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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ACE Lab. Research Intern

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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

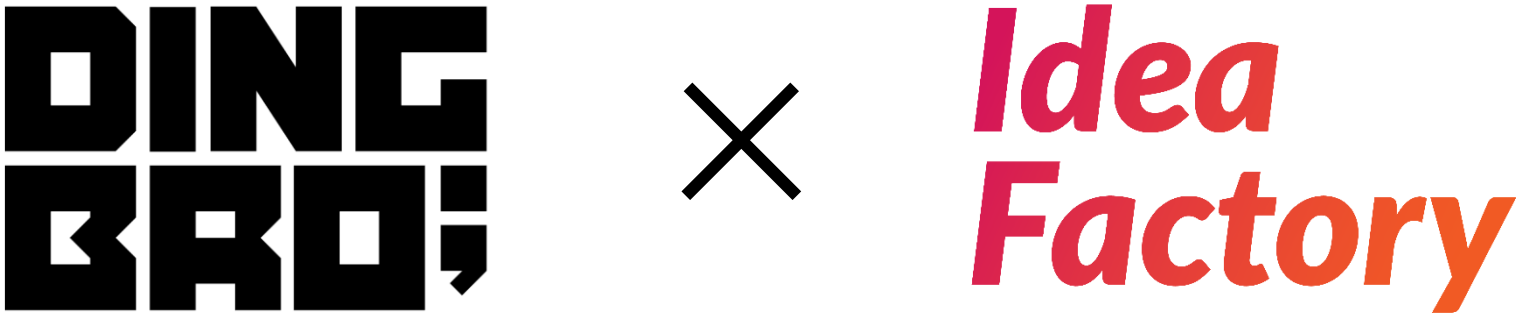
SungJu Hwang's KAIST CS492 Deep Learning Course Material

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

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딥러닝에는 많은 공부자료들이

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

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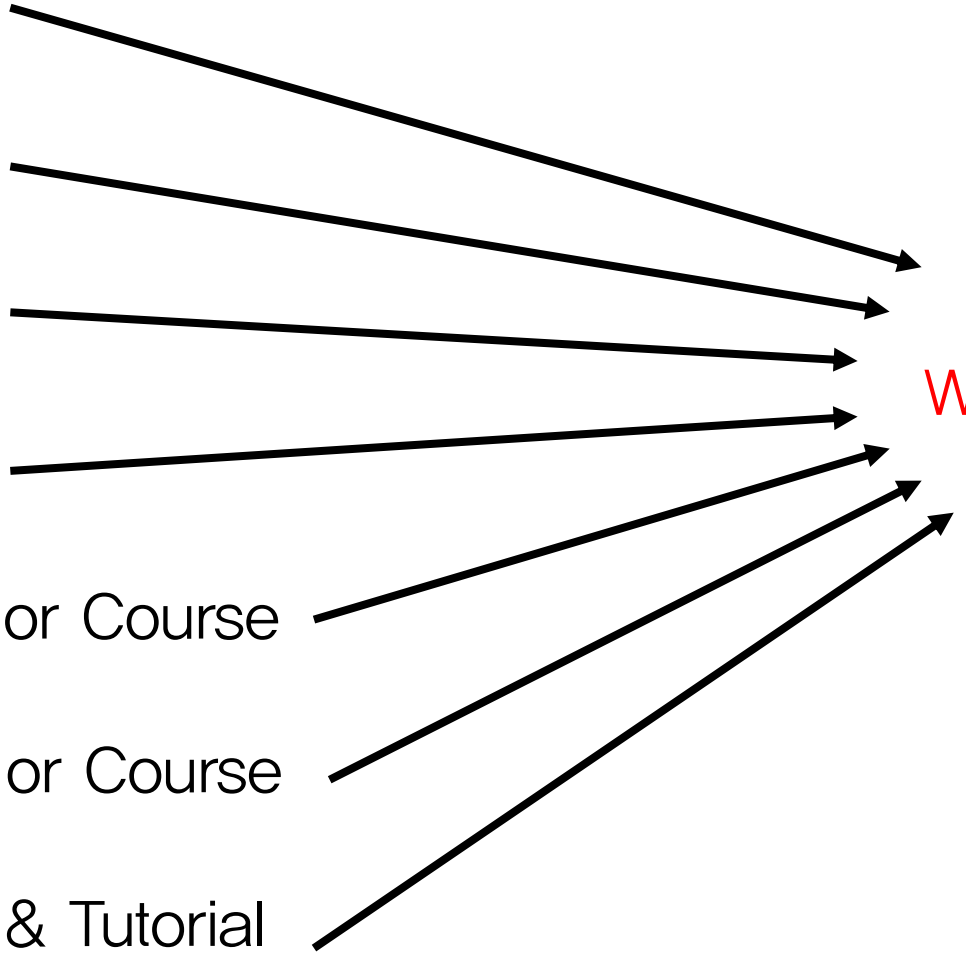

We are not the best choice!

# Why Did We Start this Course?

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- Two of our team lost their internship opportunity

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  ⇨ 실제문제가 많이해결되었기 때문
- 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?

# Why Deep Learning is Important

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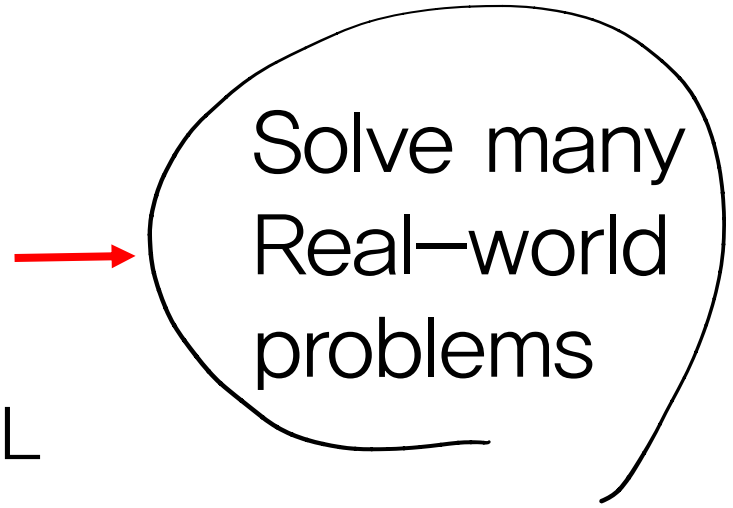


# Why Deep Learning is Important

## ImageNet Challenge

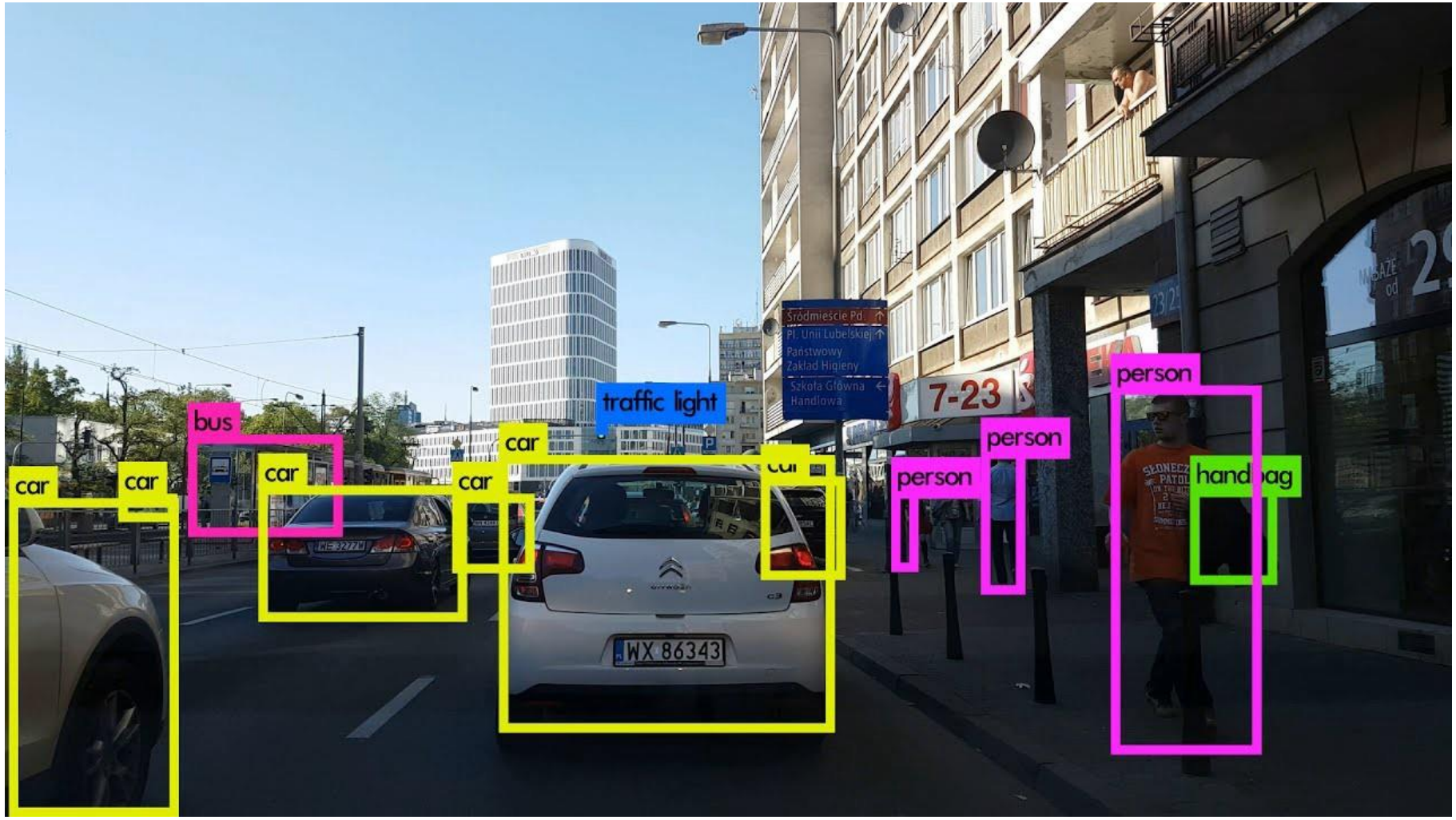
IMAGENET

- 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

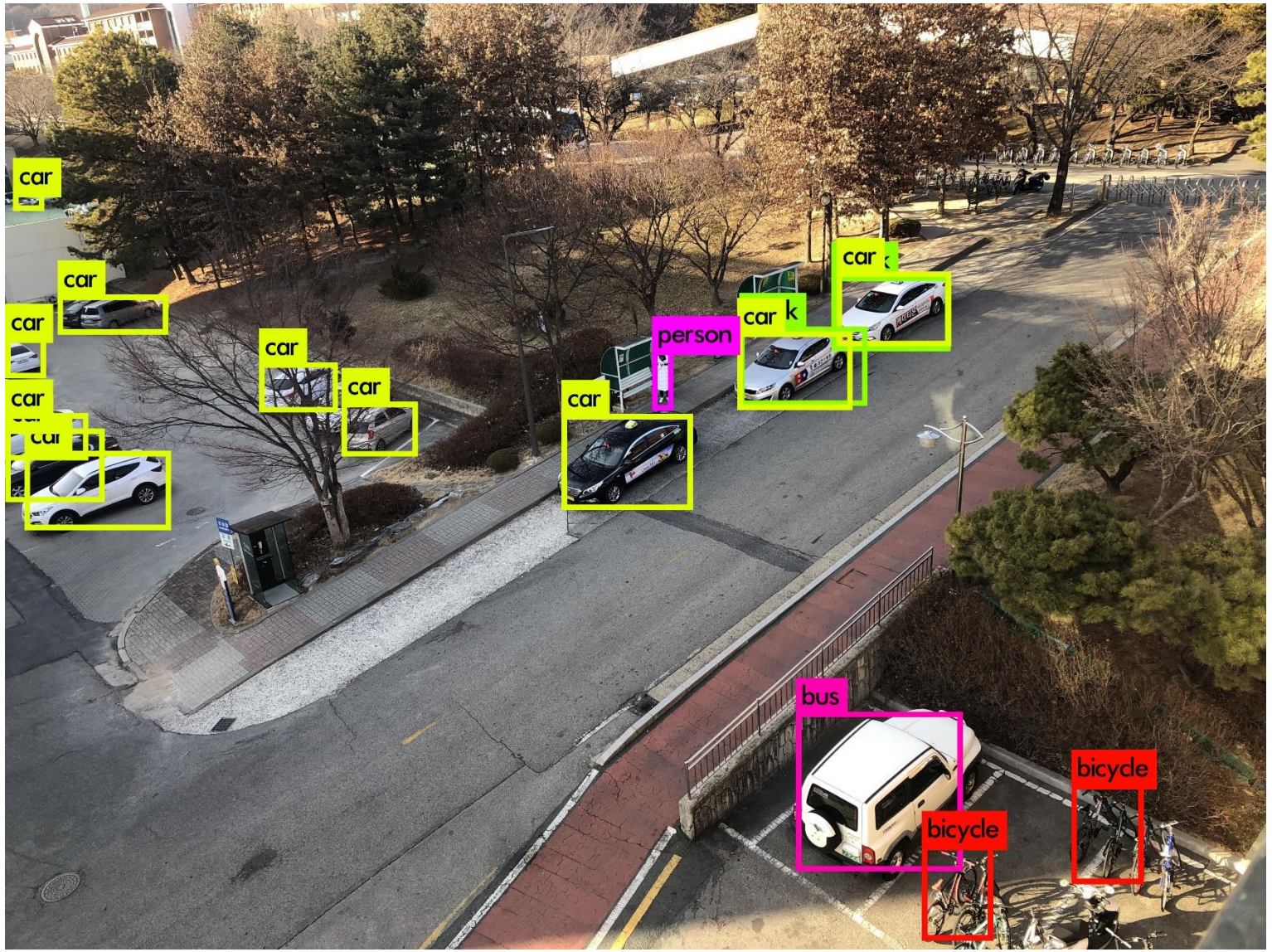



Object Detection [Yolo V3]

