

Idea Factory Intensive Program #2

# 딥러닝 홀로서기

**이론강의/PyTorch실습/코드리뷰**

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

# #1

# 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>



SeungSu Kim (School of Computing)  
Developing NOGA Cab Service  
ACE Lab. Research Intern

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🐙 <https://github.com/seungsukim>

# Acknowledgement

Sung Kim's 모두를 위한 머신러닝/딥러닝 강의

- <https://hunkim.github.io/ml/>
- [https://www.youtube.com/playlist?list=PLIMkM4tgfjnLSOjrEJN31gZATbcj\\_MpUm](https://www.youtube.com/playlist?list=PLIMkM4tgfjnLSOjrEJN31gZATbcj_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

**DING  
BRO;**



***Idea  
Factory***

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

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– Youtube

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– Offline Study or Course

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We are not the best choice!



The diagram consists of seven horizontal lines on the left, each representing a source of deep learning material. From each line, an arrow points towards the right. The arrows from 'Youtube', 'Blog', 'Book', and 'Paper' are slightly curved and point towards a common area. The arrows from 'Offline Study or Course', 'Online Study or Course', and 'Github Code & Tutorial' are straight and point towards a common area further to the right. A red text overlay 'We are not the best choice!' is positioned to the right of the arrows, indicating a critique of the first four sources.

Why Did We Start this Course?



# Why Did We Start this Course?

- Two of our team lost their internship opportunity

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# Why Did We Start this Course?

- Two of our team lost their internship opportunity
- Deep Learning is getting more important → More Specifically?
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- 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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- Everyone trains their neural net!
- DL seems to be a magic power!
- Full of successful stories using DL



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Solve many  
Real-world  
problems

# Why Deep Learning is Important

## ImageNet Challenge

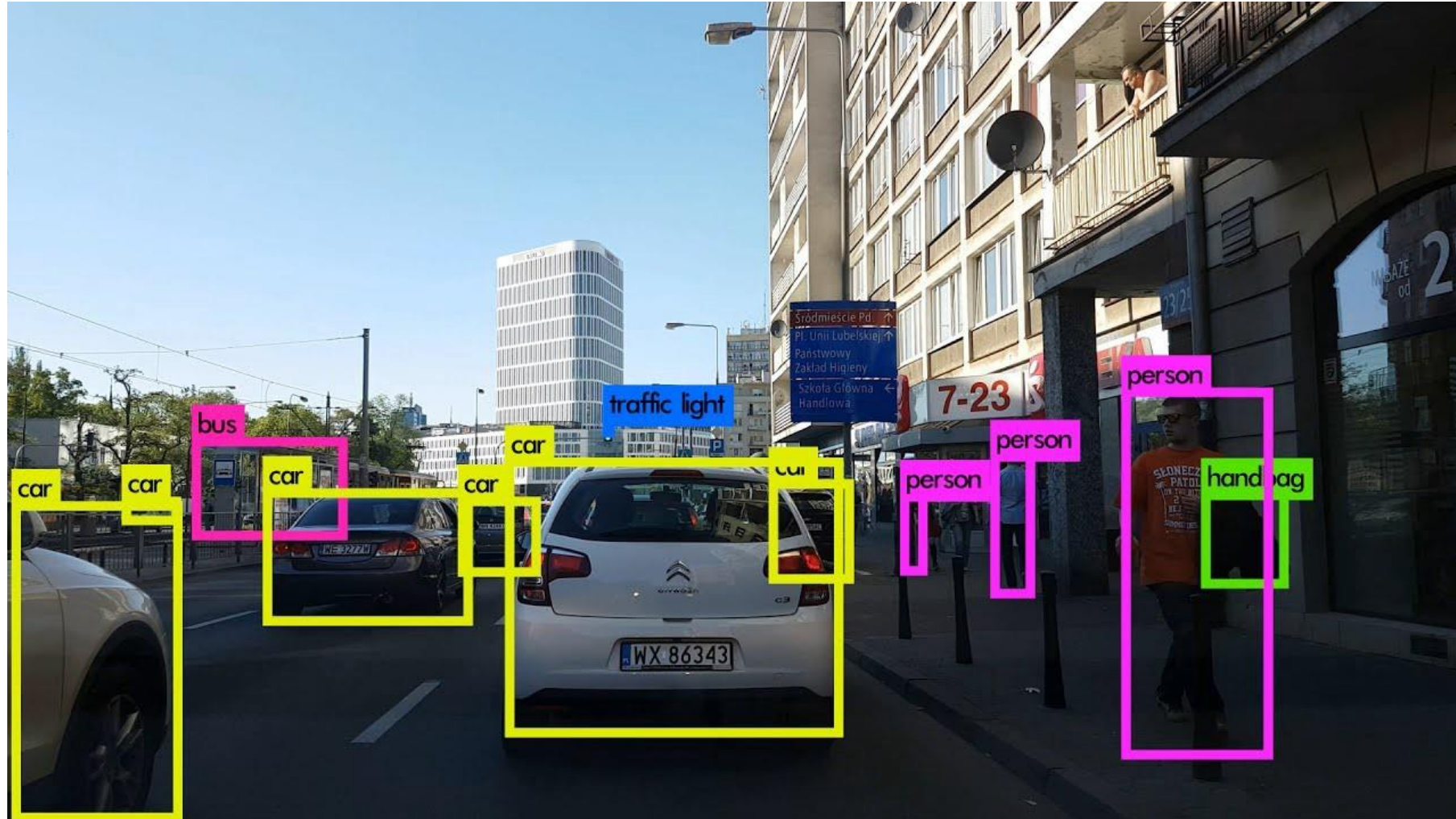
IMAGENET

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



Image Classification [ResNet]

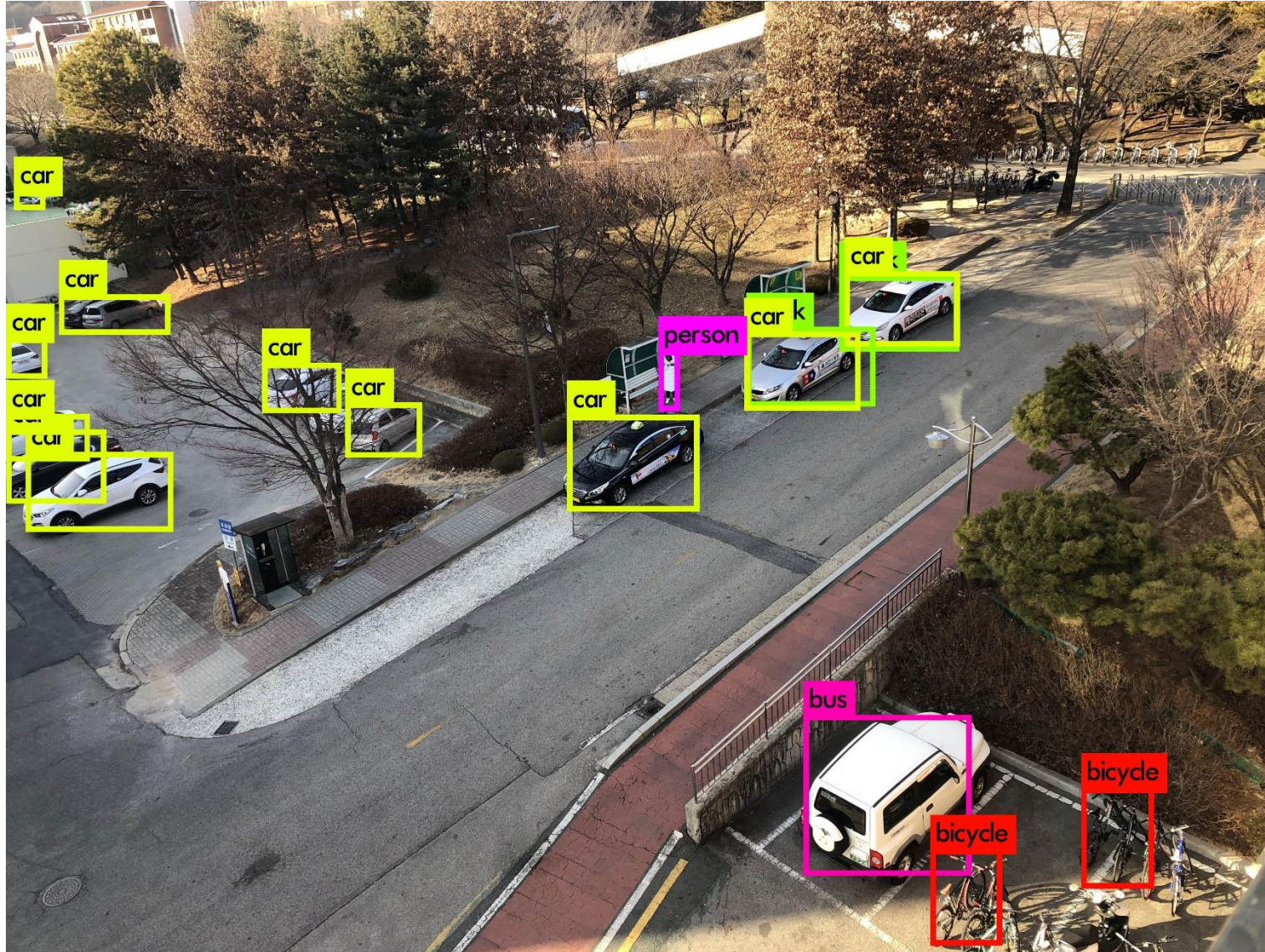
# Why Deep Learning is Important



Object Detection [Yolo V3]



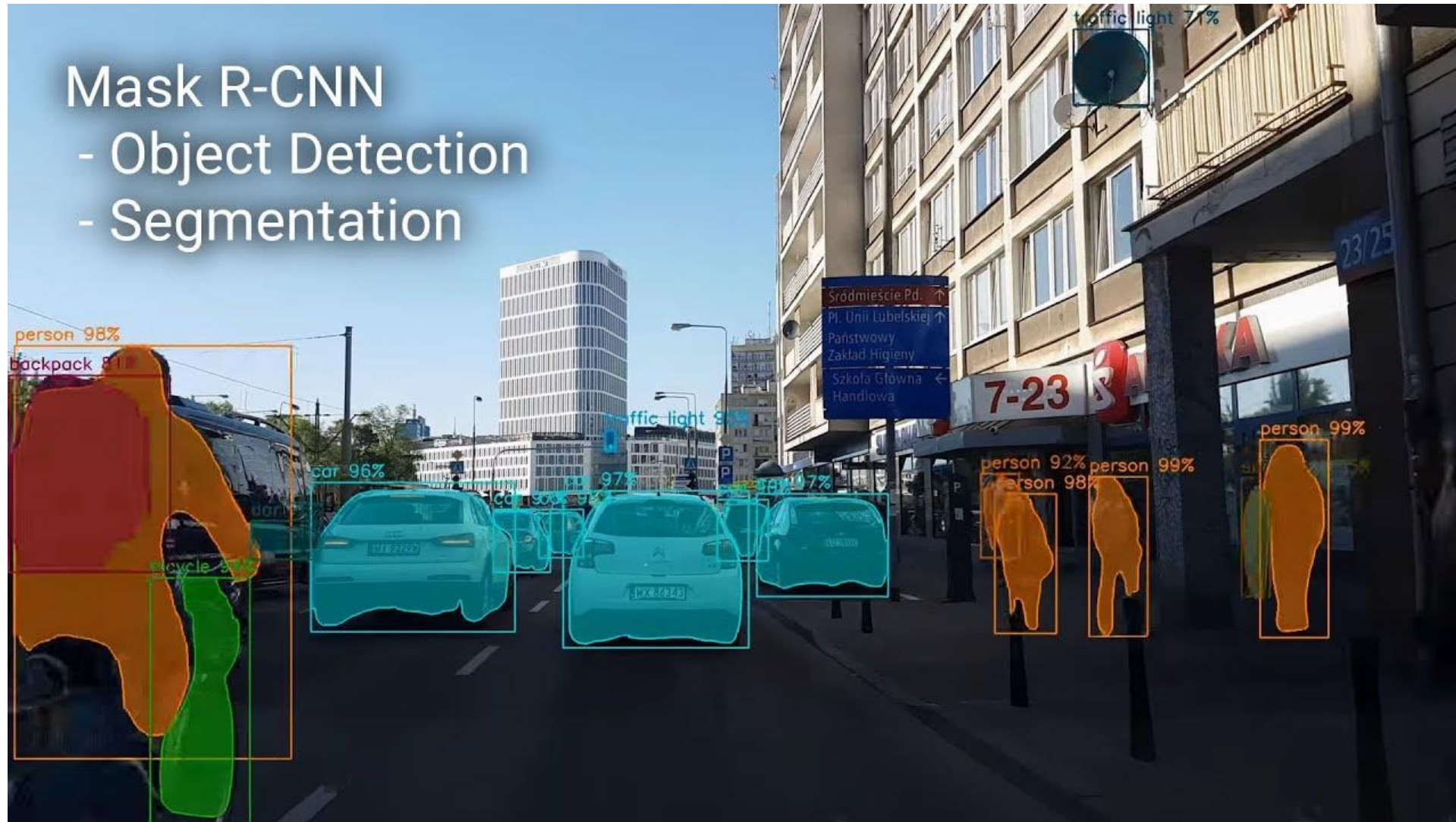
# Why Deep Learning is Important



Object Detection [Yolo V3]



