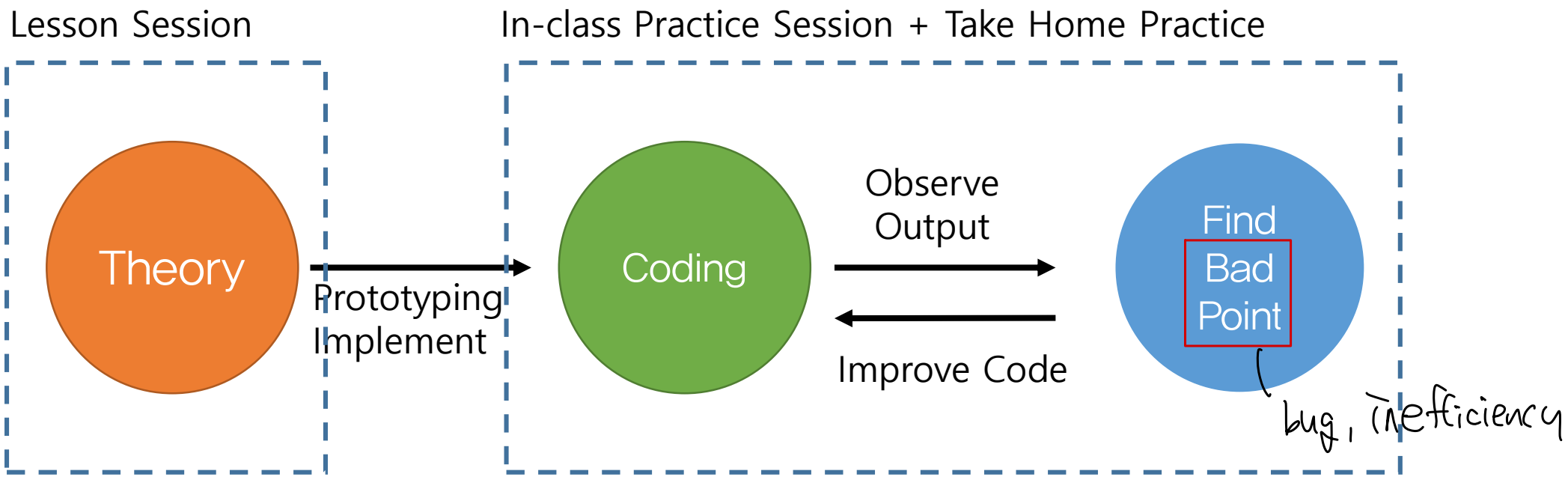
응답 54개



Audience Statics



Course Structure



제가 생각한 ML/DL Learning Curve

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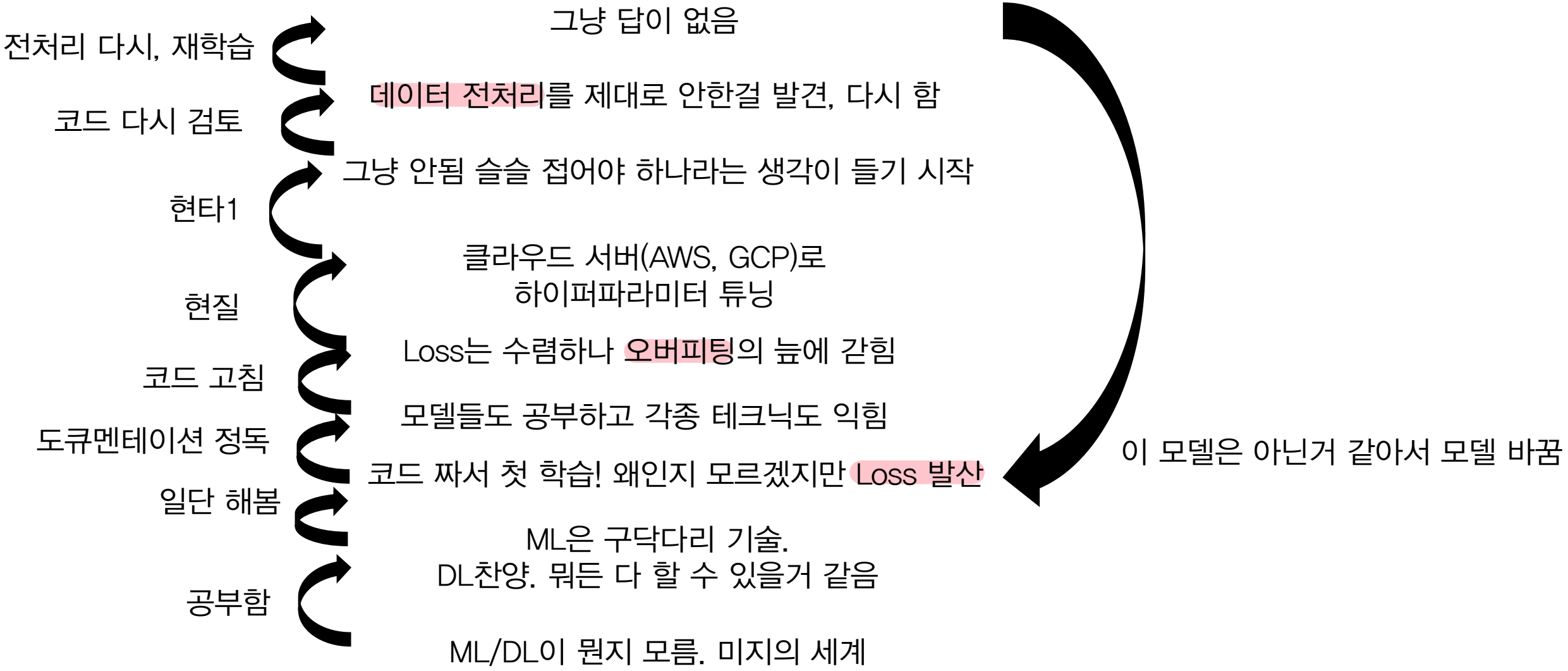