객체 탐지

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

# Why Deep Learning is Important

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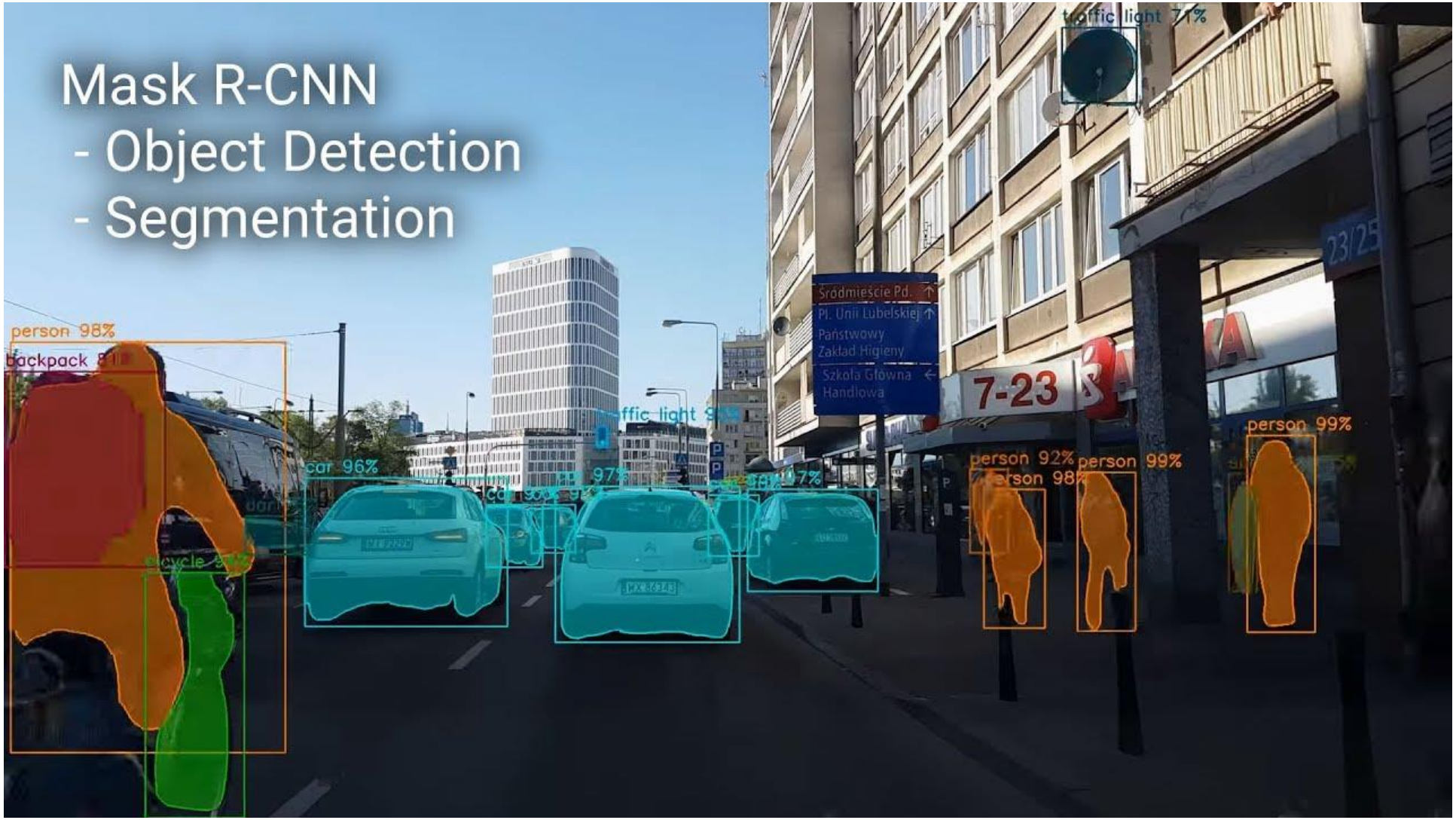


Object Detection + Segmentation [Mask R-CNN]

윤곽을 따주는 기술

https://arxiv.org/abs/1703.06870

# Why Deep Learning is Important


Image Generation [Style-Transfer]

이미지 생성



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

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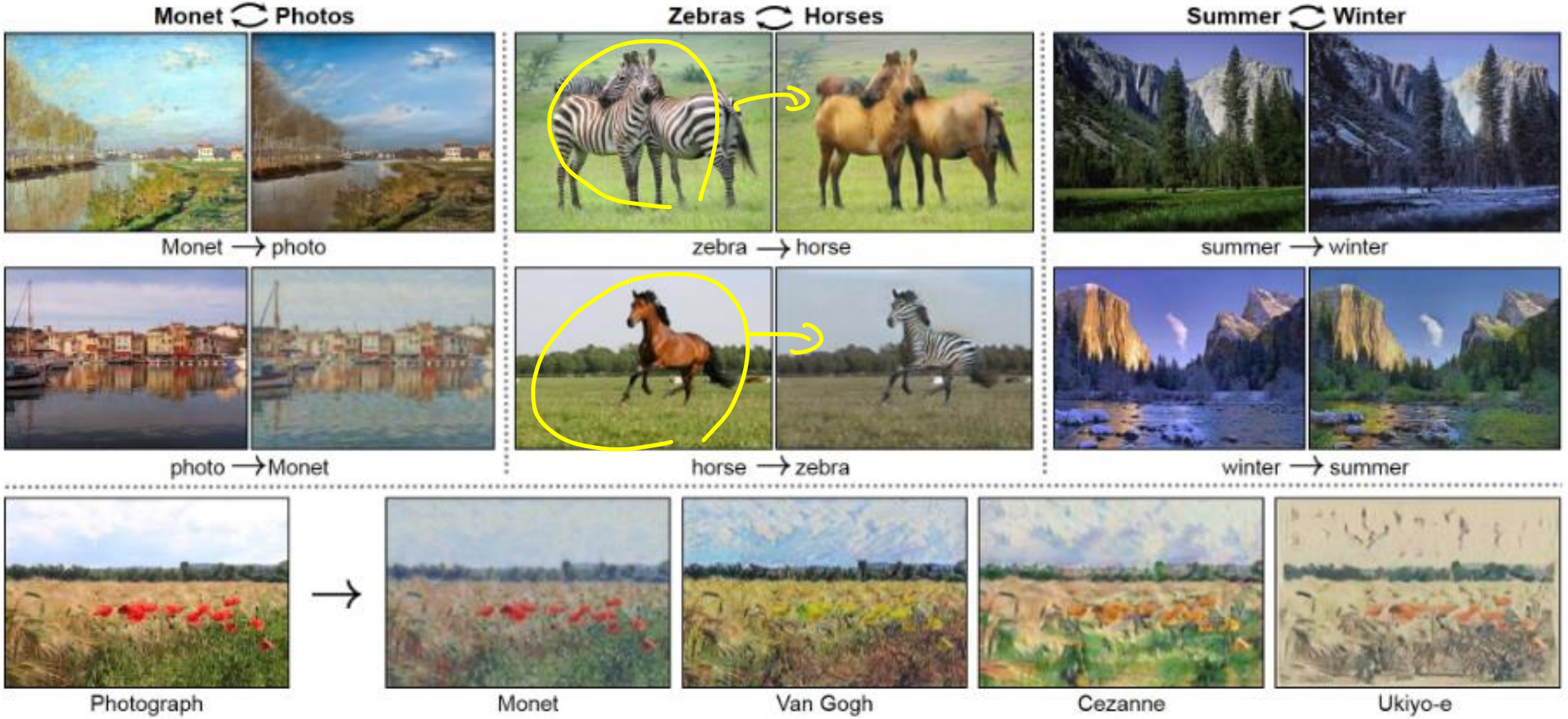



Image Generation [CycleGAN]



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

# Why Deep Learning is Important

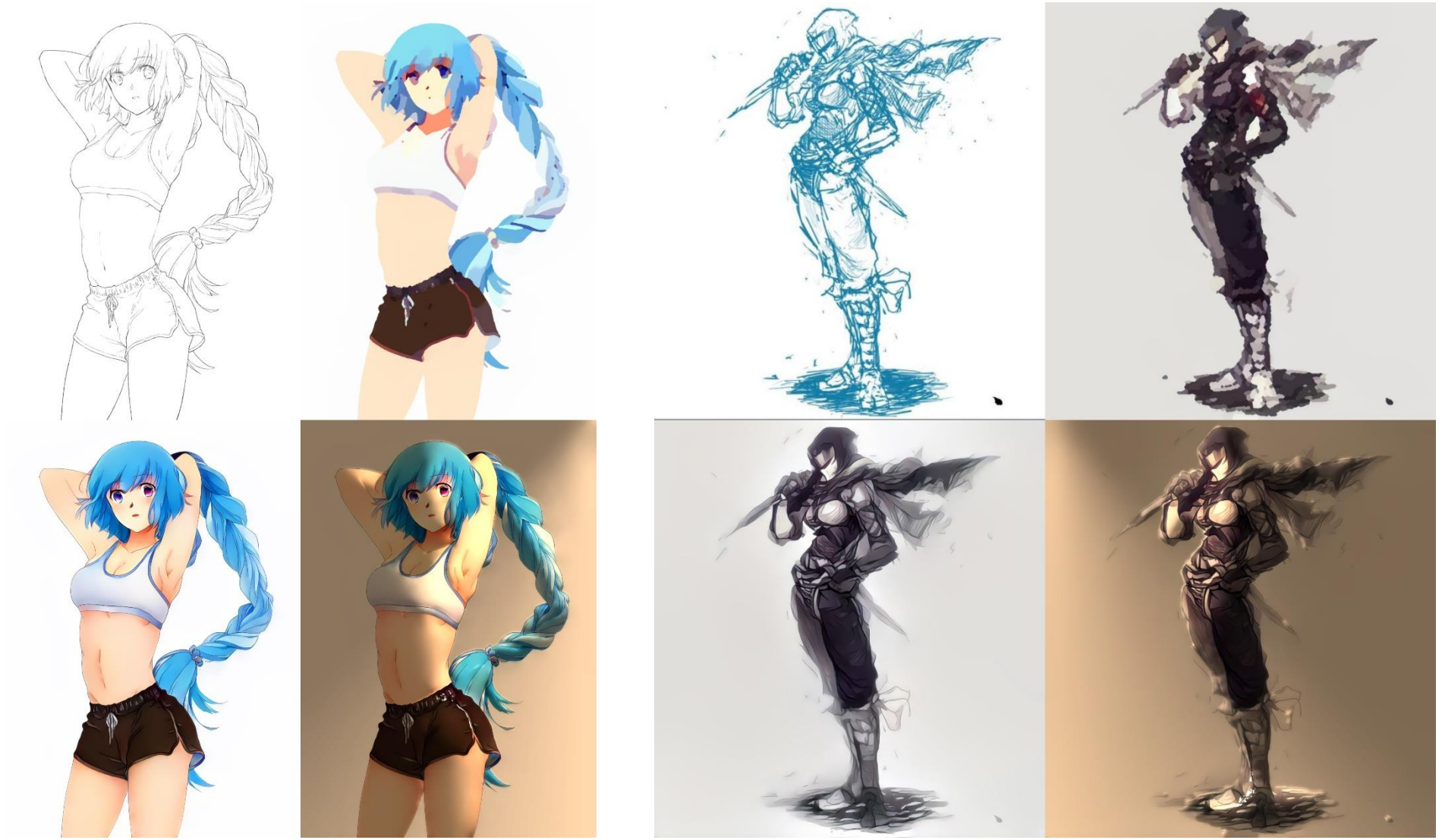


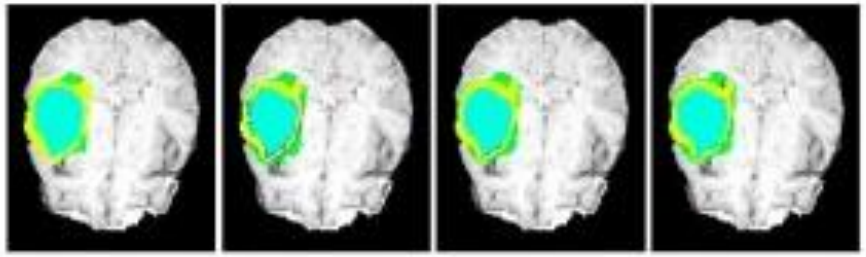
Image Generation [Style2Paints]



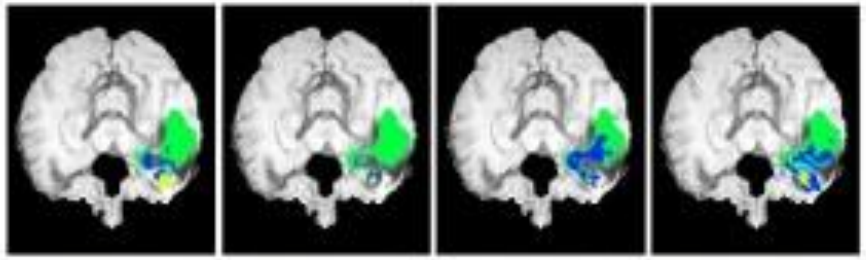
https://github.com/lllyasviel/style2paints