# Why Deep Learning is Important



Object Detection + Segmentation [Mask R-CNN]

# Why Deep Learning is Important



Image Generation [Style-Transfer]



# Why Deep Learning is Important

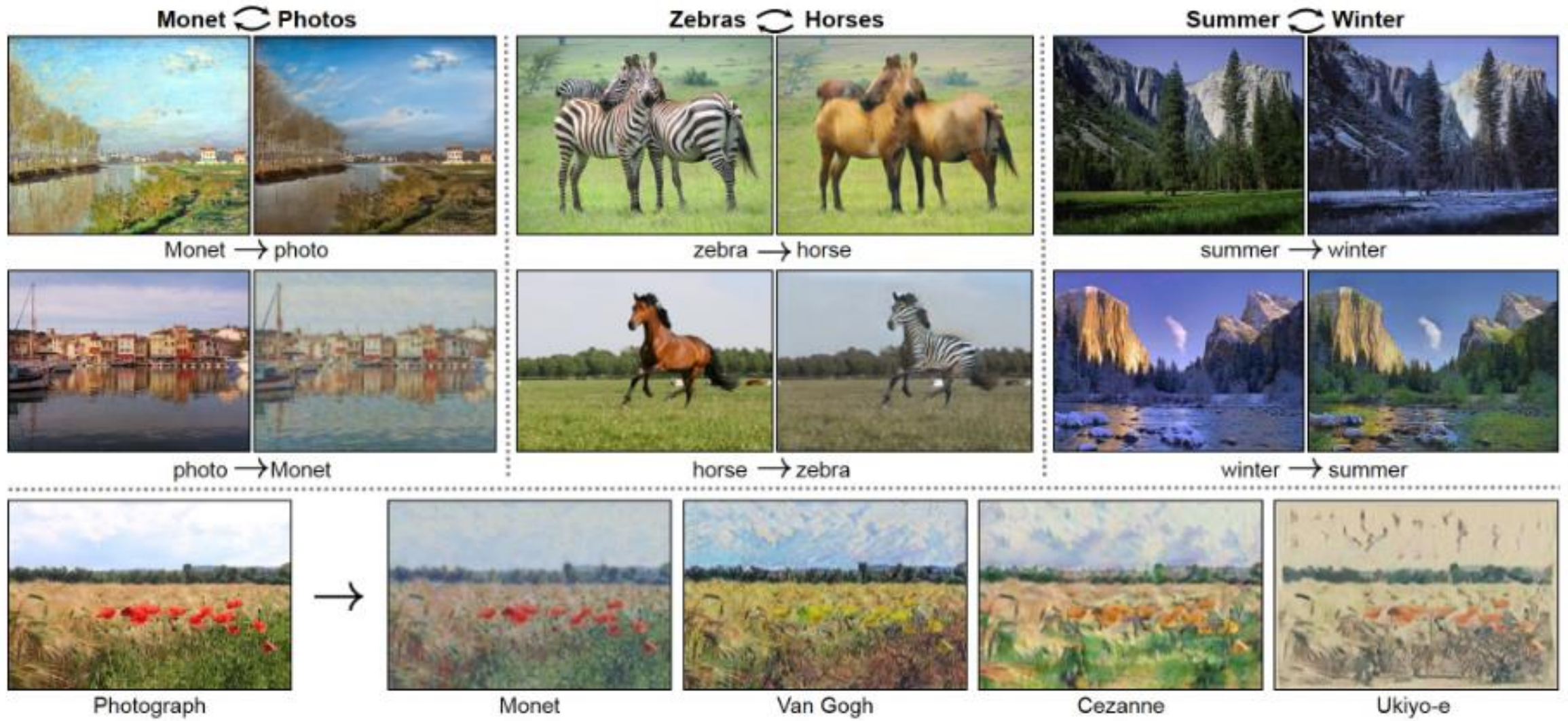


Image Generation [CycleGAN]

# Why Deep Learning is Important

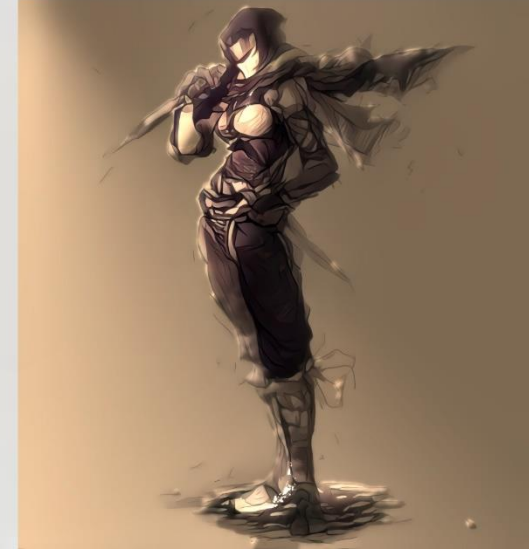
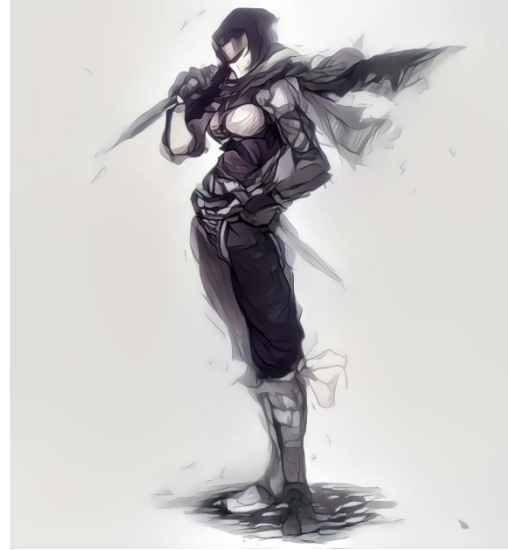
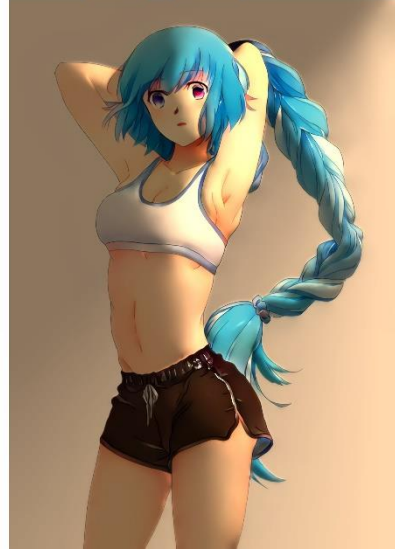
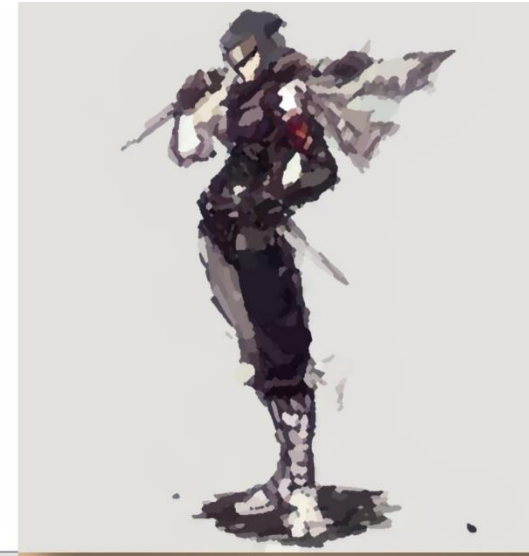
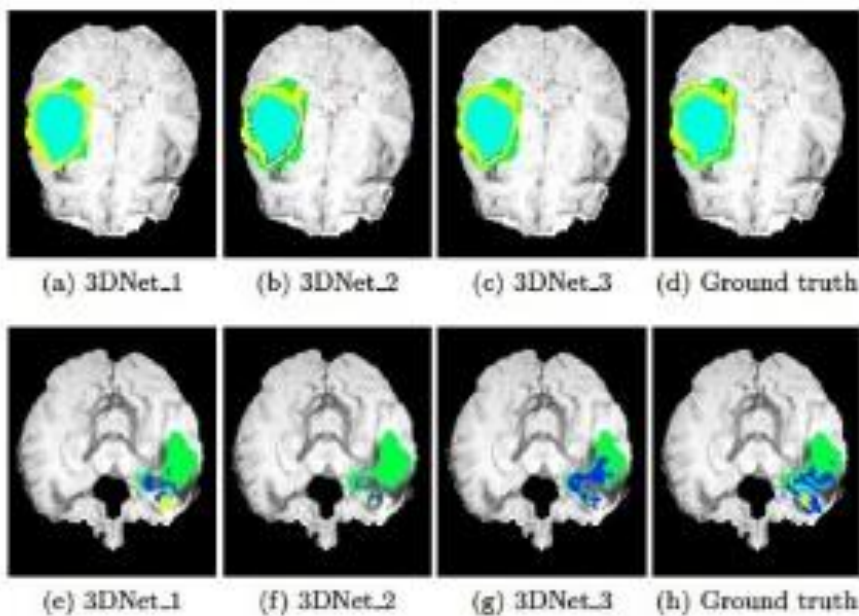


Image Generation [Style2Paints]

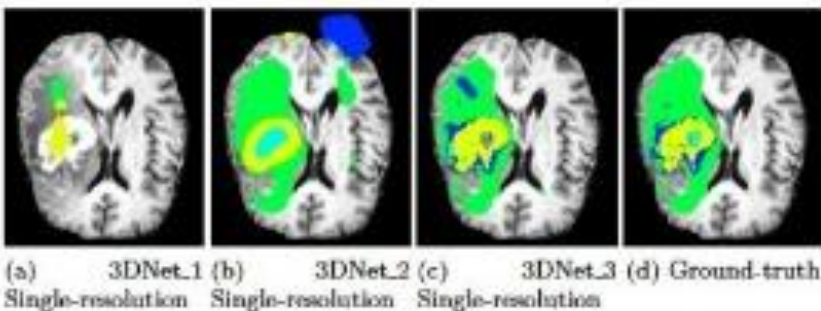


# Why Deep Learning is Important

## Segmentation: brain tumor segmentation



The importance of skip connections



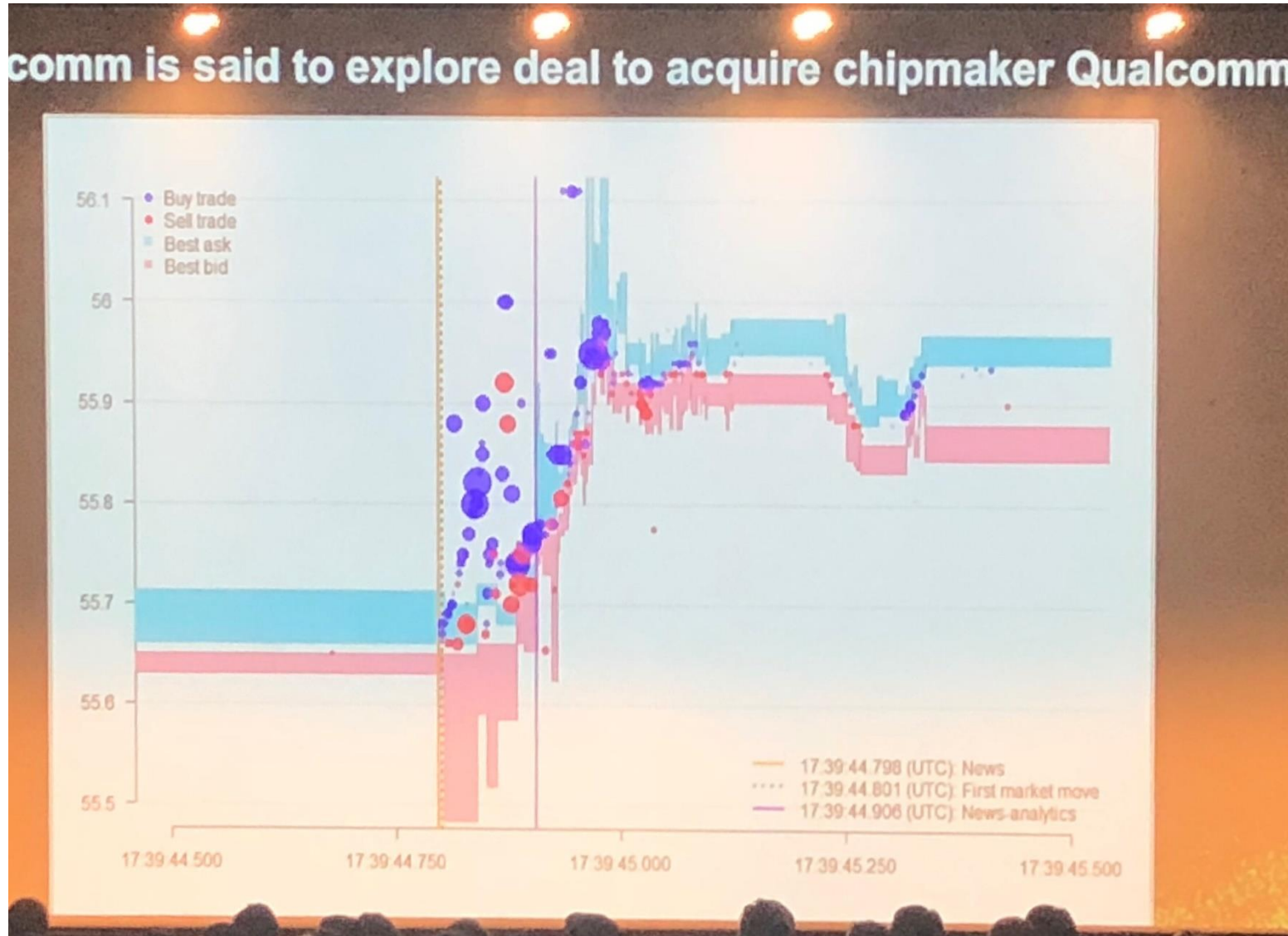
|         | Accuracy     | Dice score   |              |              |
|---------|--------------|--------------|--------------|--------------|
|         |              | Whole        | Core         | Active       |
| 3DNet_1 | 99.69        | 89.64        | 76.87        | 63.12        |
| 3DNet_2 | 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

|         | 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        | <b>99.95</b> | 44.71        | 74.09        | 28.40        | 66.94        | <b>99.95</b> |
| 3DNet_2 | <b>75.21</b> | 79.07        | 43.57        | <b>82.65</b> | 99.92        | 41.10        | <b>84.16</b> | 32.35        | 73.38        | 99.93        |
| 3DNet_3 | 67.45        | <b>85.06</b> | <b>49.44</b> | 74.06        | 99.90        | <b>51.29</b> | 77.50        | <b>37.61</b> | <b>87.29</b> | <b>99.95</b> |