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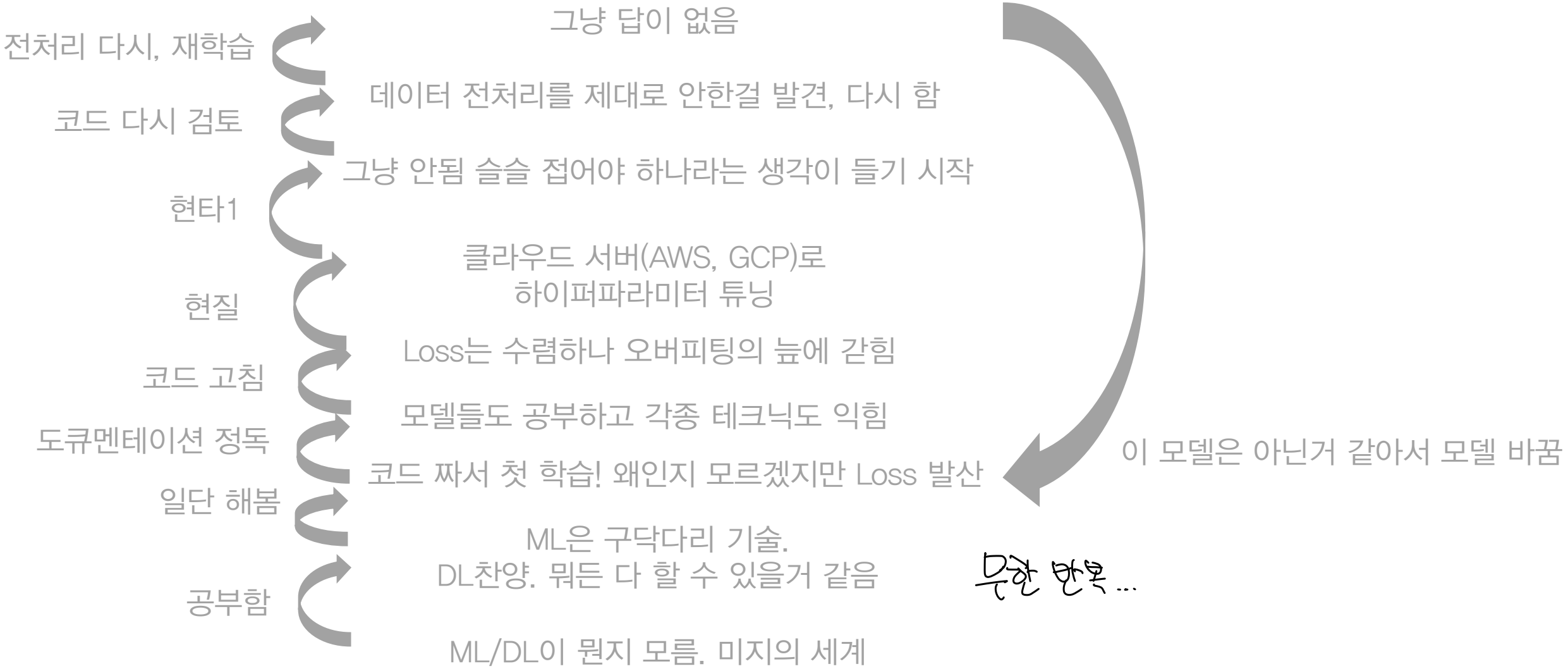