# Why Deep Learning is Important

## Segmentation: brain tumor segmentation

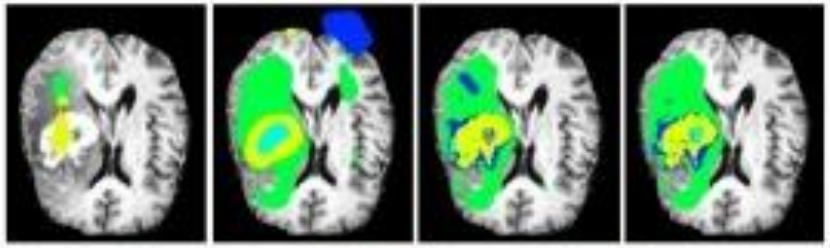


(a) 3DNet_1 (b) 3DNet_2 (c) 3DNet_3 (d) Ground truth



(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

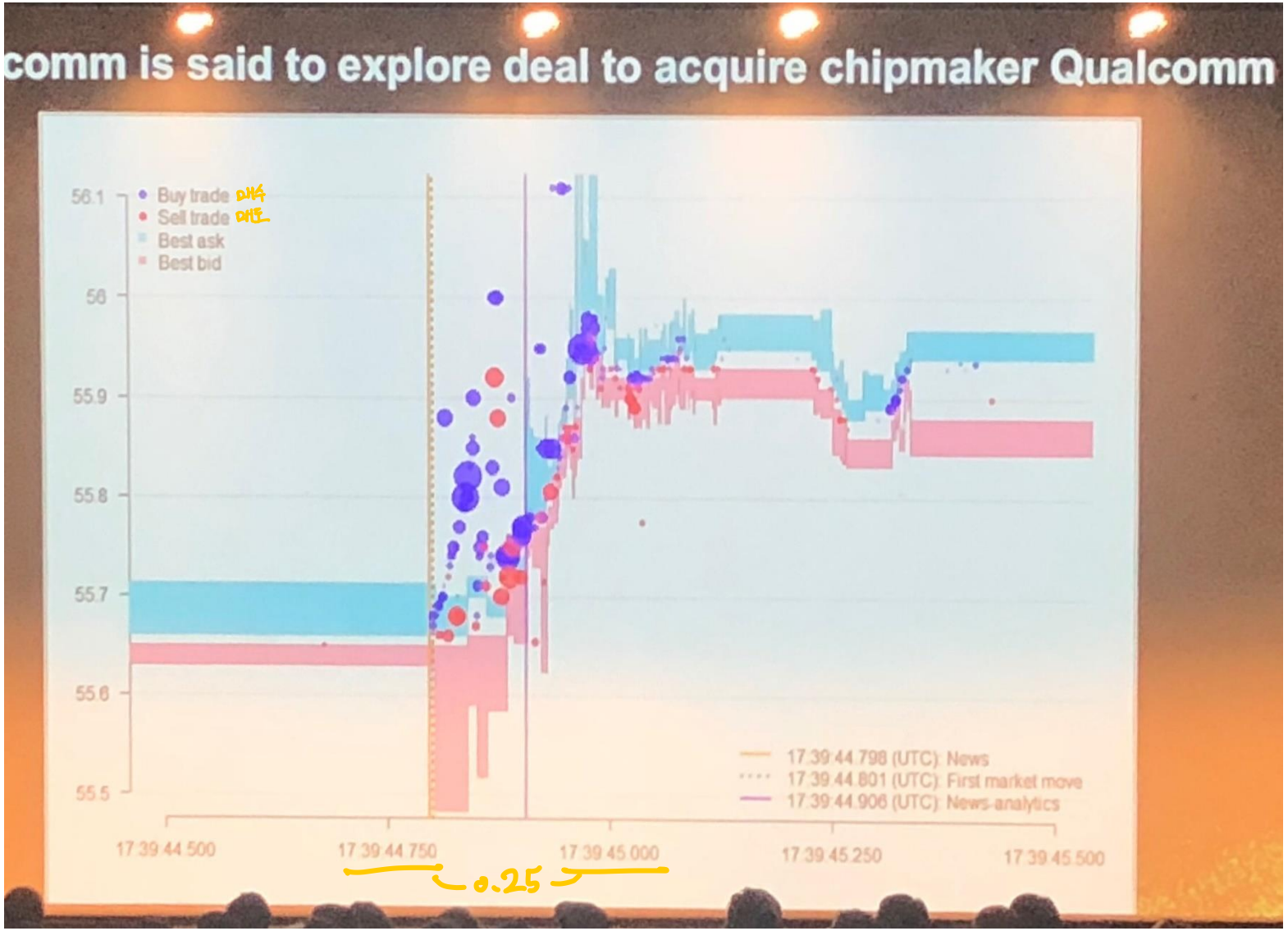
| | Accuracy | Dice score | | |
|---|---|---|---|---|
| | | Whole | Core | Active |
| 3DNet_1 | 99.69 | 89.64 | 76.87 | 63.12 |
| 3DNet_2 | **99.71** | 91.59 | 69.90 | 73.89 |
| 3DNet_3 | **99.71** | **91.74** | **83.61** | **76.82** |

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

Question Answering [BERT]

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

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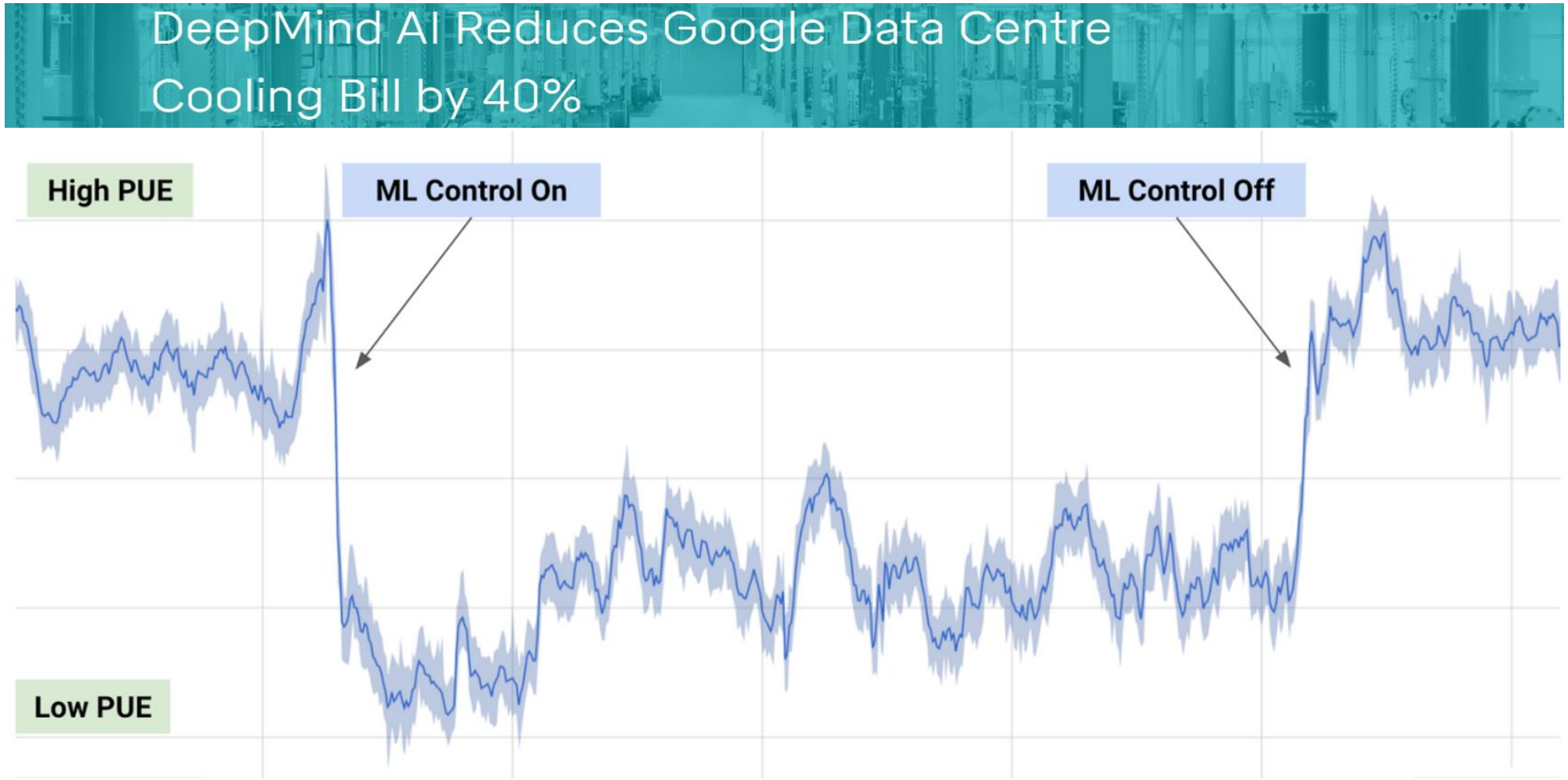


Data Center Cooling Control [DeepMind]

강화학습



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

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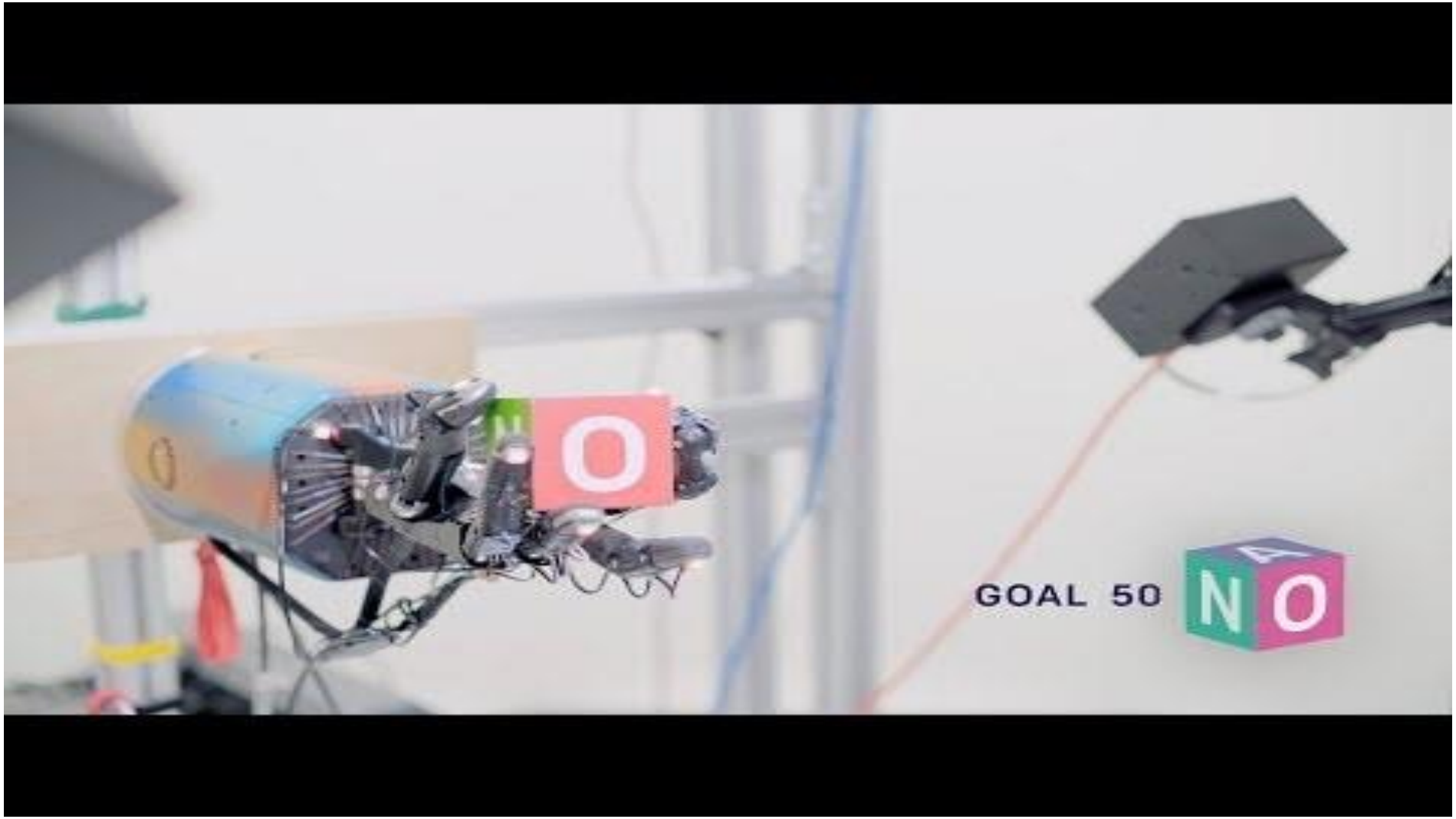


Robot Hand Control [OpenAI]



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

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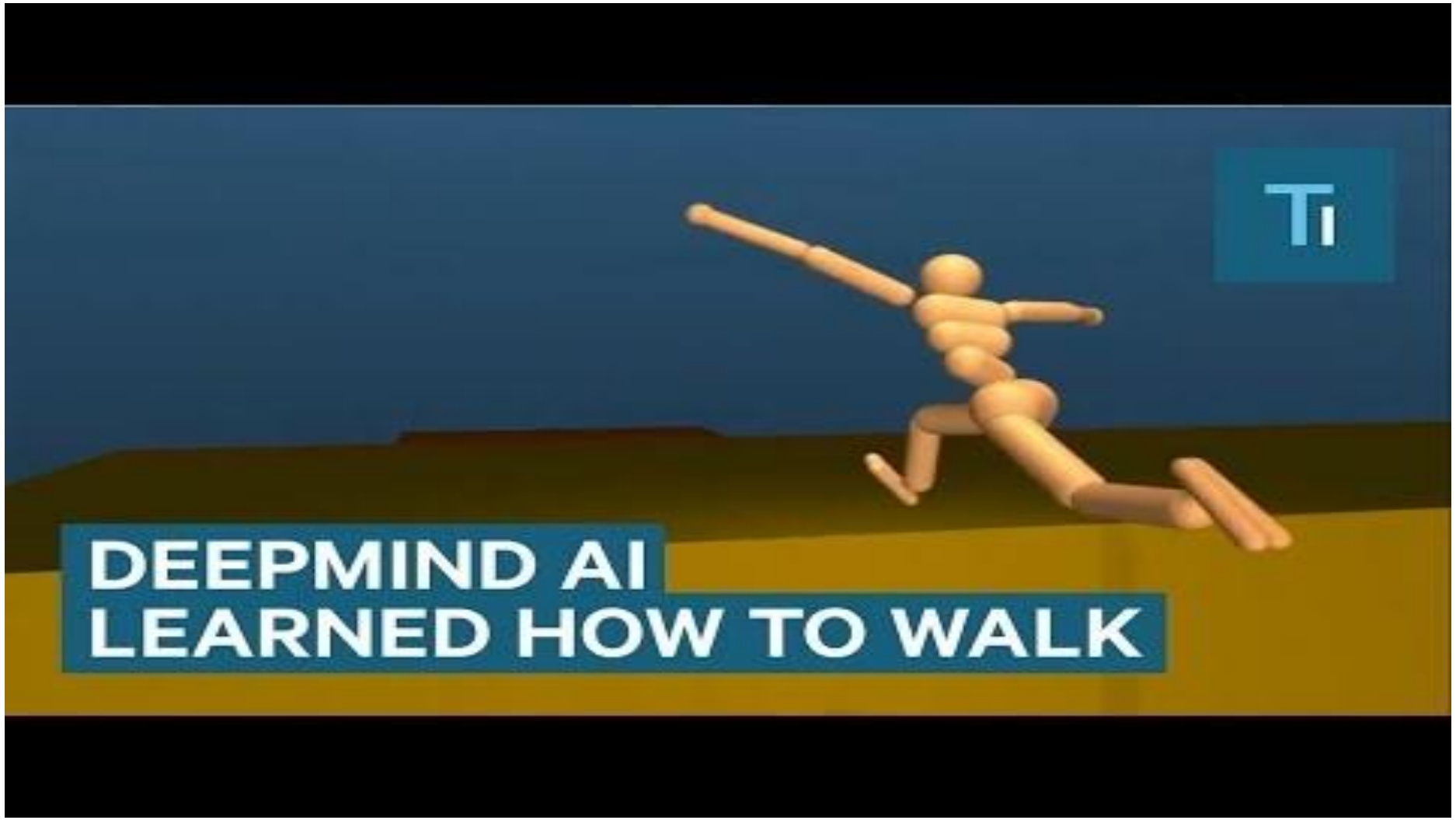