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

## Tumor Segmentation

# Why Deep Learning is Important



News(Event) Based Trading Algorithm

# 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.

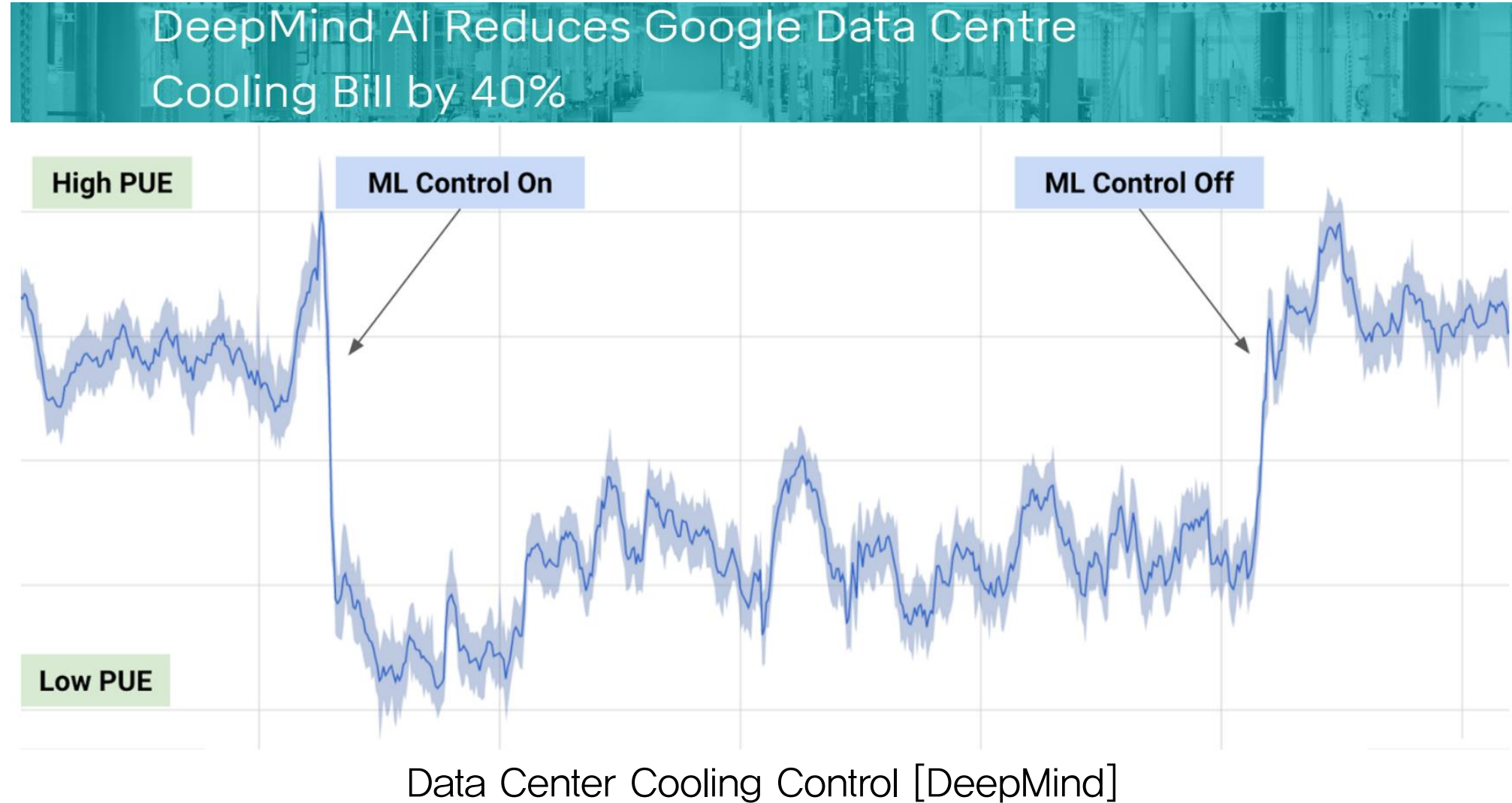
How did some suspect that Polo learned about China instead of by actually visiting it?

**Answer:** **through contact with Persian traders**

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

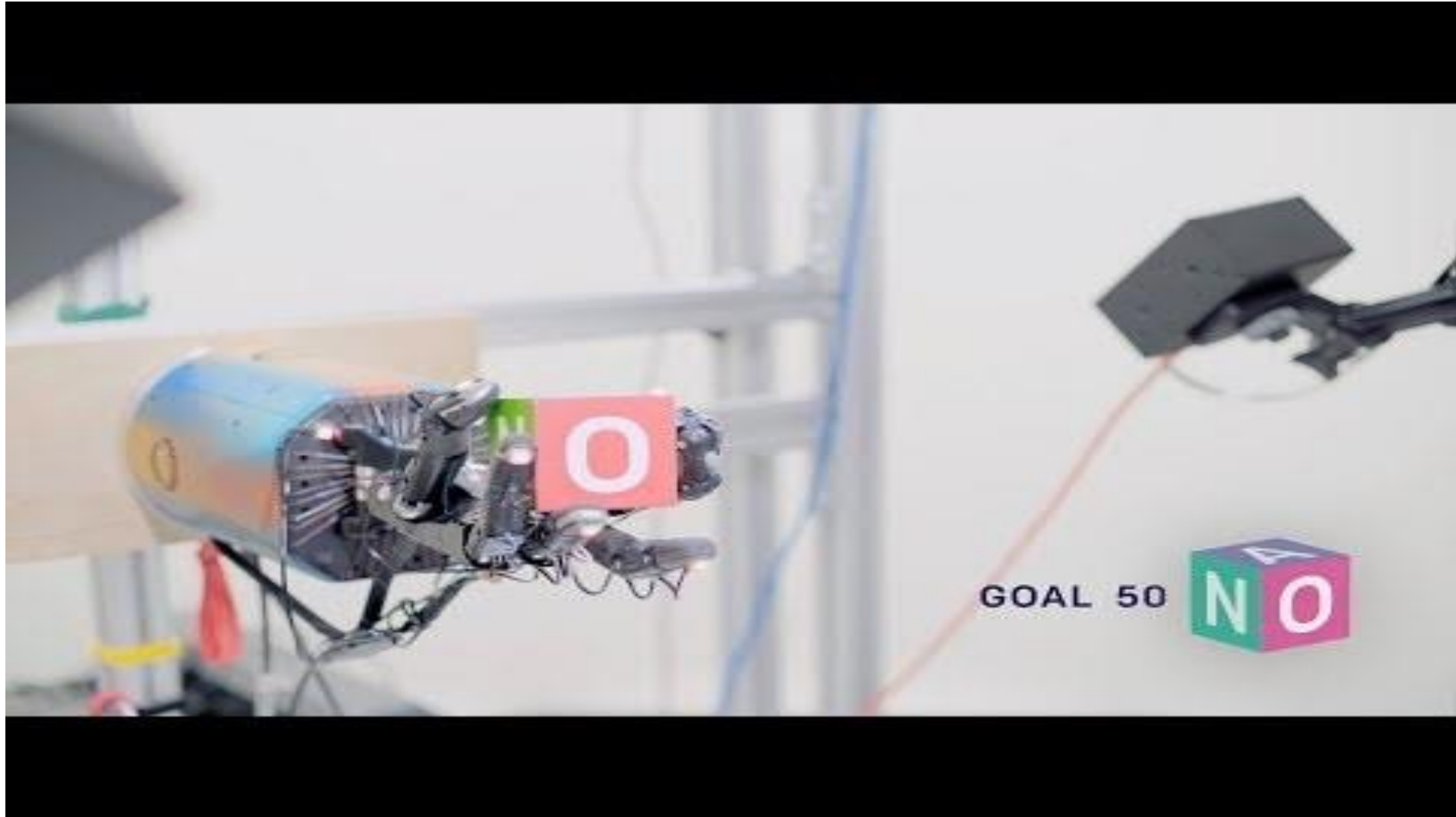
Question Answering [BERT]

# Why Deep Learning is Important





# Why Deep Learning is Important



Robot Hand Control [OpenAI]

# Why Deep Learning is Important

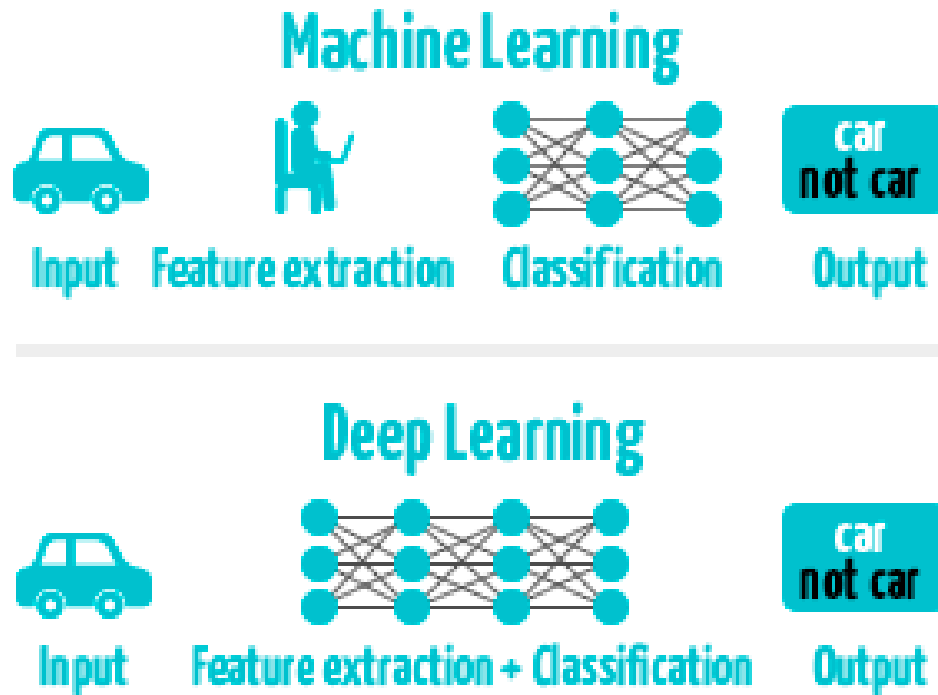


How to learn move [DeepMind]