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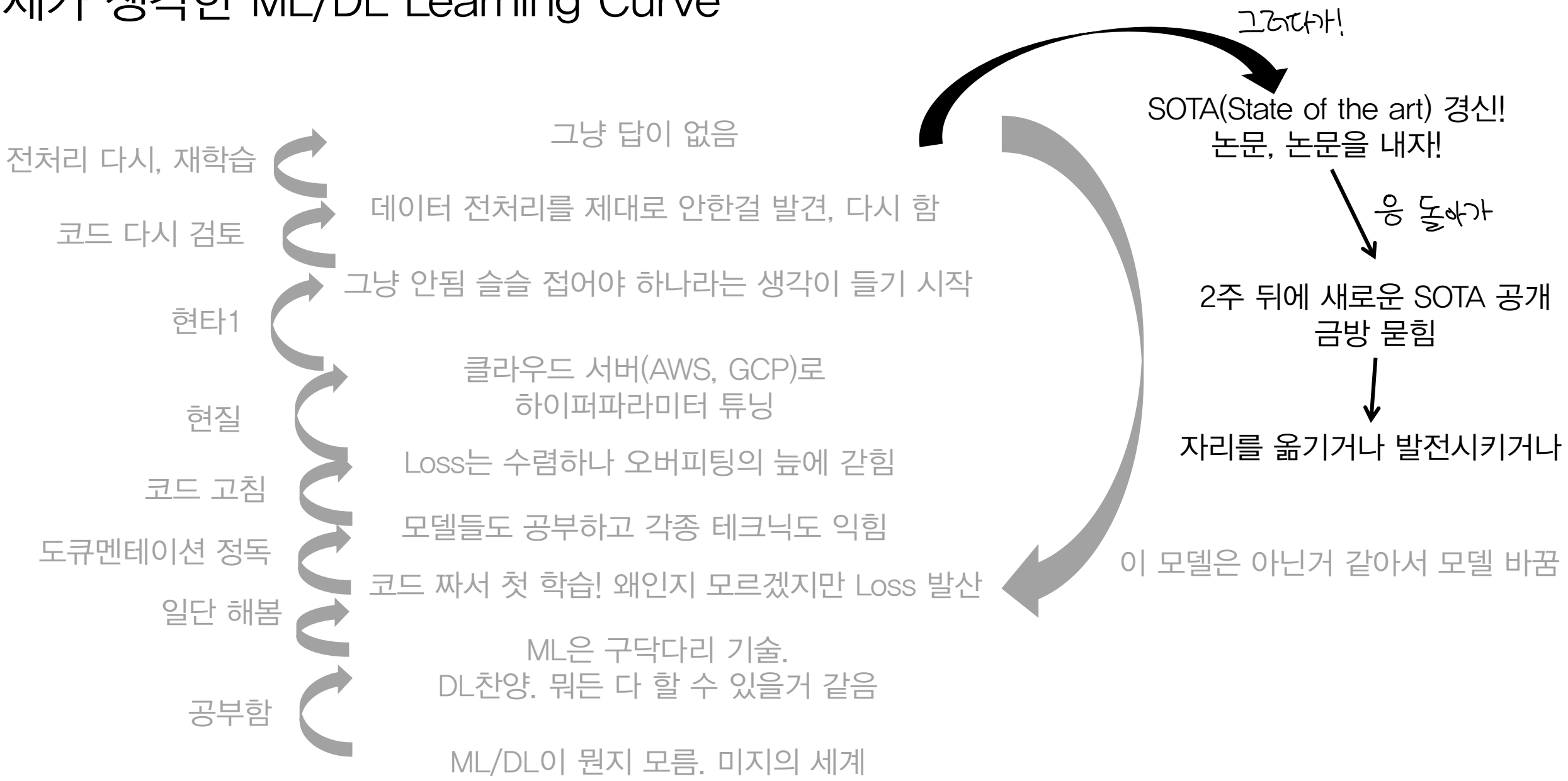

그래서 딥러닝 홀로서기는..
..뭘 하기 위한 수업인가요?

딥러닝 홀로서기를 들으면..

그냥 답이 없음

주변에 물어보는 법. 커뮤니티, 좋은 자료들

데이터 전처리를 제대로 안한걸 발견, 다시 함

데이터 분포 파악, 정규화, 라벨링 기법

그냥 안됨 슬슬 접어야 하나라는 생각이 들기 시작

클라우드 서버(AWS, GCP)로
하이퍼파라미터 튜닝

이왕 돈을 쓸거면 제대로 쓰자
(하이퍼파라미터 자동 튜닝)

Loss는 수렴하나 오버피팅의 늪에 갇힘

오버피팅을 벗어나는 테크닉 소개

모델들도 공부하고 각종 테크닉도 익힘

코드 짜서 첫 학습! 왜인지 모르겠지만 Loss 발산

코드 단계별 검수는 필수!
실험 과정 로깅하기

ML은 구닥다리 기술.
DL찬양. 뭐든 다 할 수 있을거 같음

DL의 한계점을 인지하고 기존 고전 알고리즘을 존중

ML/DL이 뭔지 모름. 미지의 세계

ML/DL이 적어도 뭔지는 알자

Summary

Summary

- Deep Learning is powerful tool
- Let's train ourselves in order to train neural net
- Write more code!