How to learn move [DeepMind]



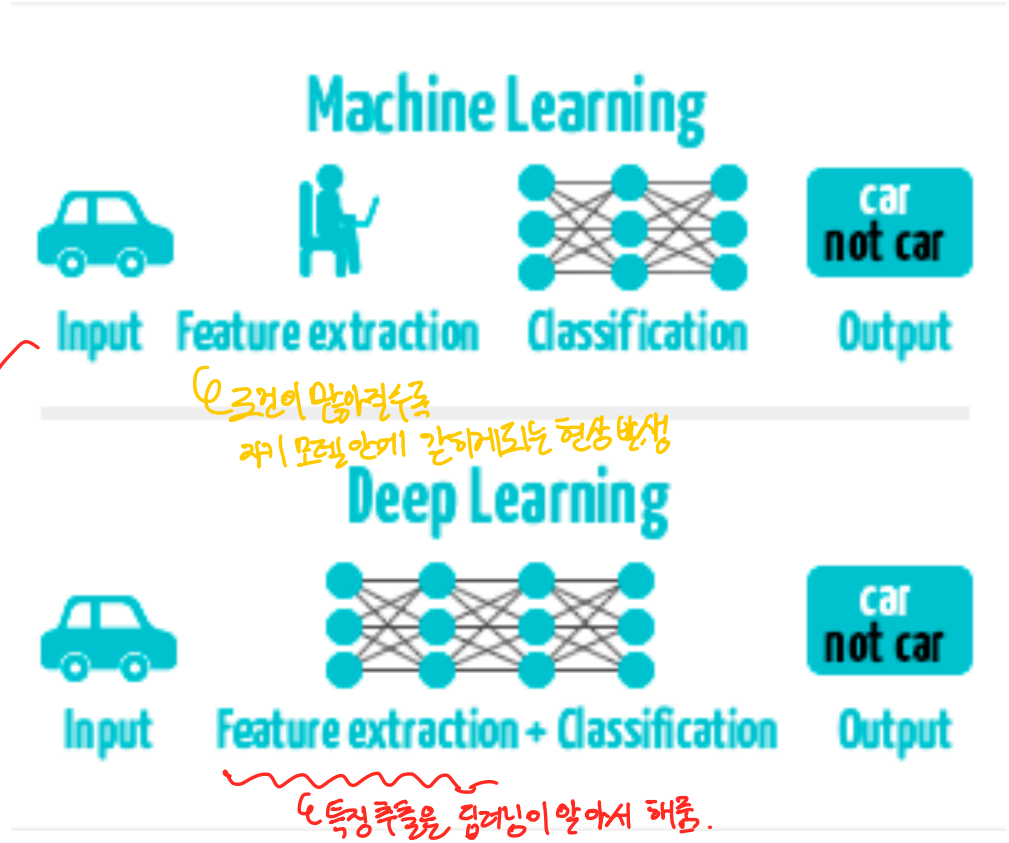
https://www.youtube.com/watch?v=gn4nRCC9TwQ

# More Projects on..

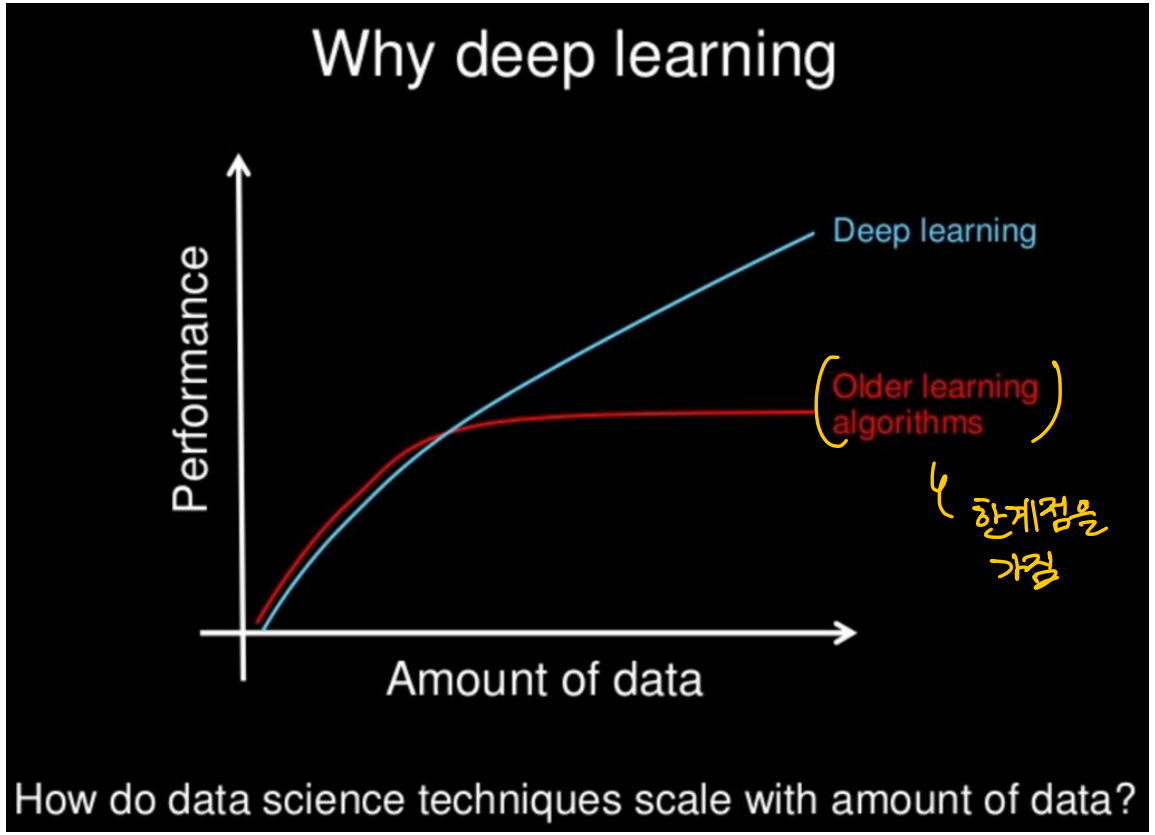
- 30 Amazing Machine Learning Projects
- Really Awesome GAN
- Awesome Deep Learning

`awesome + 검색어'
형태로 자료찾기

# 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

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- Understanding how other solve the problems

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- Utilize available techniques or source code
- Solve your own problem with nice performance
- To get a job and make money

# Audience Statics

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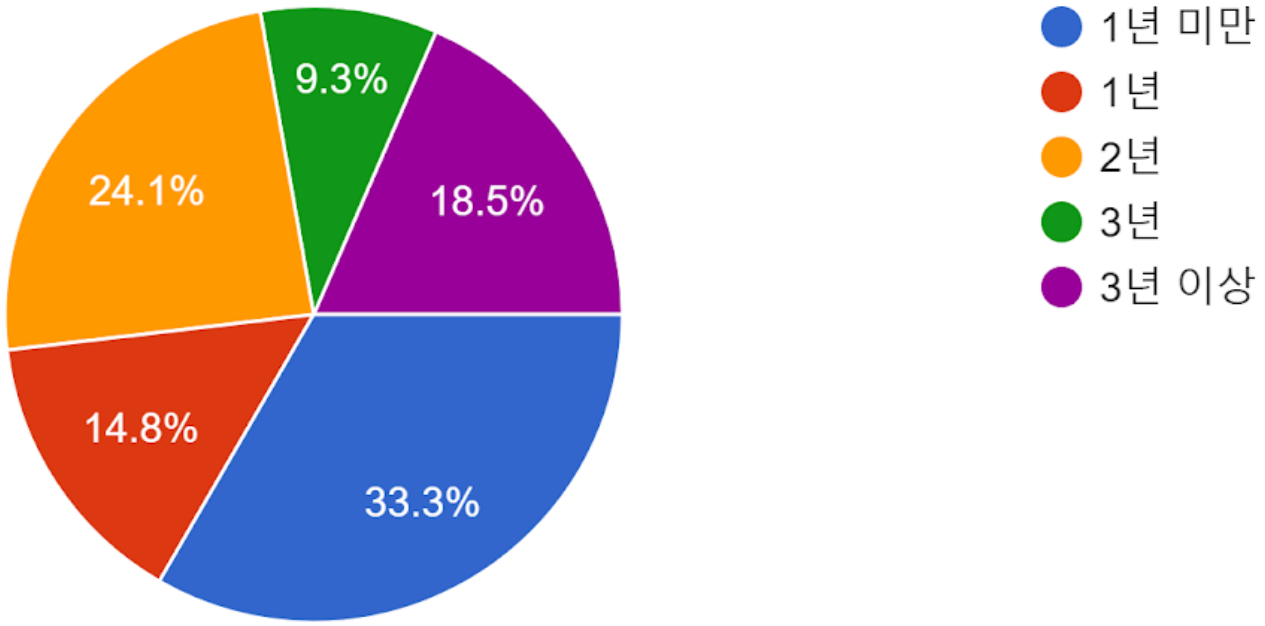
## 본인의 프로그래밍 경험은?

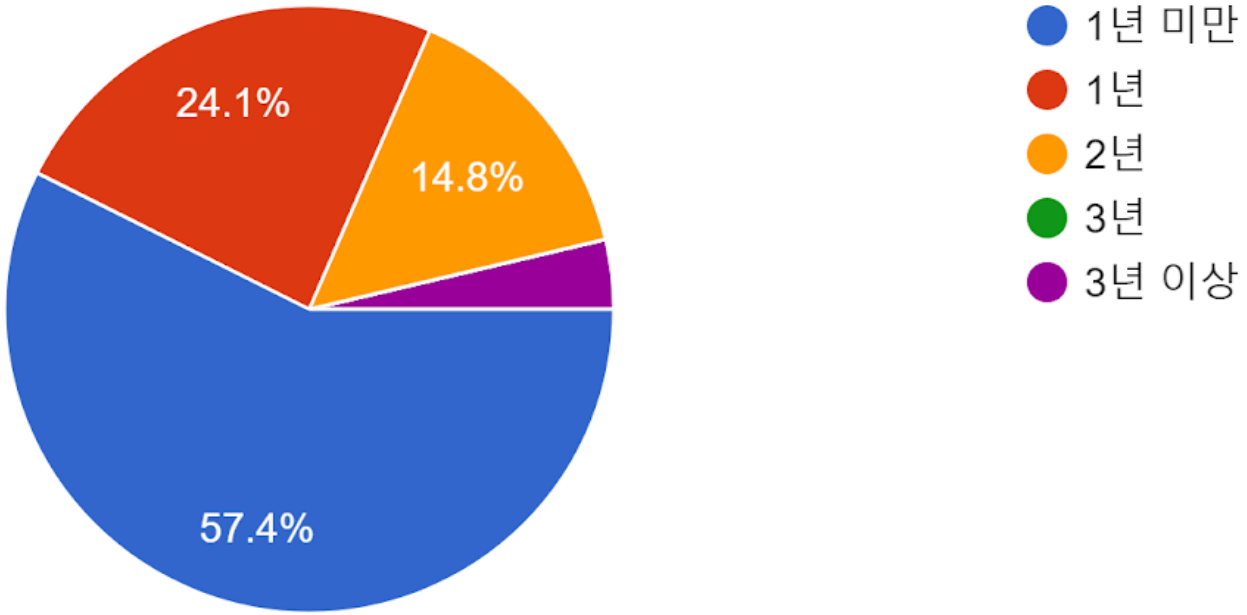
응답 54개



# Audience Statics

## 그 중 파이썬을 다뤄본 경험은?

응답 54개



# Audience Statics

## 아래 항목 중 해당되는 것을 모두 고르면?

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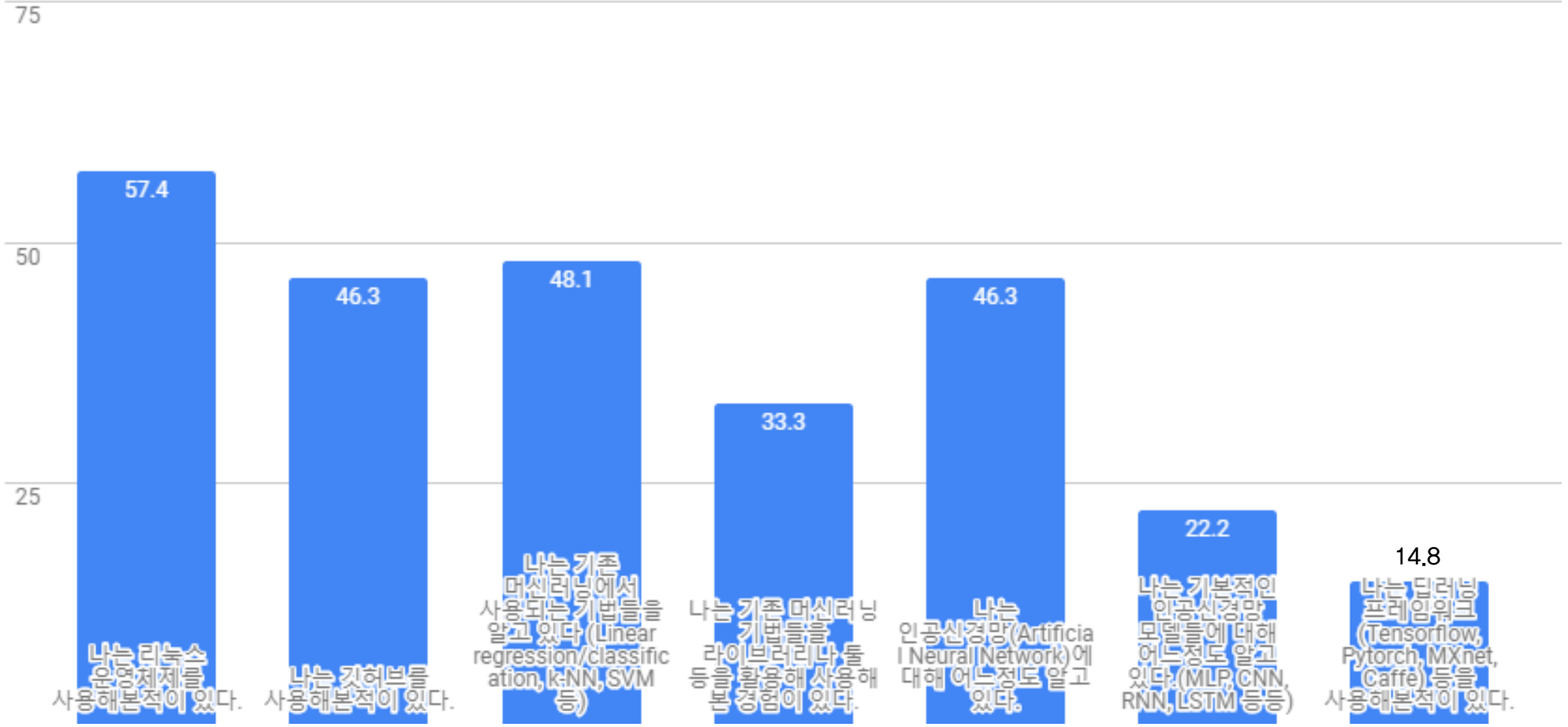