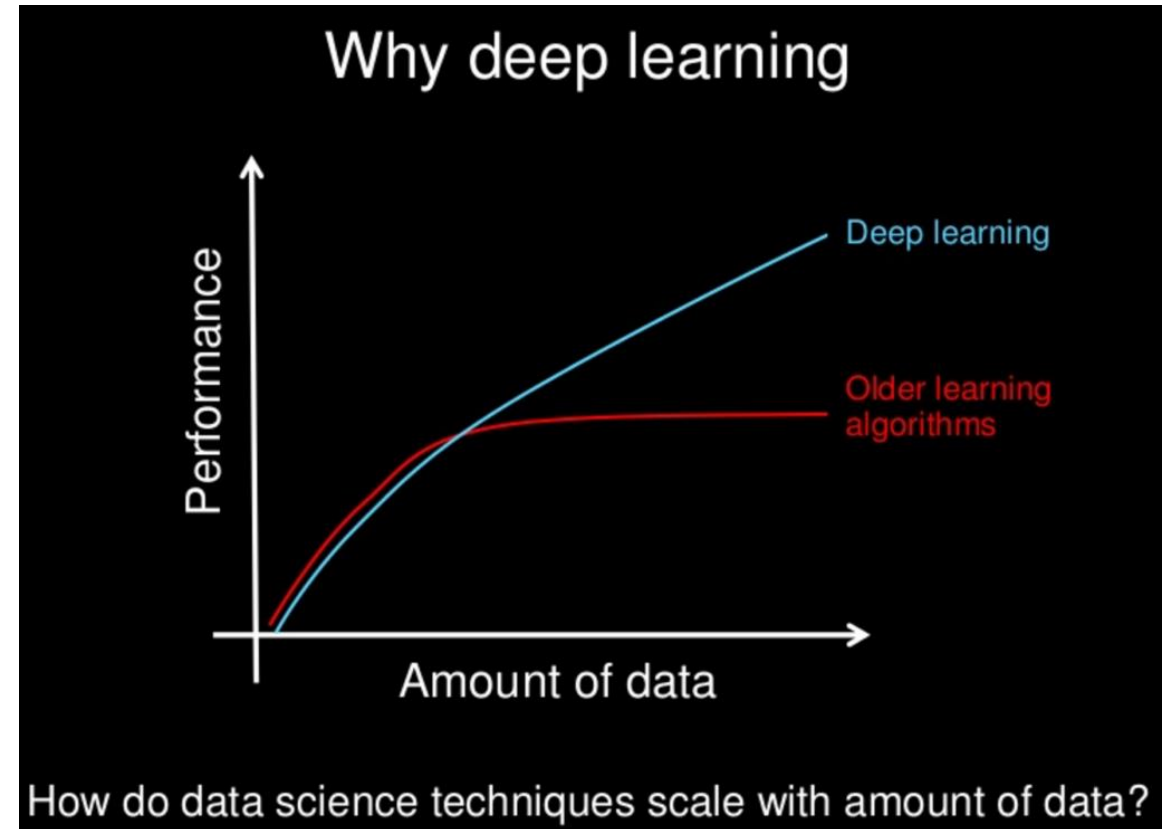
More Projects on..

- [30 Amazing Machine Learning Projects](#)
- [Really Awesome GAN](#)
- [Awesome Deep Learning](#)

# Why Deep Learning is Important



Get rid of feature engineering



Limitless performance improvement



# Why **Learning** Deep Learning is Important

# Why Learning Deep Learning is Important

- Understanding how other solve the problems

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- Understanding how other solve the problems
- Survive from AI invasion

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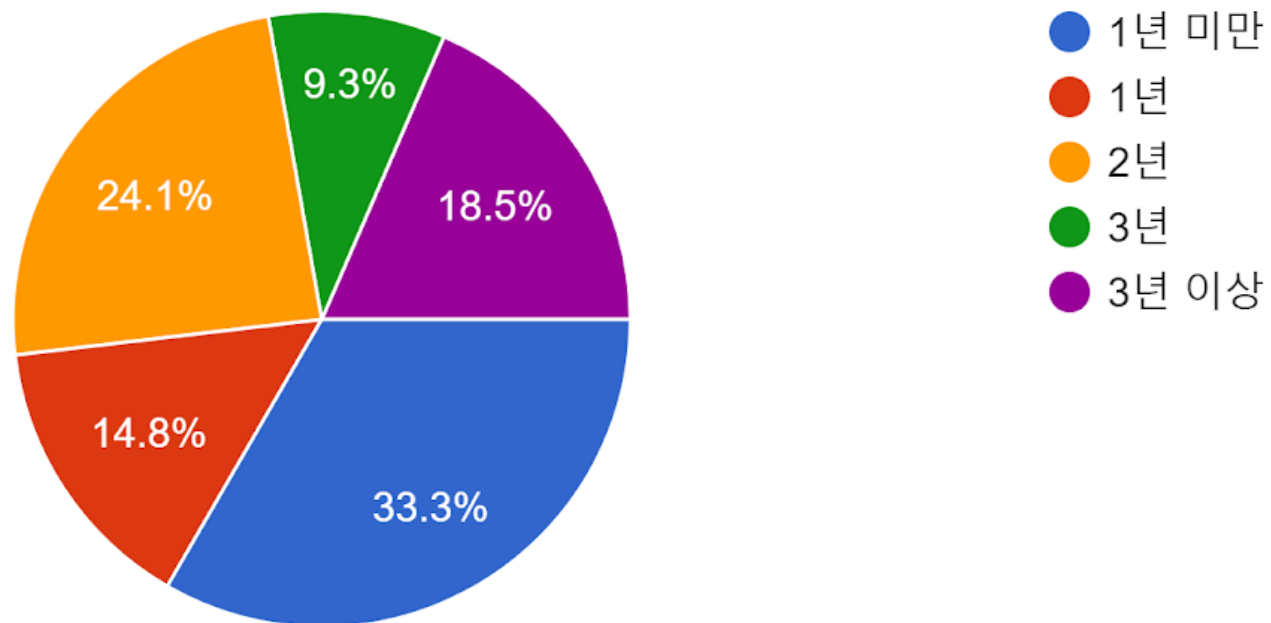
- Understanding how other solve the problems
- Survive from AI invasion
- Utilize available techniques or source code
- Solve your own problem with nice performance
- To get a job and make money

# Audience Statics

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본인의 프로그래밍 경험은?

응답 54개

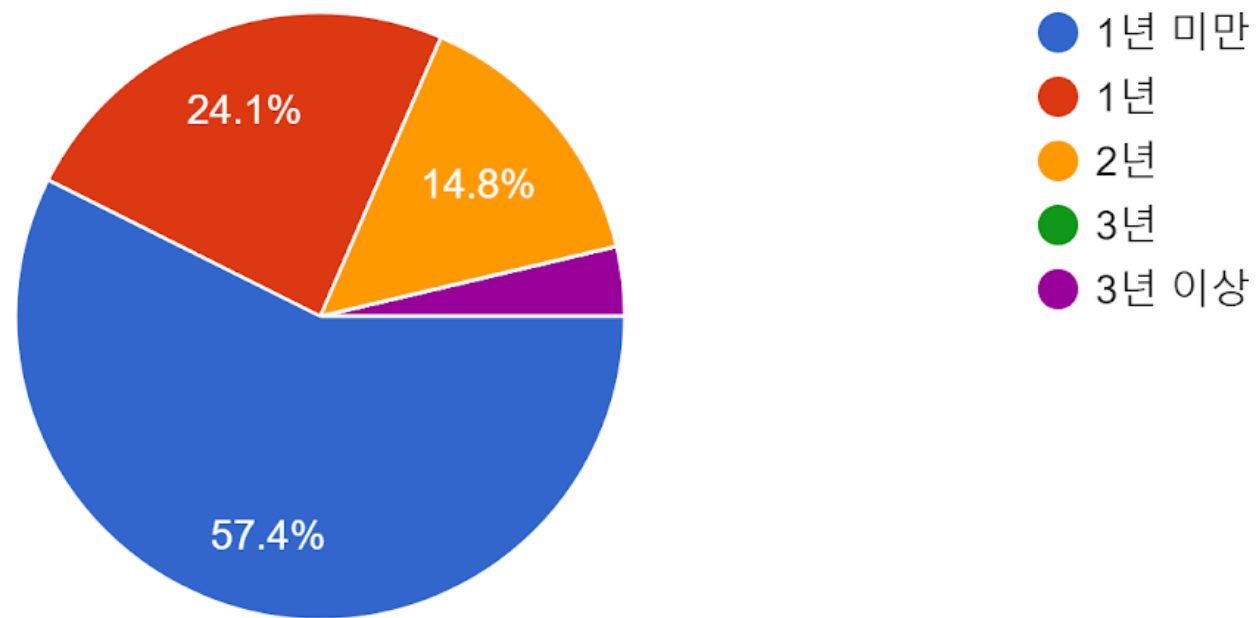




# Audience Statics

그 중 파이썬을 다뤄본 경험은?

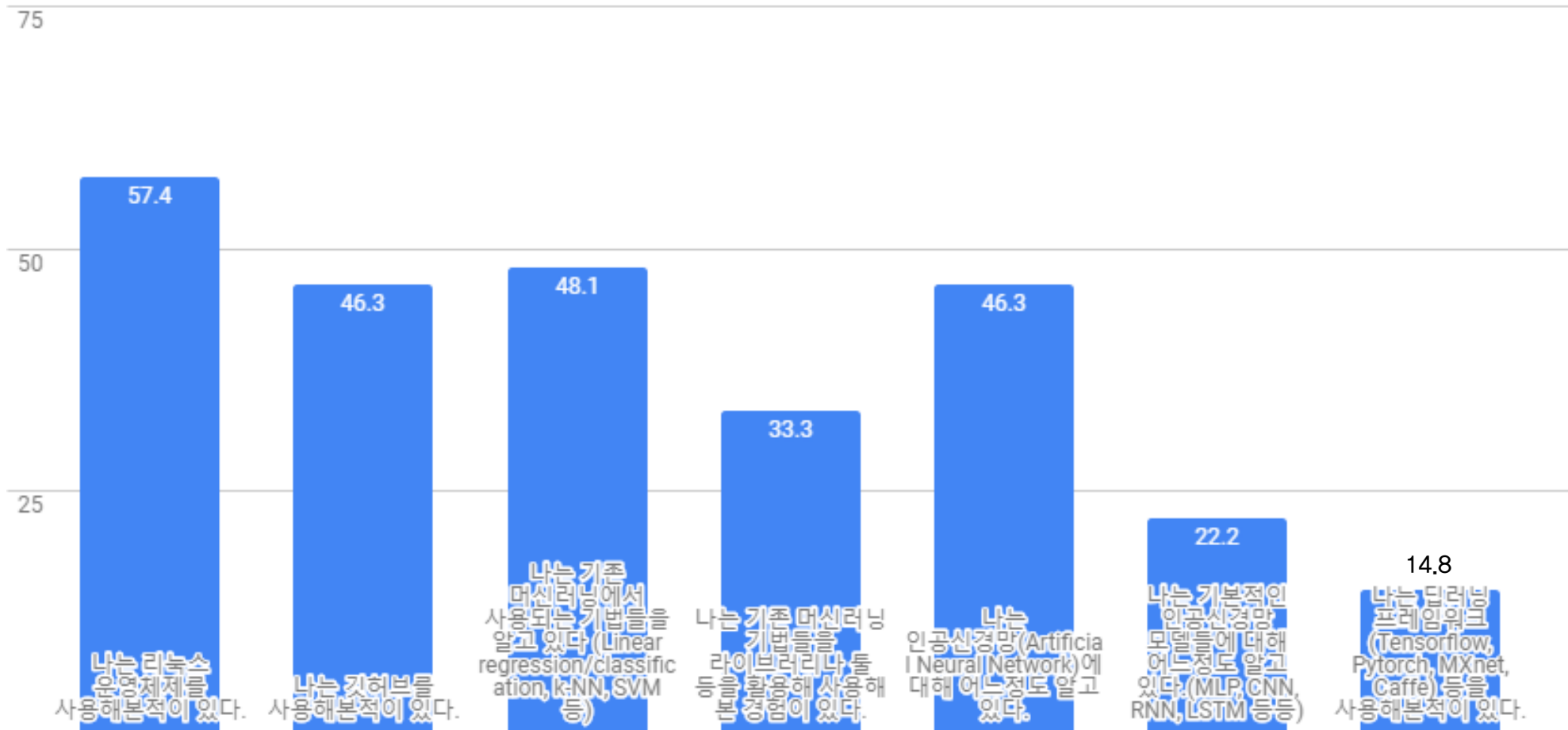
응답 54개



# Audience Statics

아래 항목 중 해당되는 것을 모두 고르면?

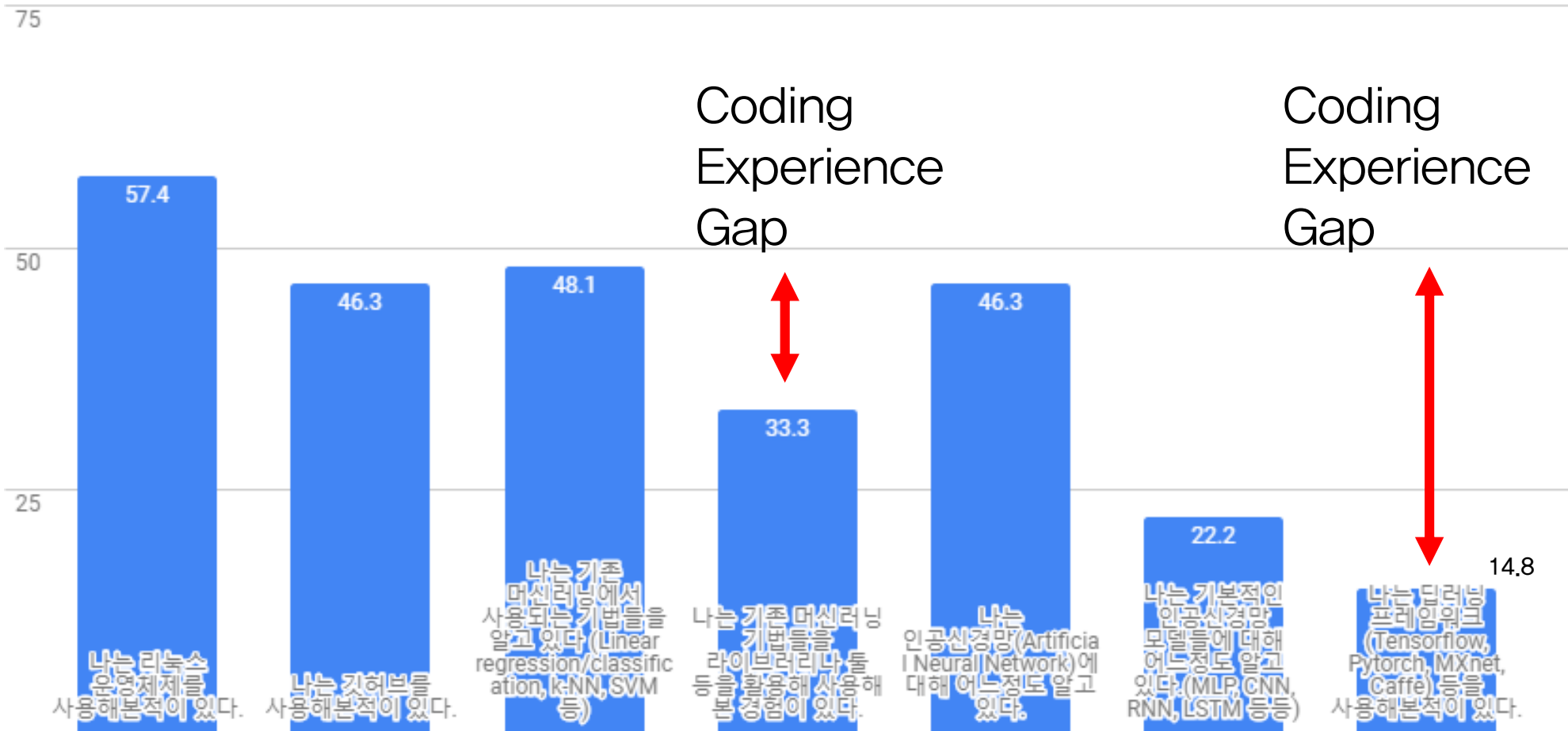
응답 54개



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아래 항목 중 해당되는 것을 모두 고르면?

응답 54개



# Audience Statics

## 5주 뒤에 기대하는 본인의 능력은?

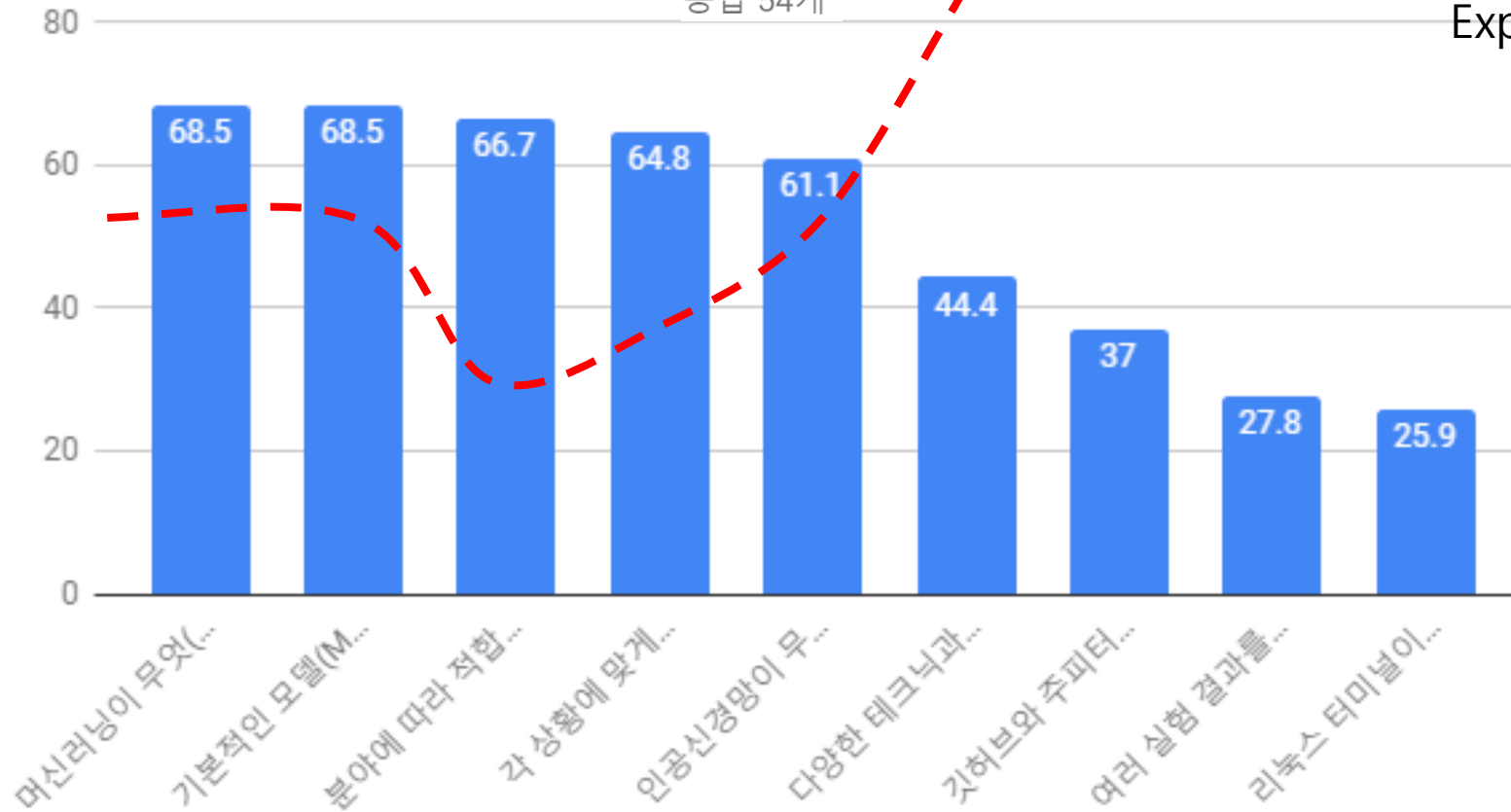
응답 54개



# Audience Statics

5주 뒤에 기대하는 본인의 능력은?

응답 54개

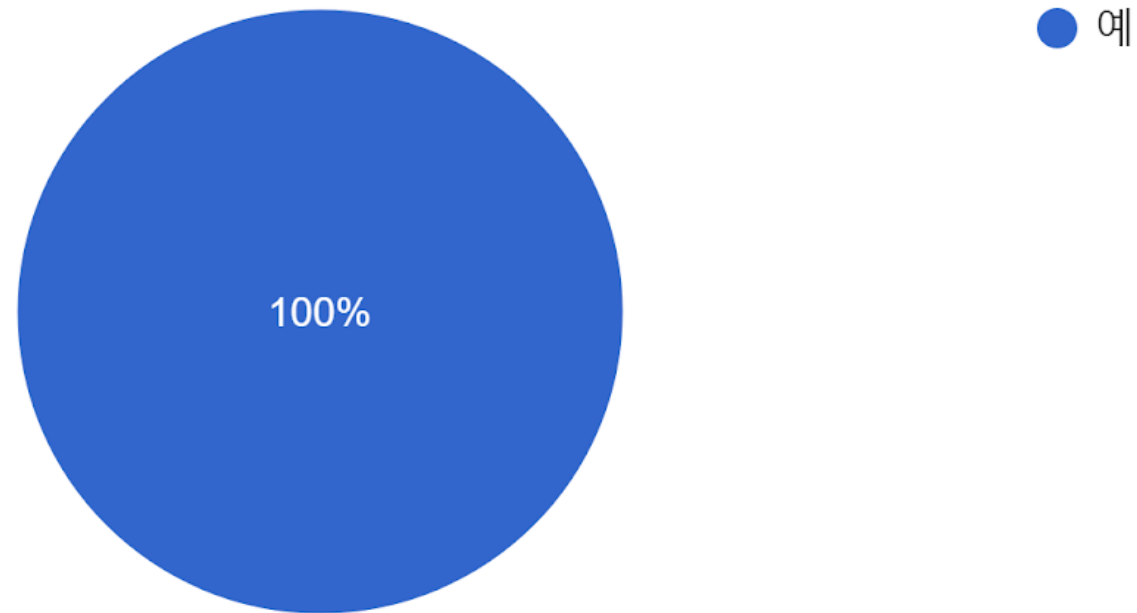


Expected Skill Distribution

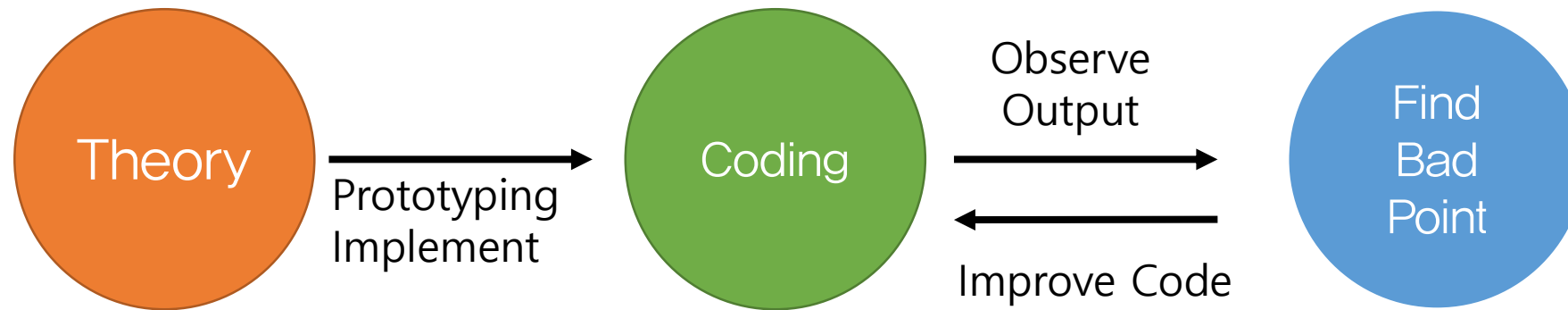
# Audience Statics

본인은 매 과제를 성실히 임할 준비가 되었습니까?