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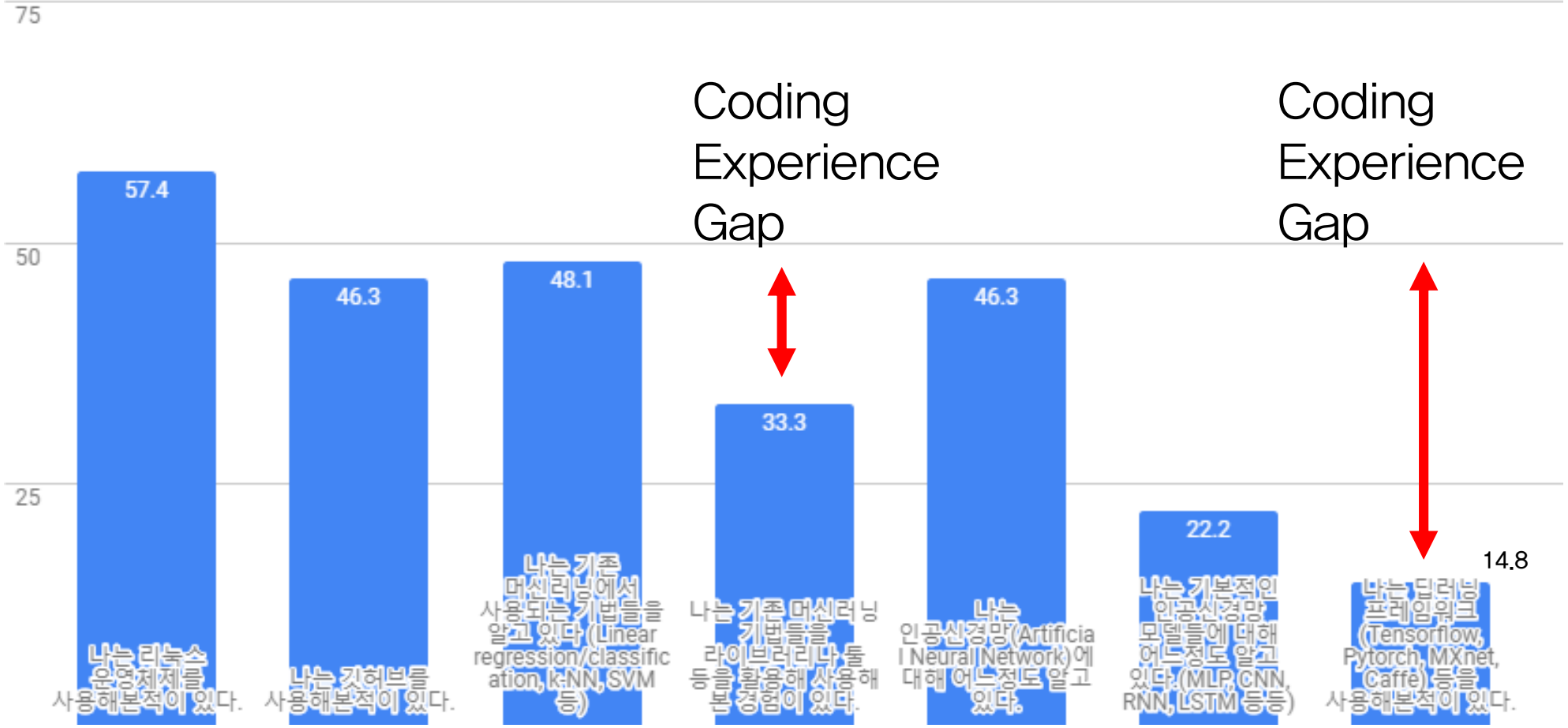

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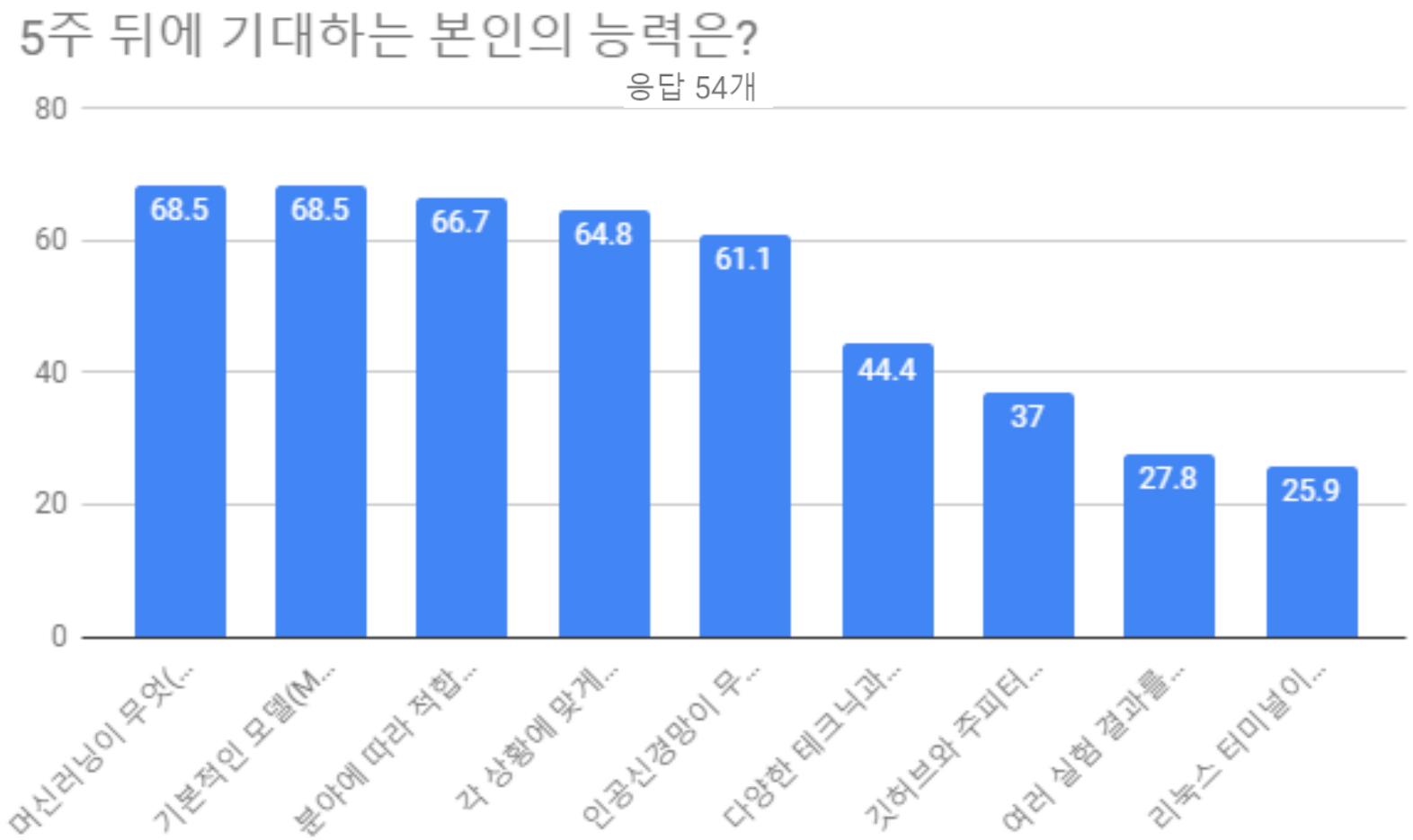

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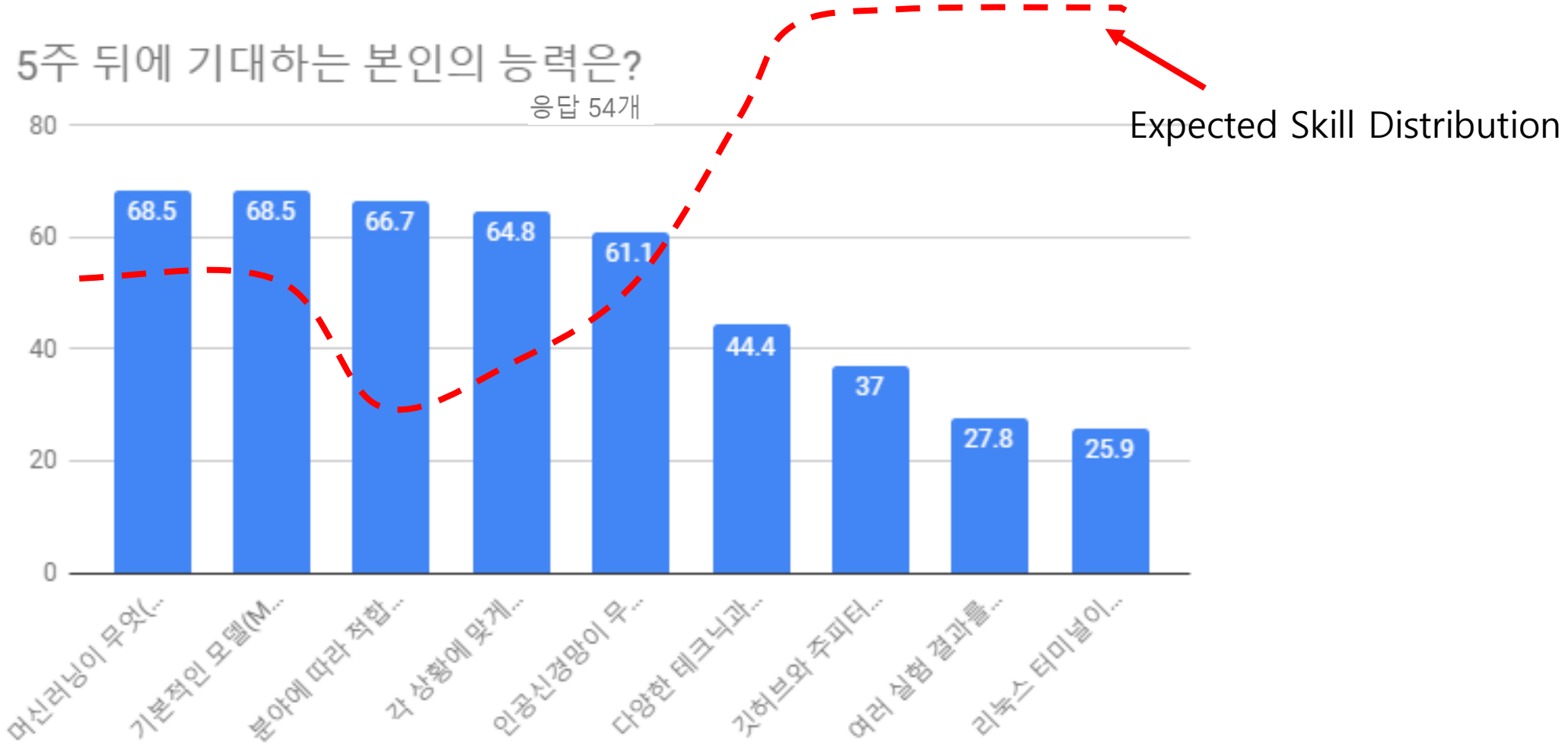

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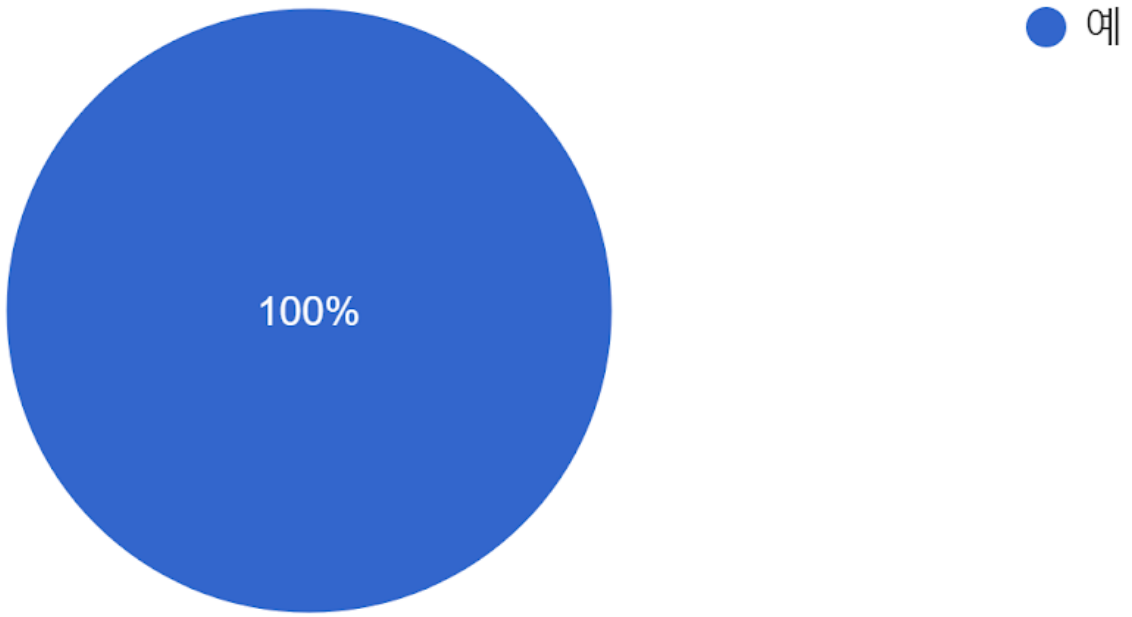
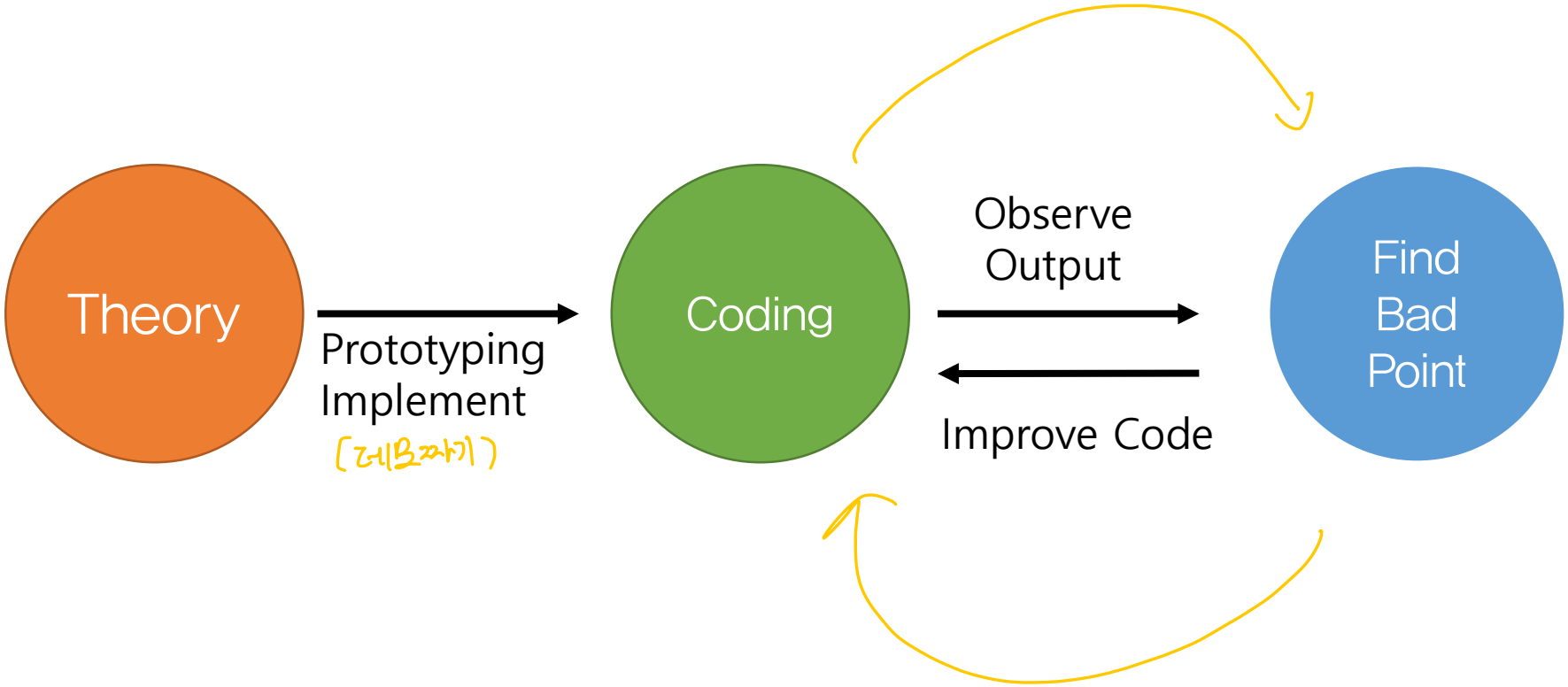
## 본인은 매 과제를 성실히 임할 준비가 되었습니까?

응답 54개

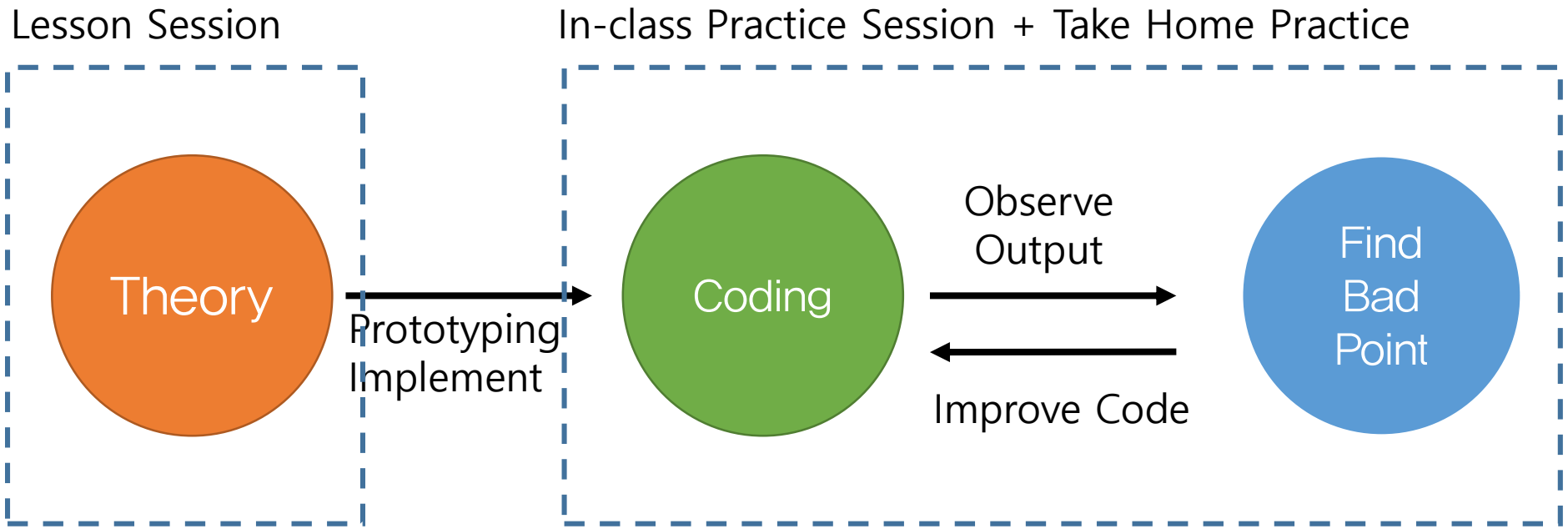


# Course Structure



# Course Structure

1 : 2



# 제가 생각한 ML/DL Learning Curve

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ML/DL이 뭔지 모름. 미지의 세계

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공부함

ML은 구닥다리 기술.
DL찬양. 뭐든 다 할 수 있을거 같음

ML/DL이 뭔지 모름. 미지의 세계

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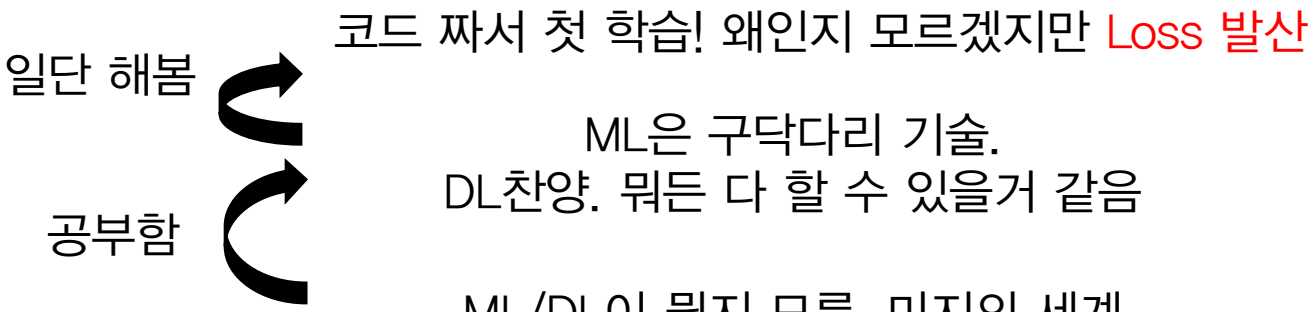

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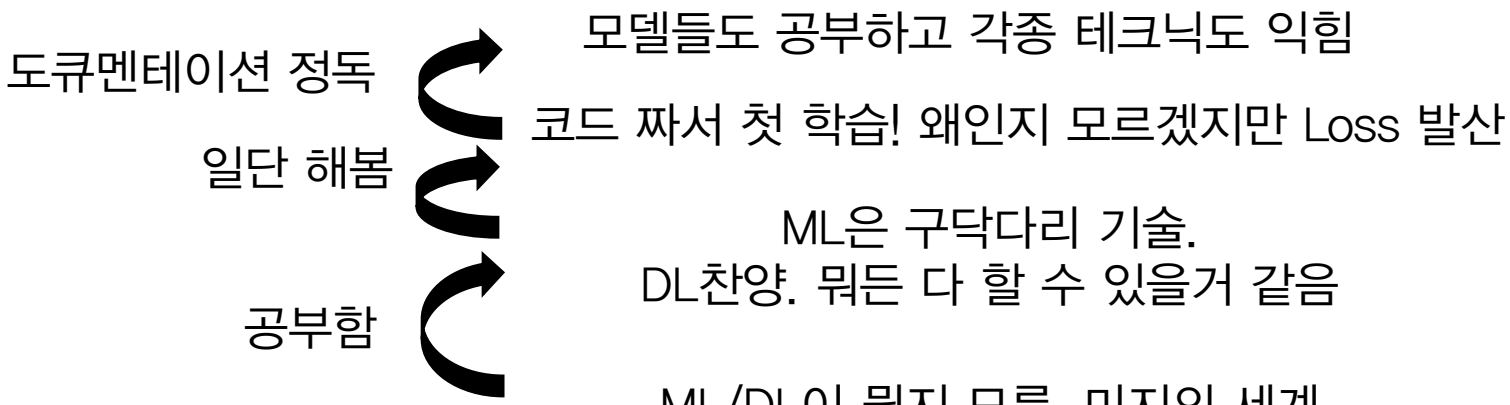

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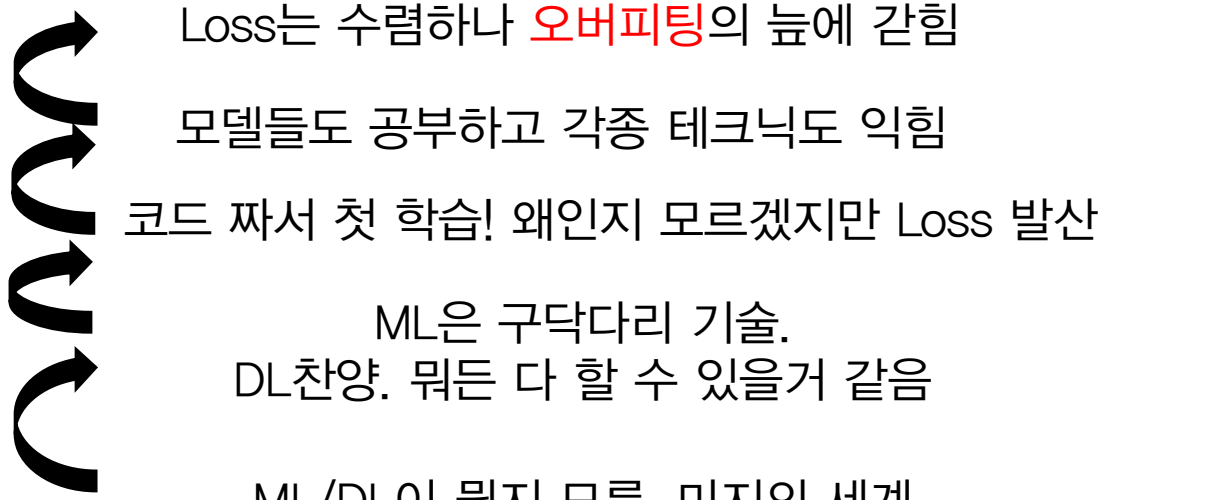

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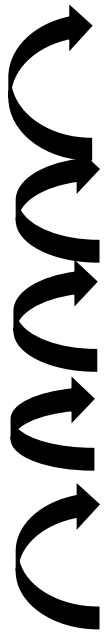