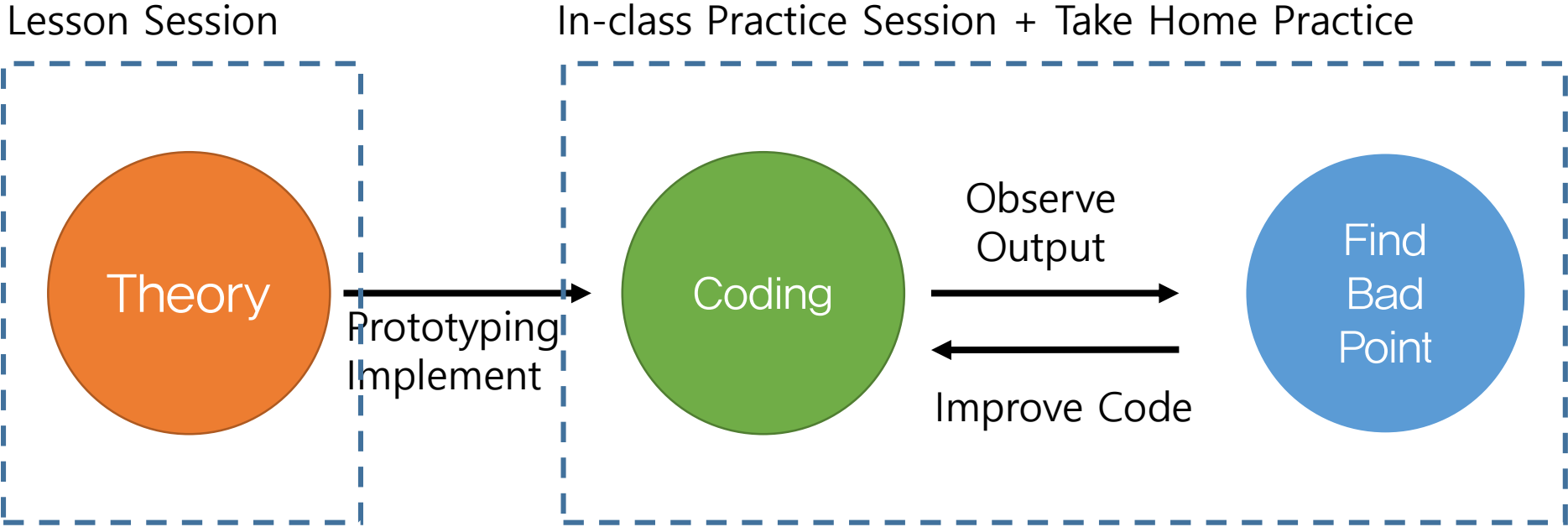
응답 54개



# Course Structure



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제가 생각한 ML/DL Learning Curve

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ML/DL이 뭔지 모름. 미지의 세계

# 제가 생각한 ML/DL Learning Curve

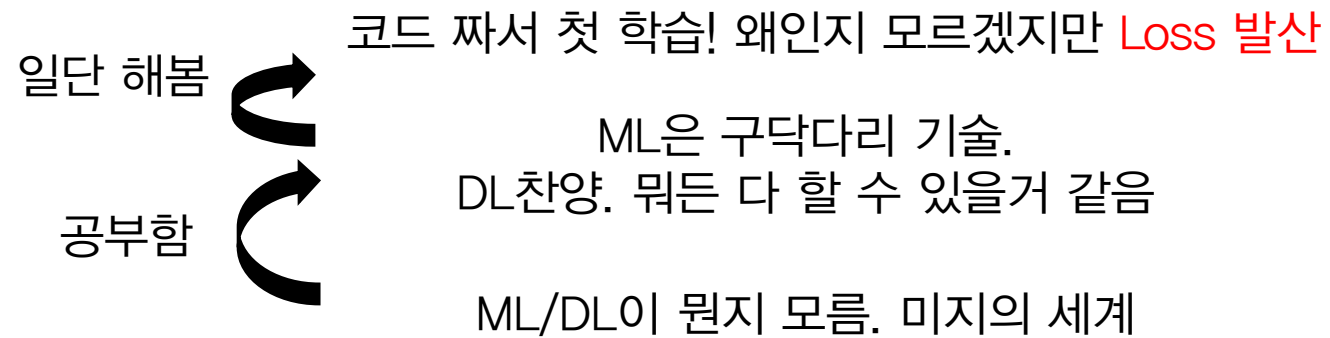
공부함



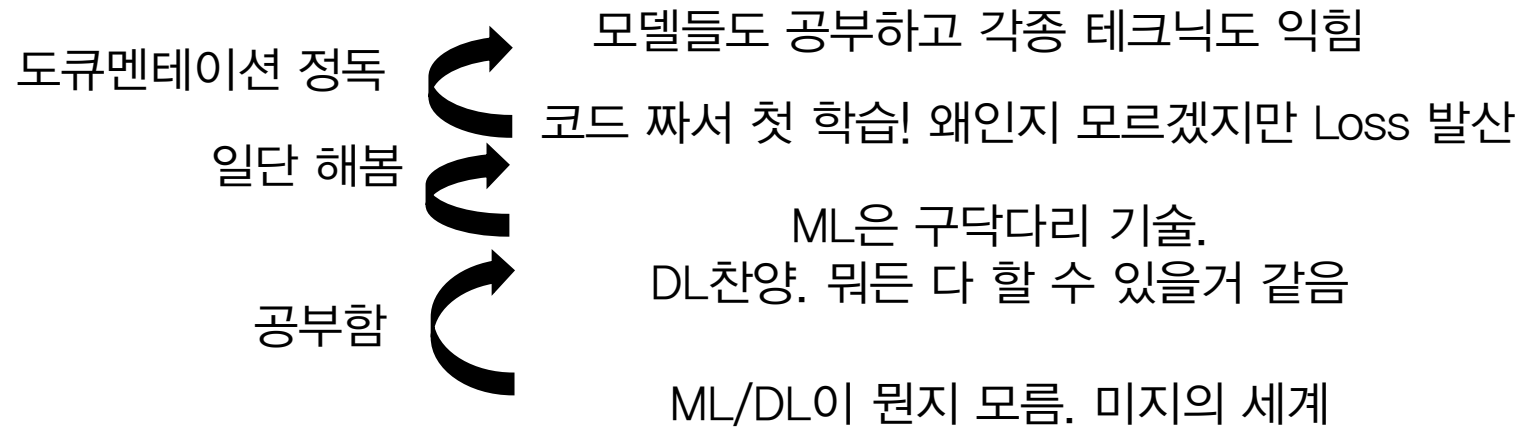
ML은 구닥다리 기술.  
DL찬양. 뭐든 다 할 수 있을거 같음

ML/DL이 뭔지 모름. 미지의 세계

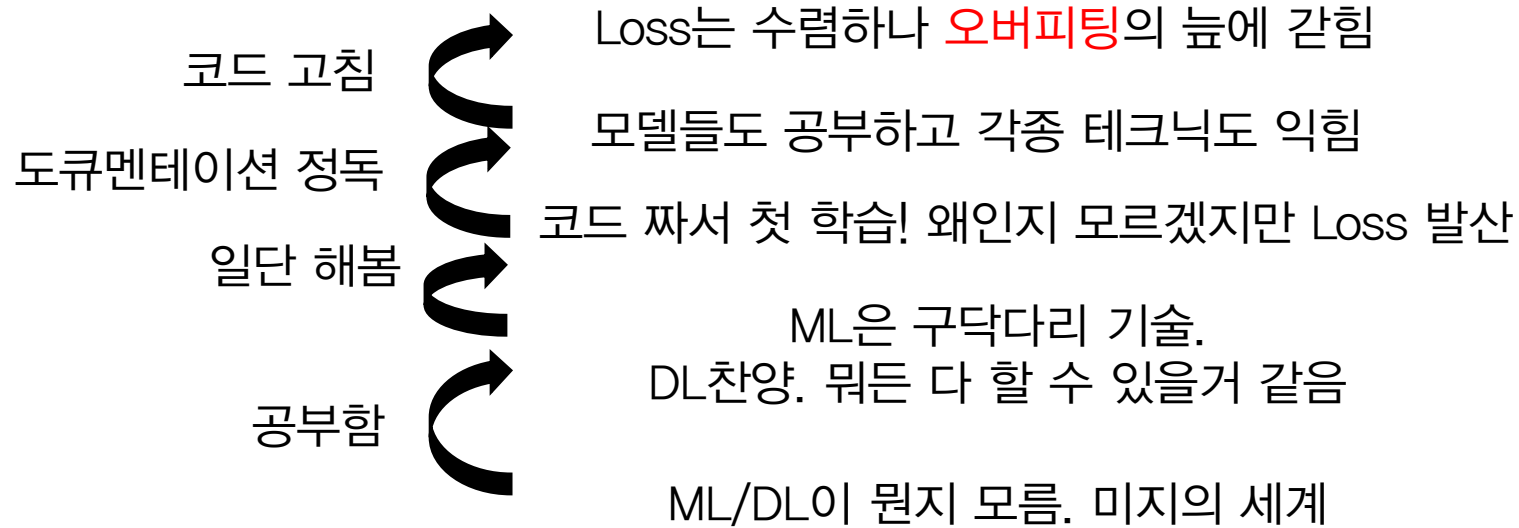
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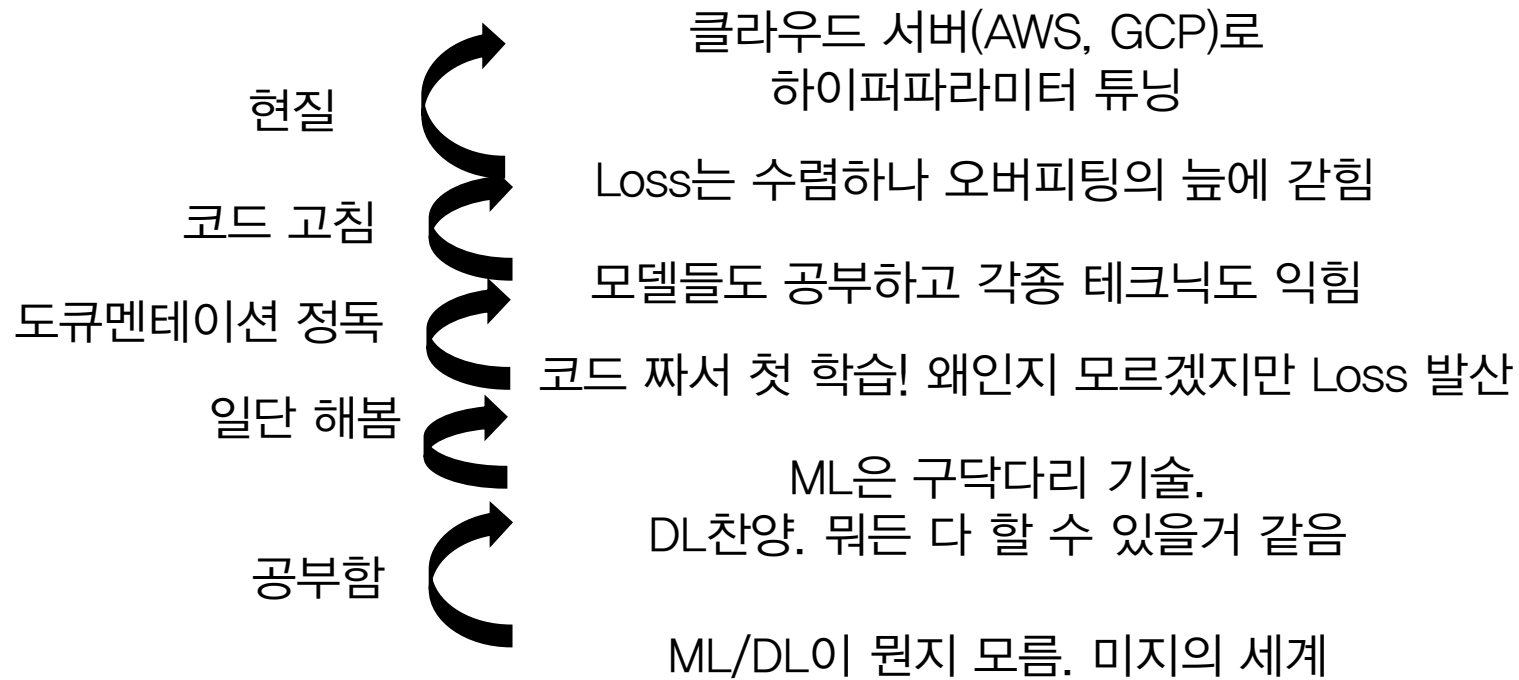
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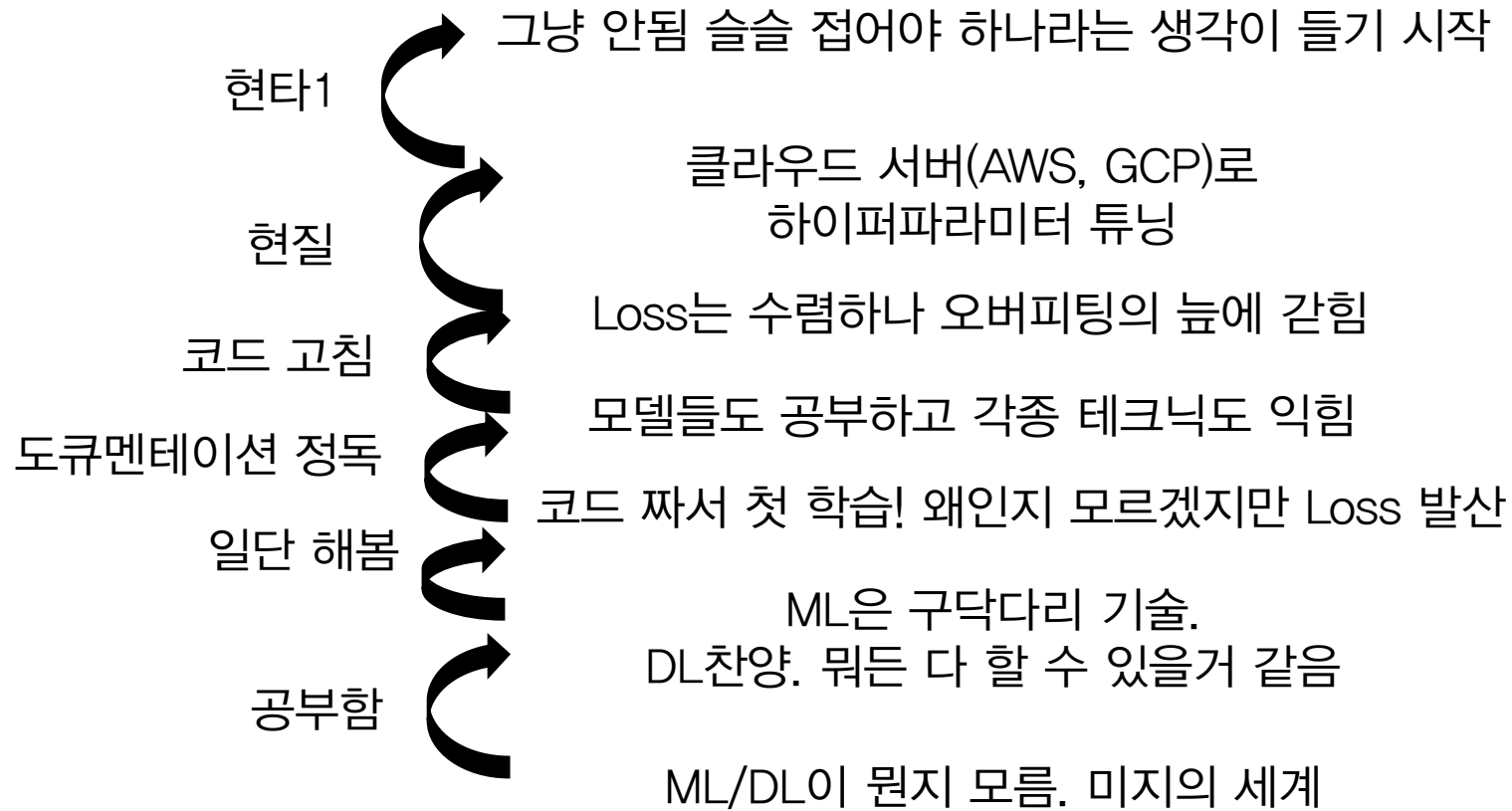
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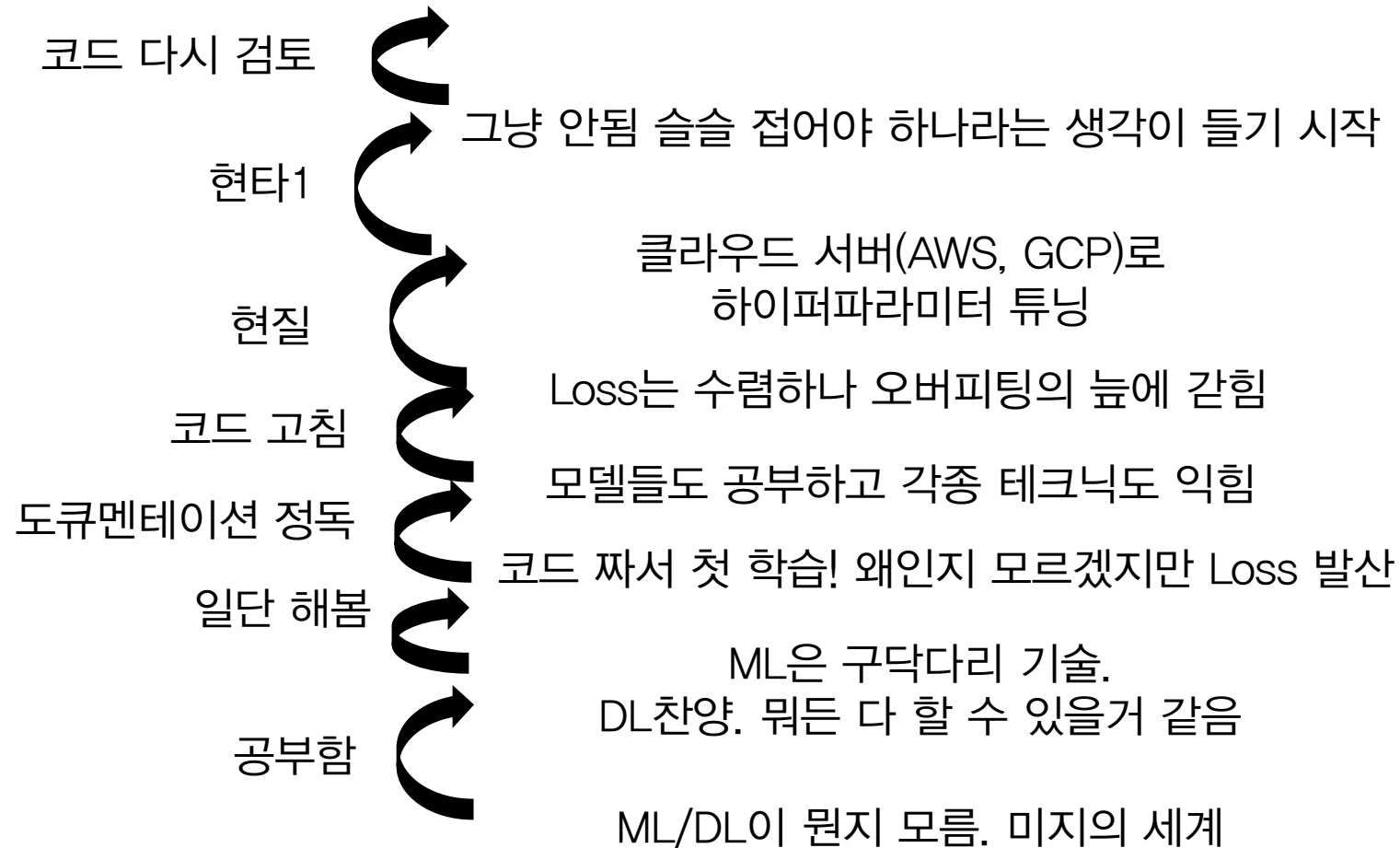