현질

코드 고침

도큐멘테이션 정독

일단 해봄

공부함

클라우드 서버(AWS, GCP)로
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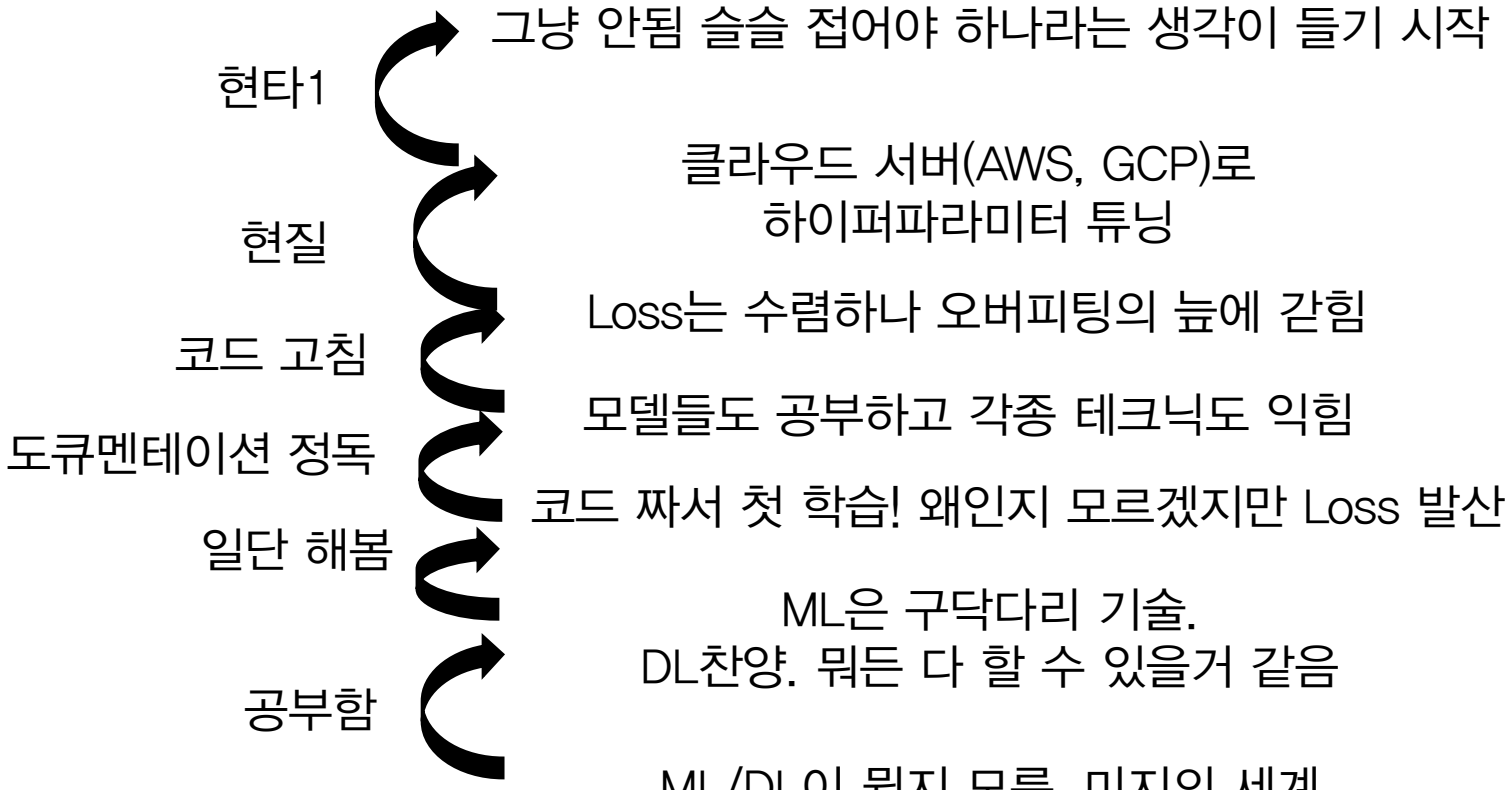

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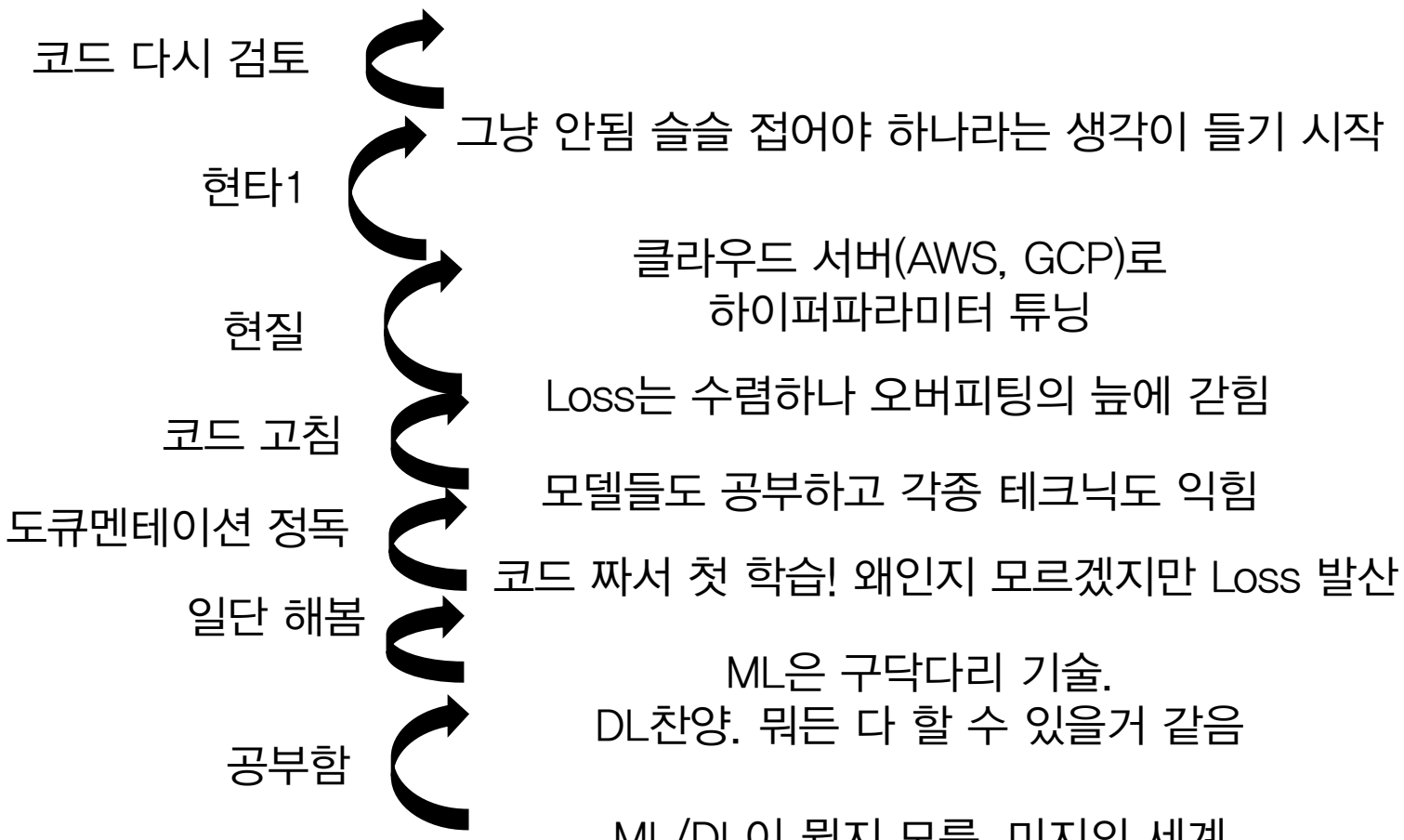

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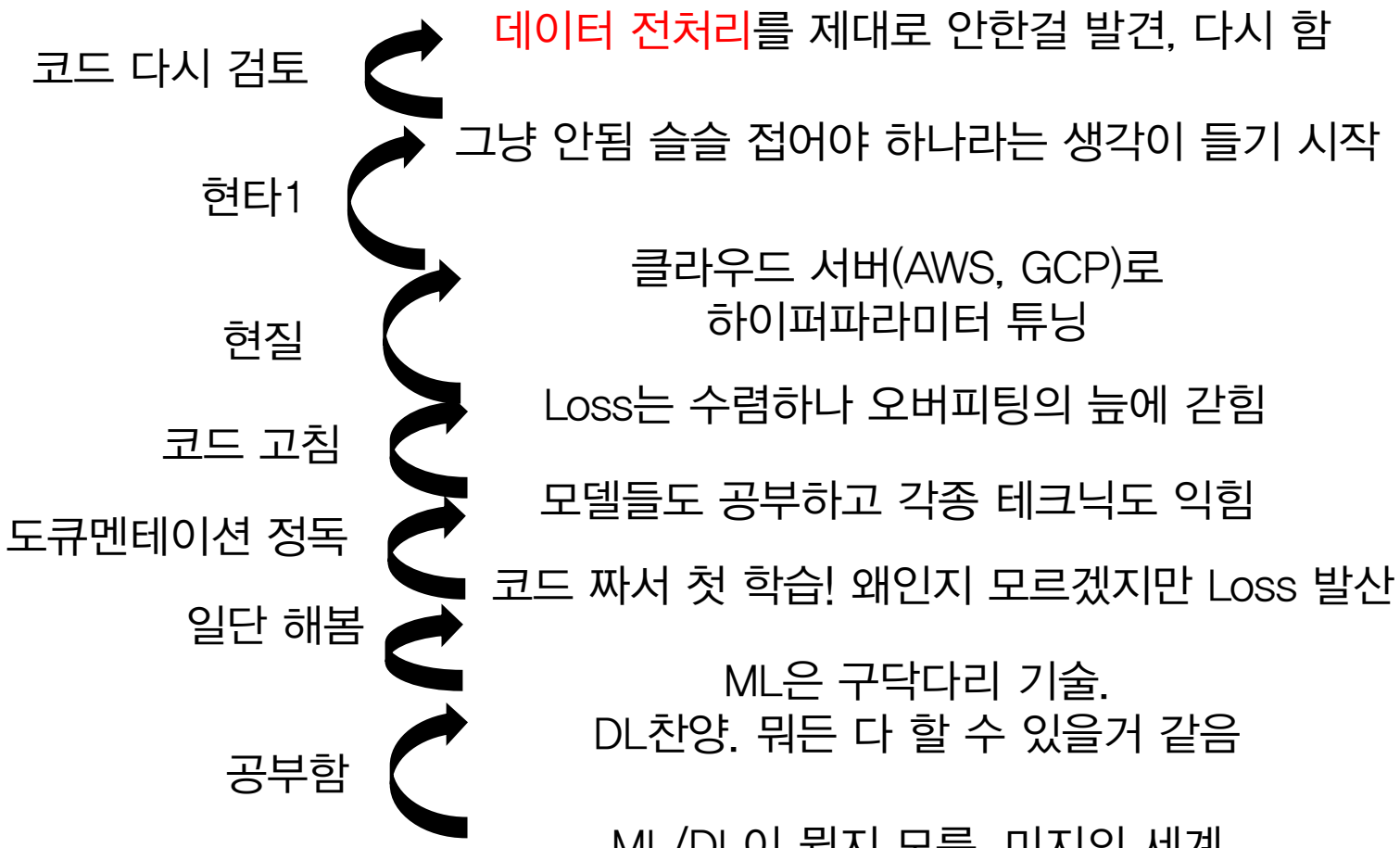

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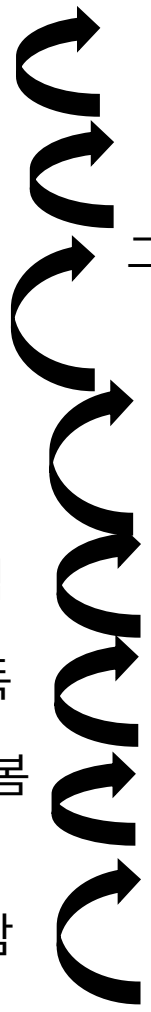

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현타1

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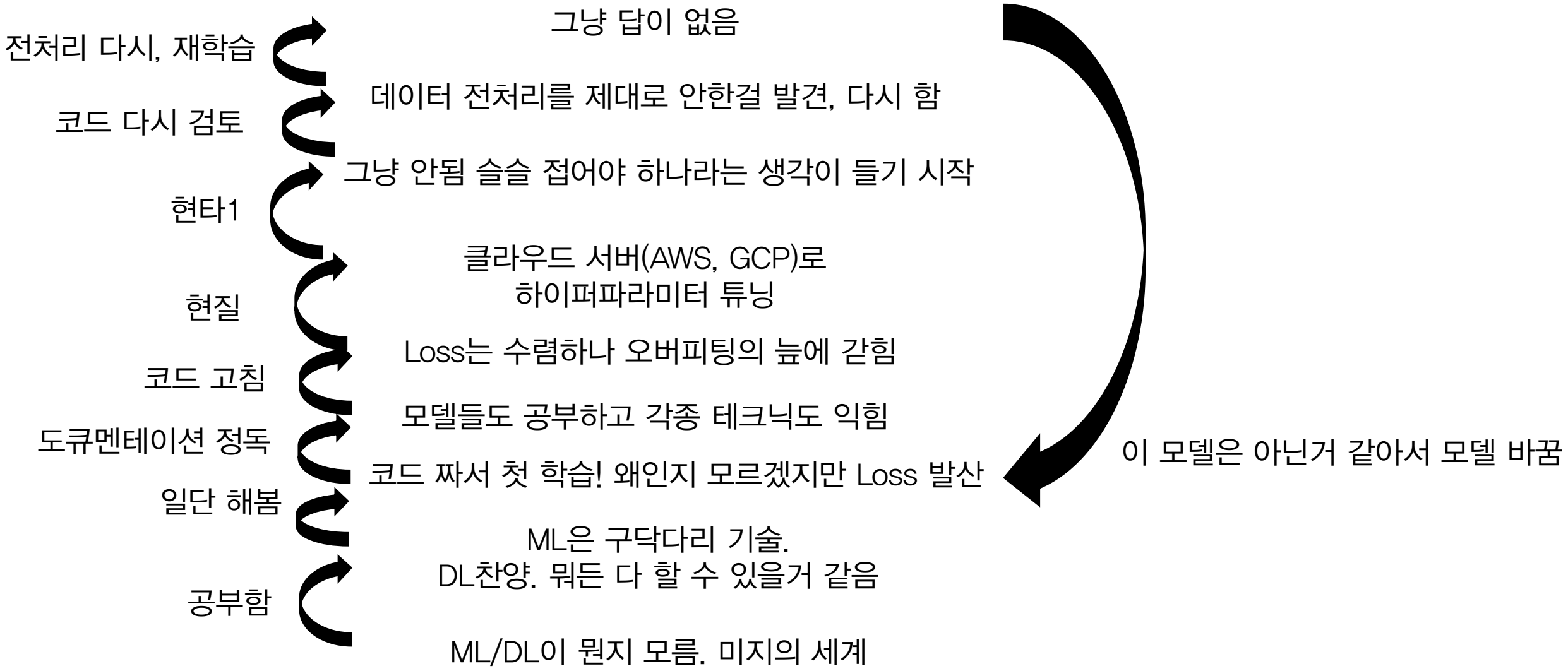