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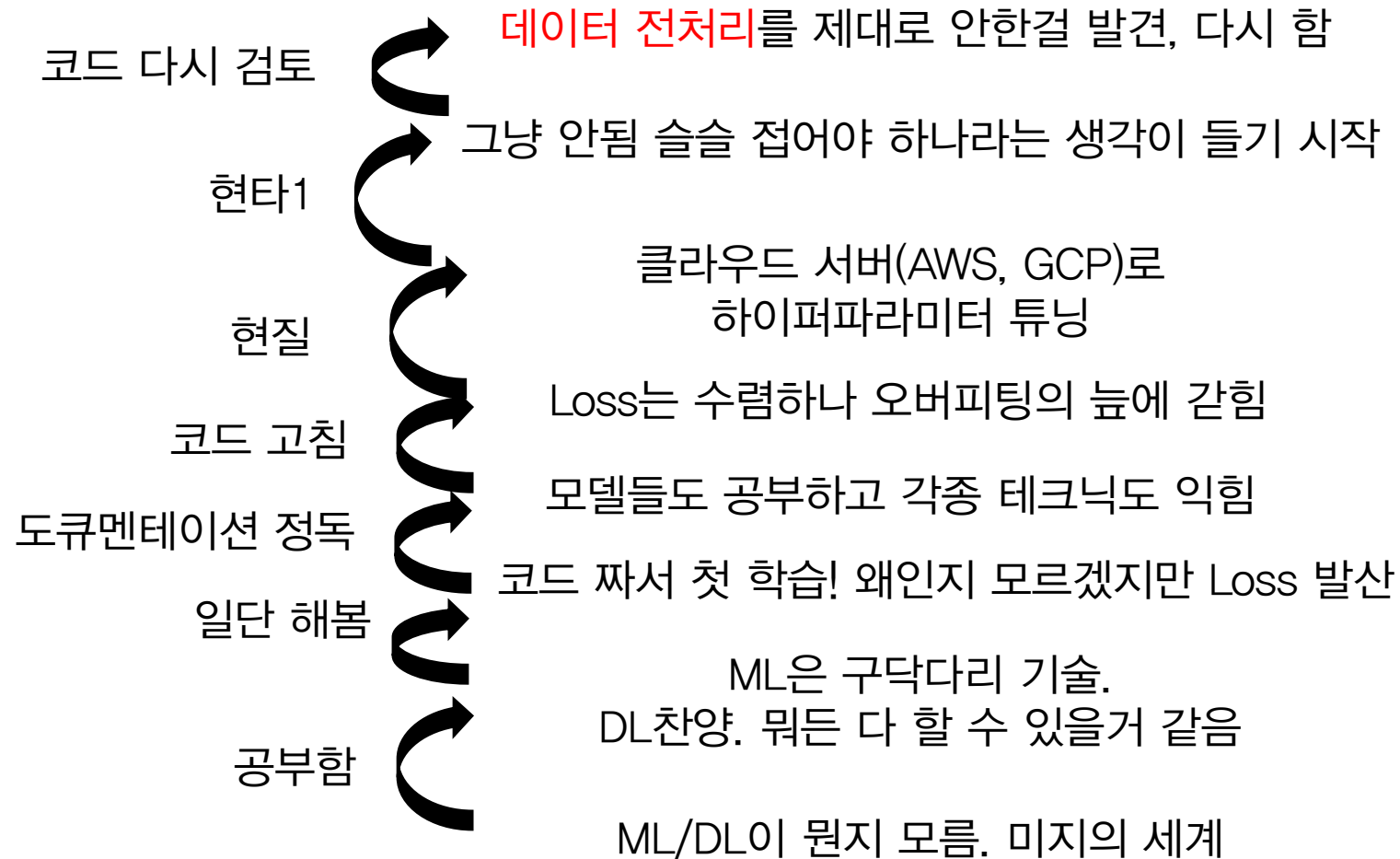