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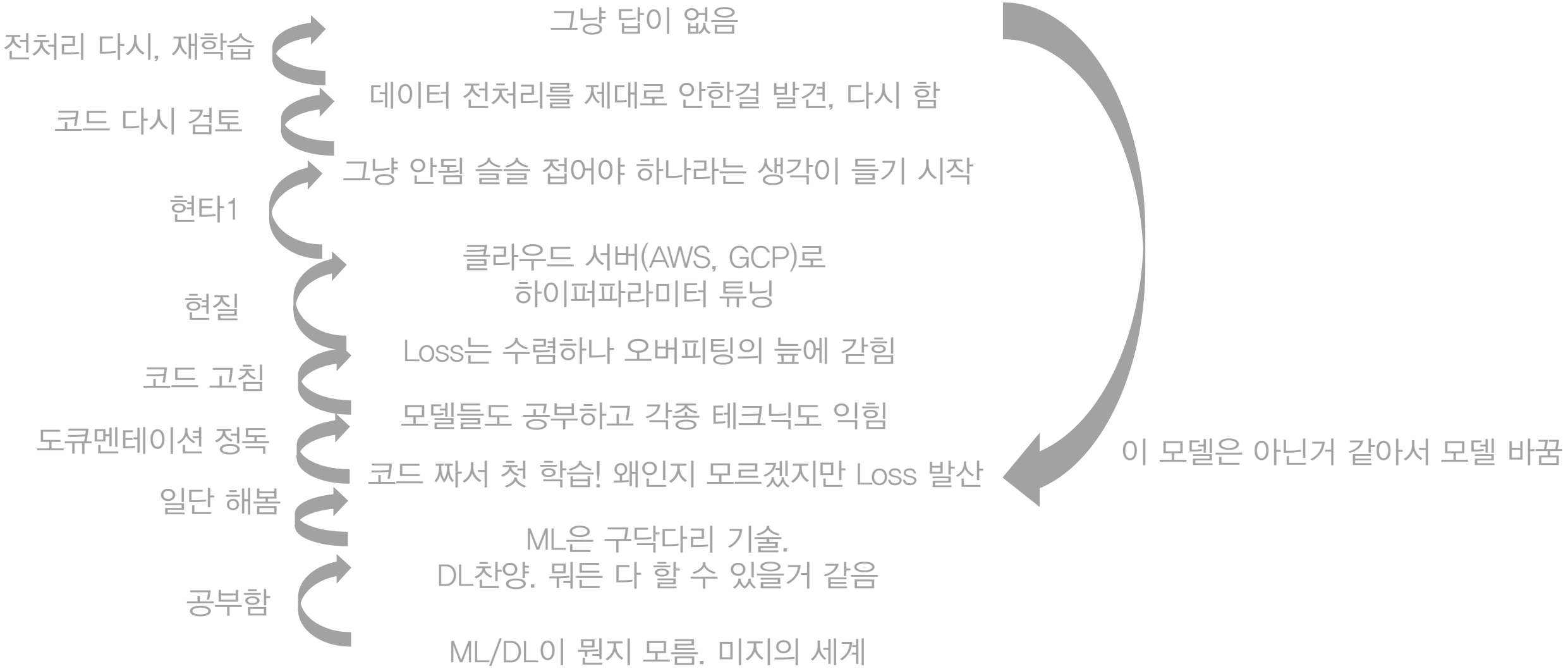

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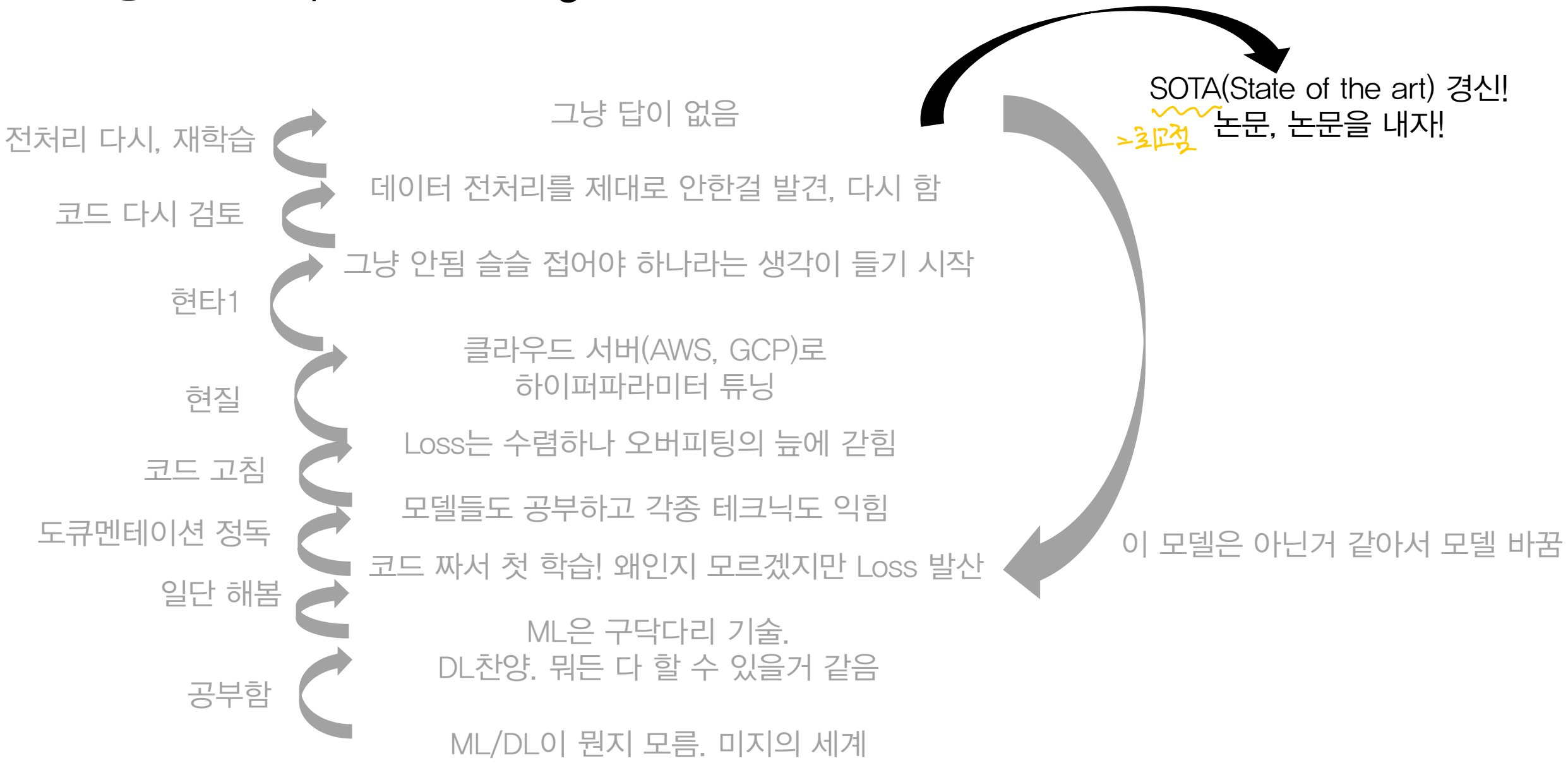

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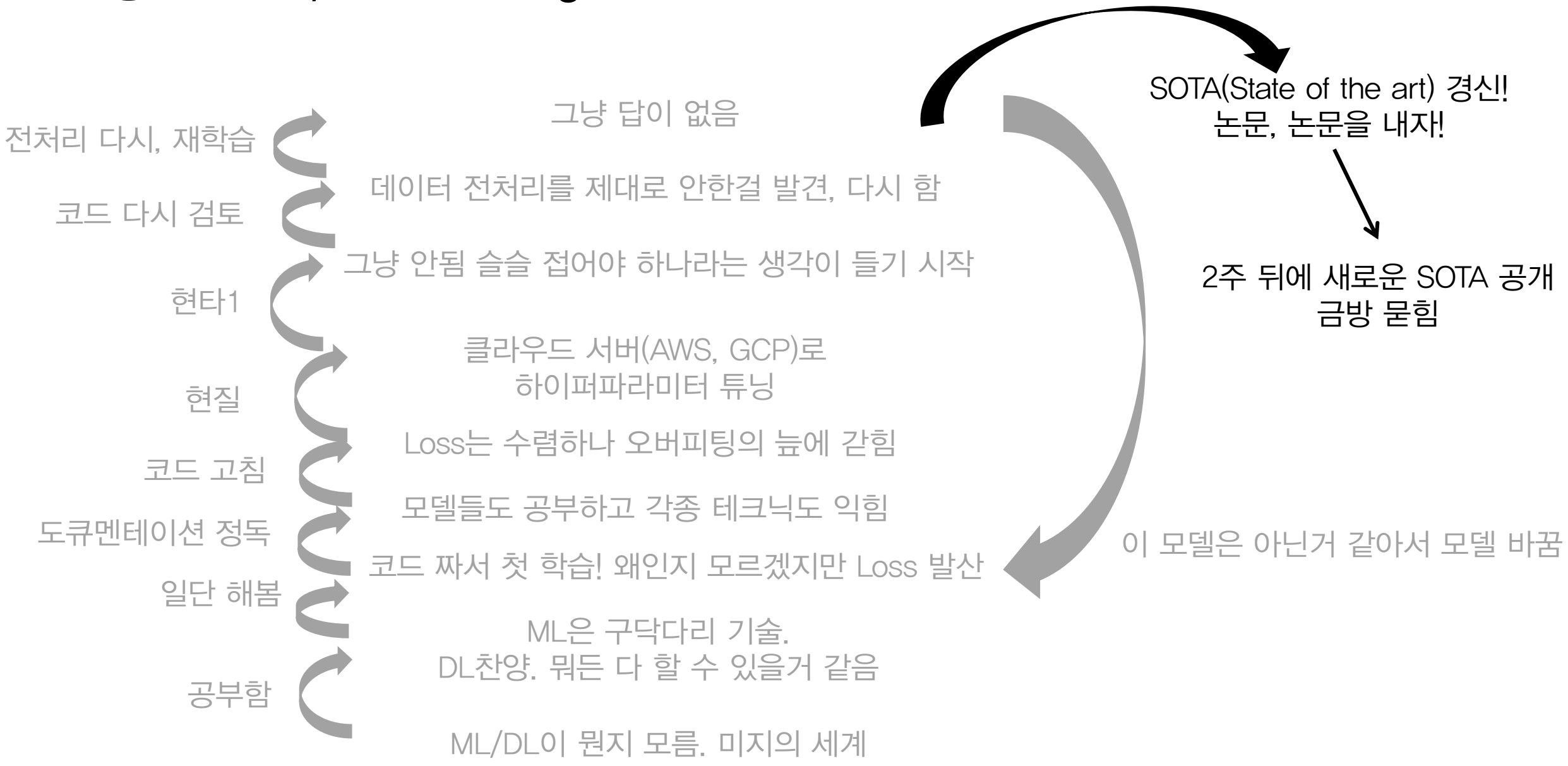

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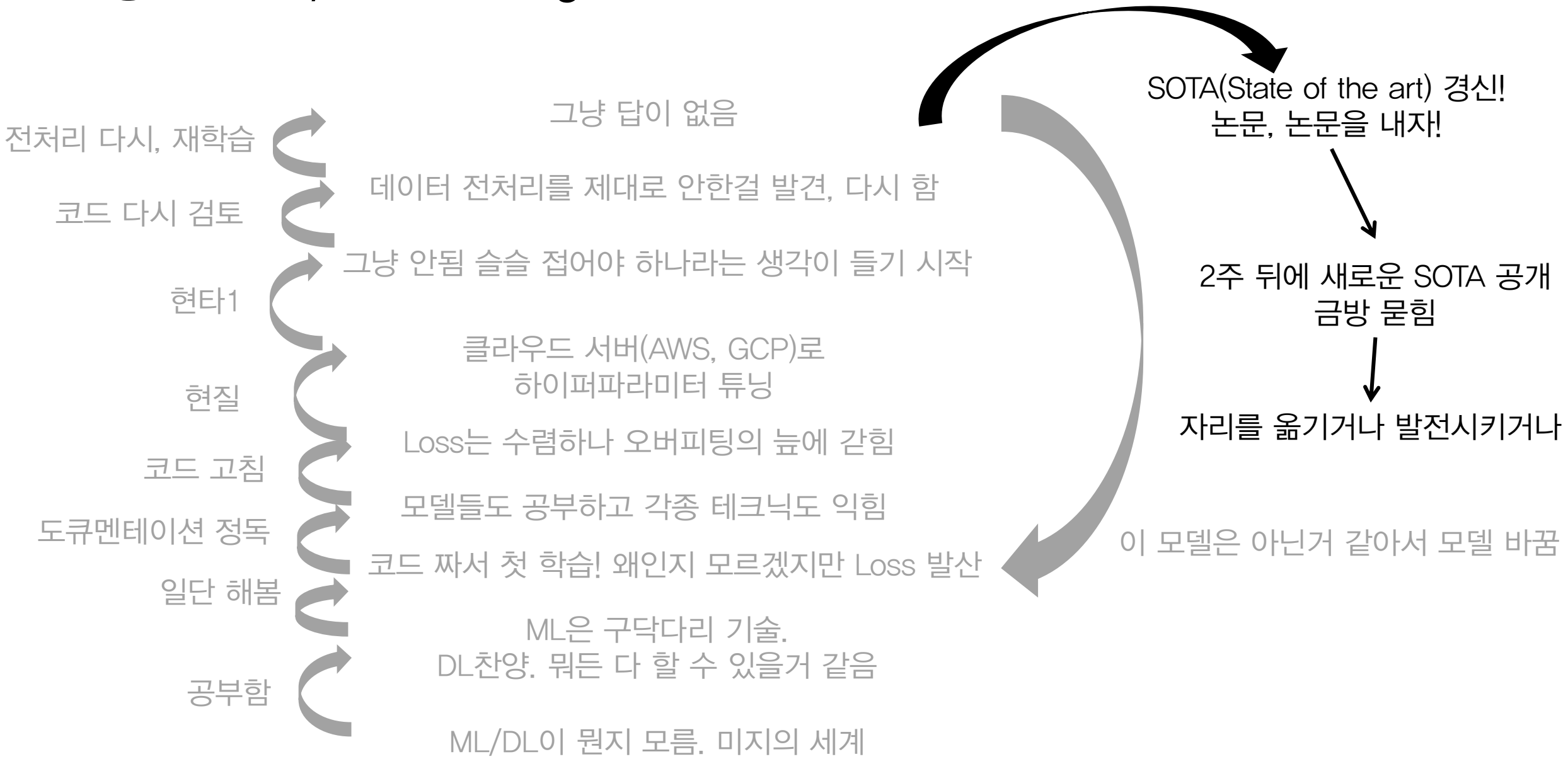

그래서 딥러닝 홀로서기는..
..뭘 하기 위한 수업인가요?

# 딥러닝 홀로서기를 들으면..

그냥 답이 없음

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# Summary

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