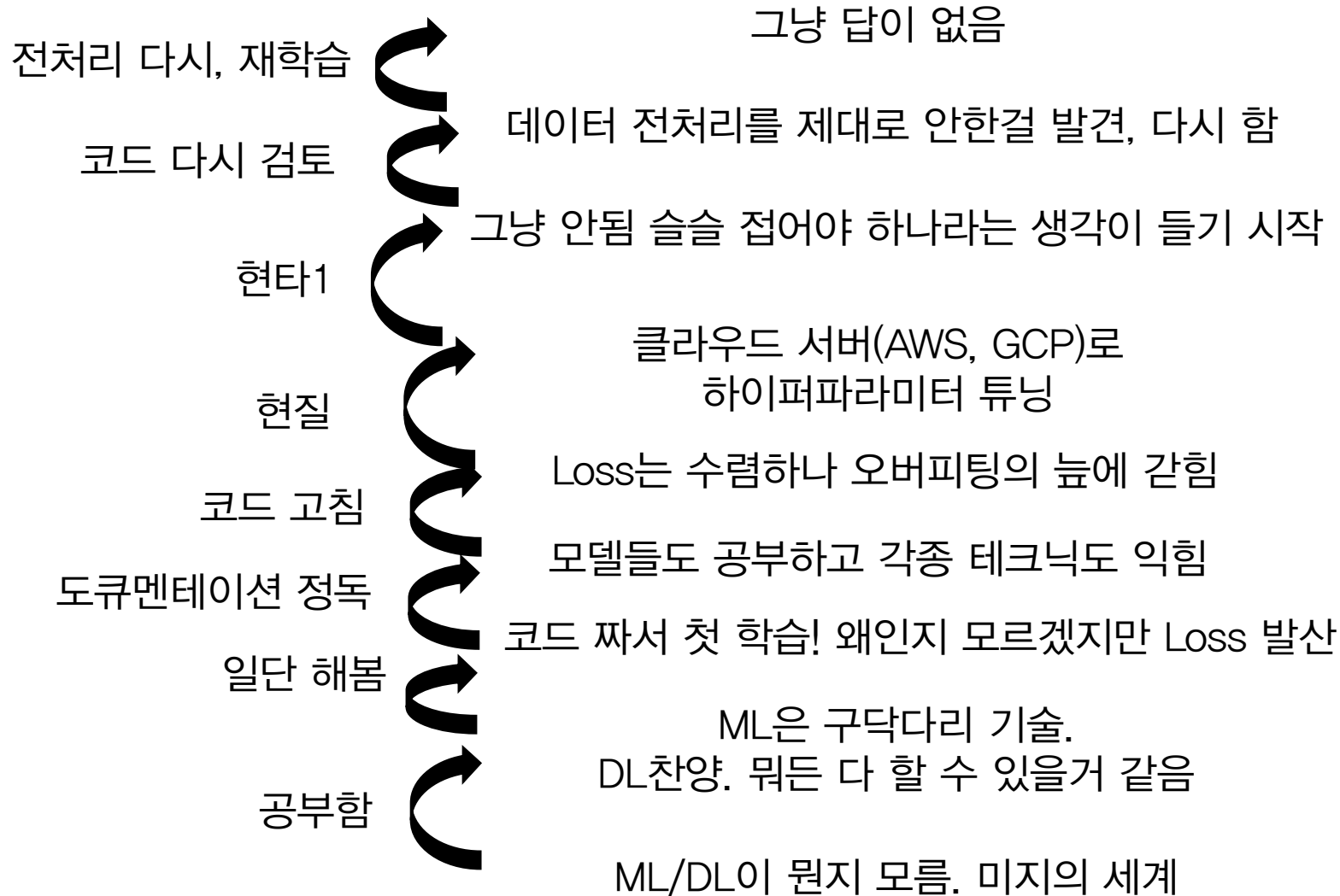
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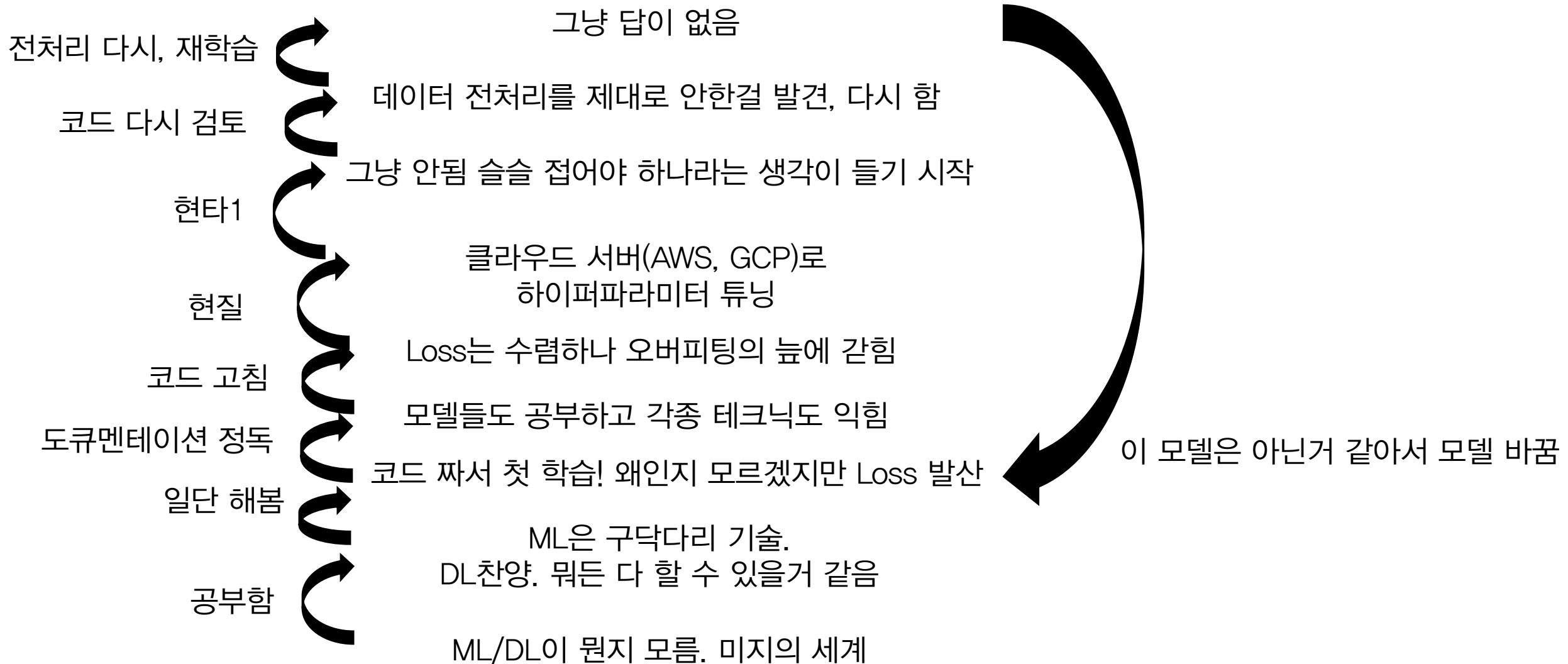
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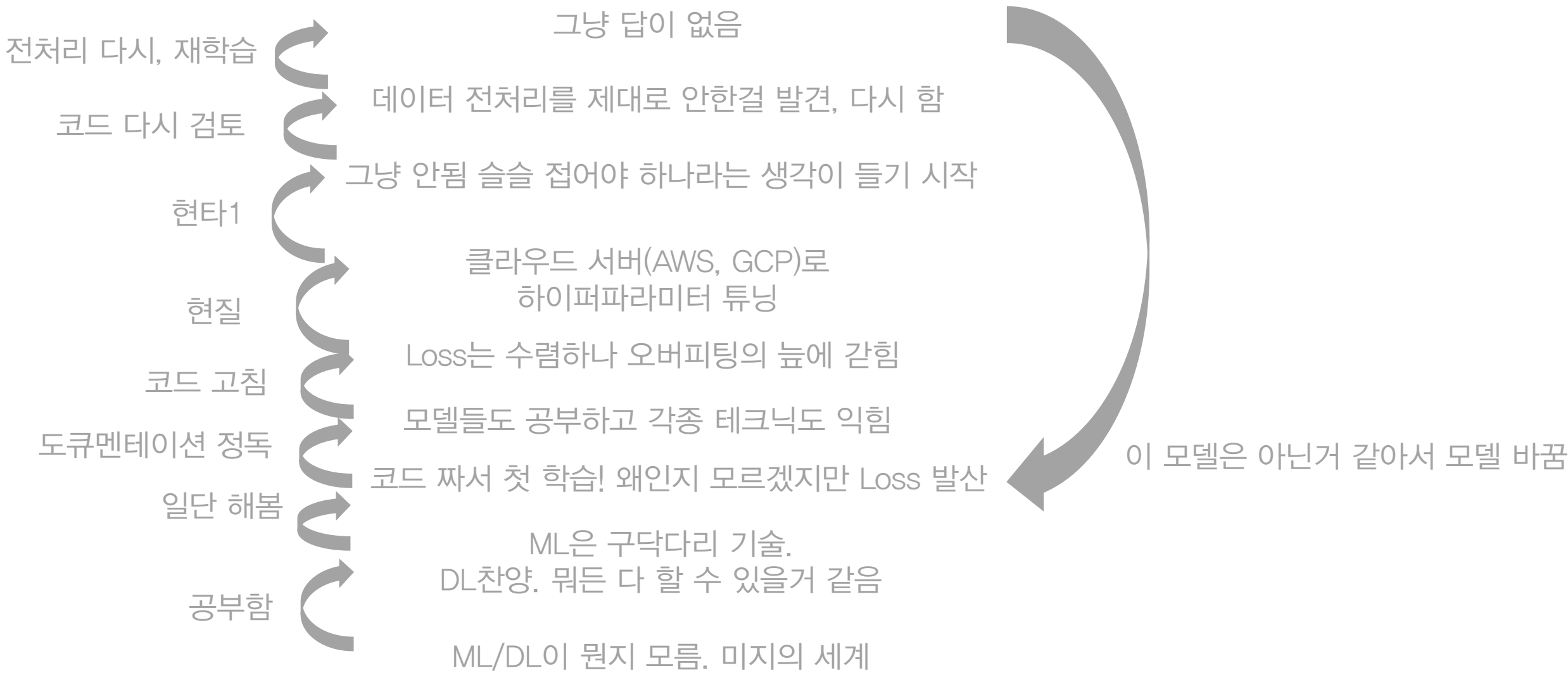
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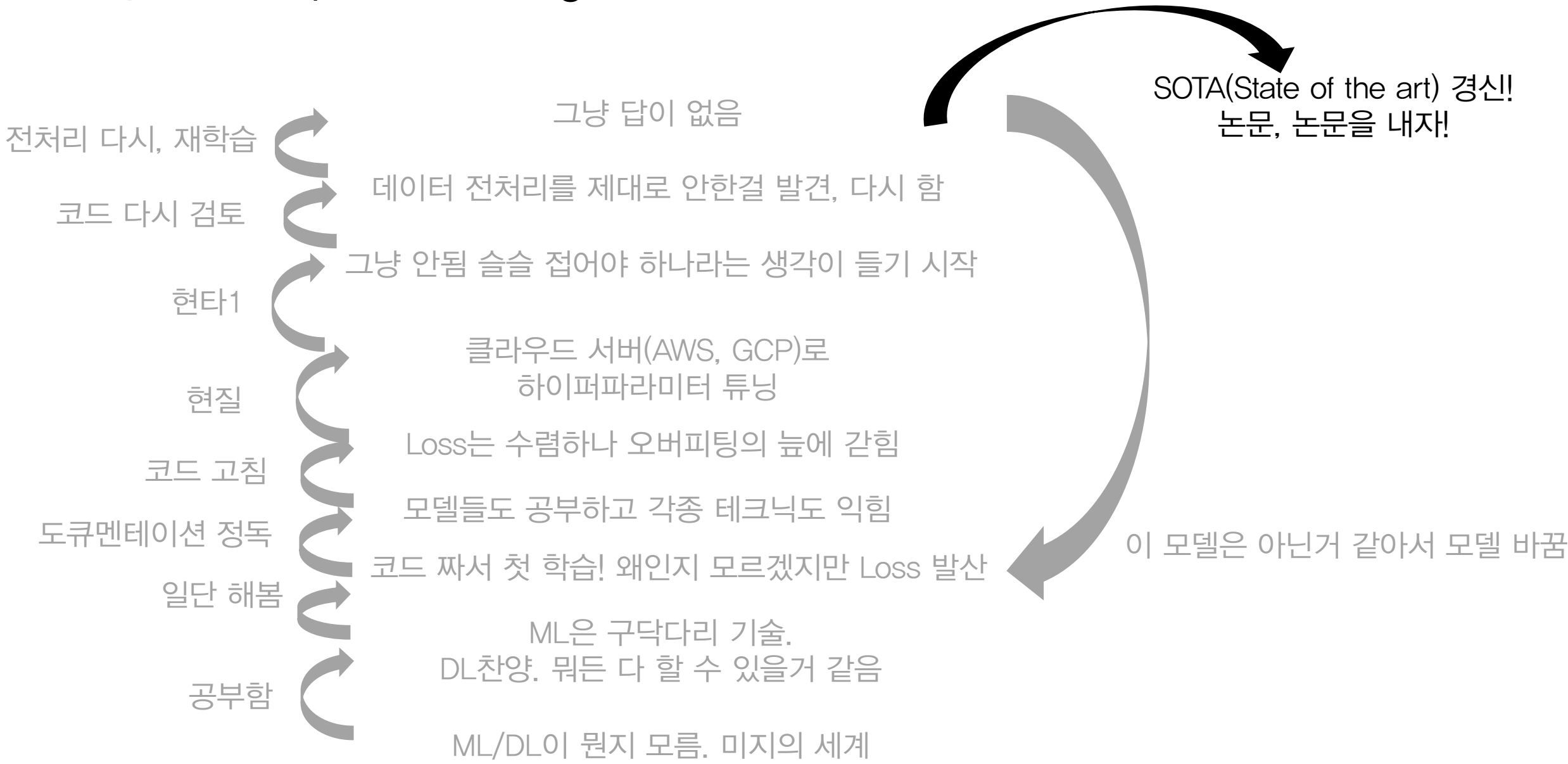
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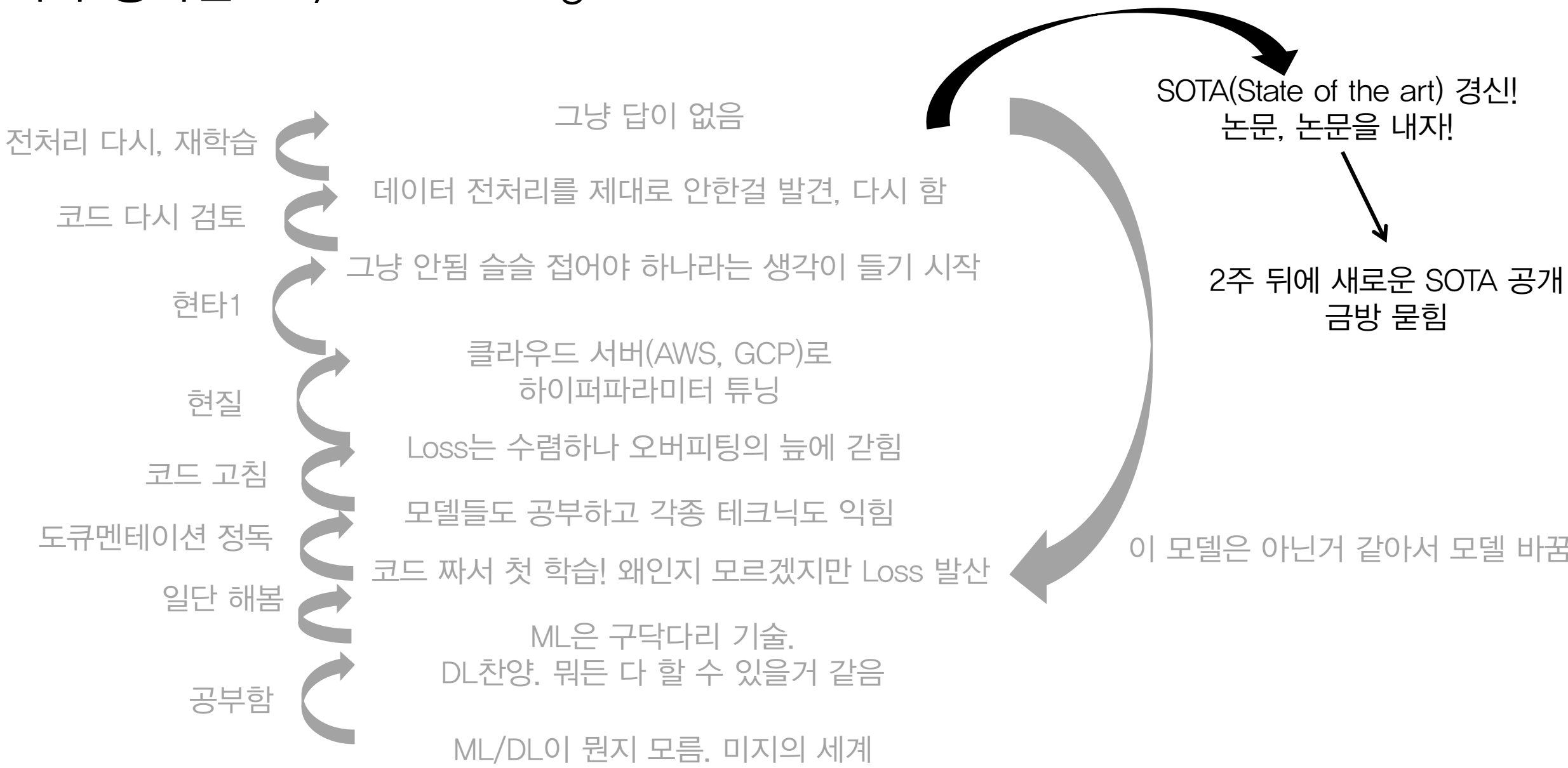
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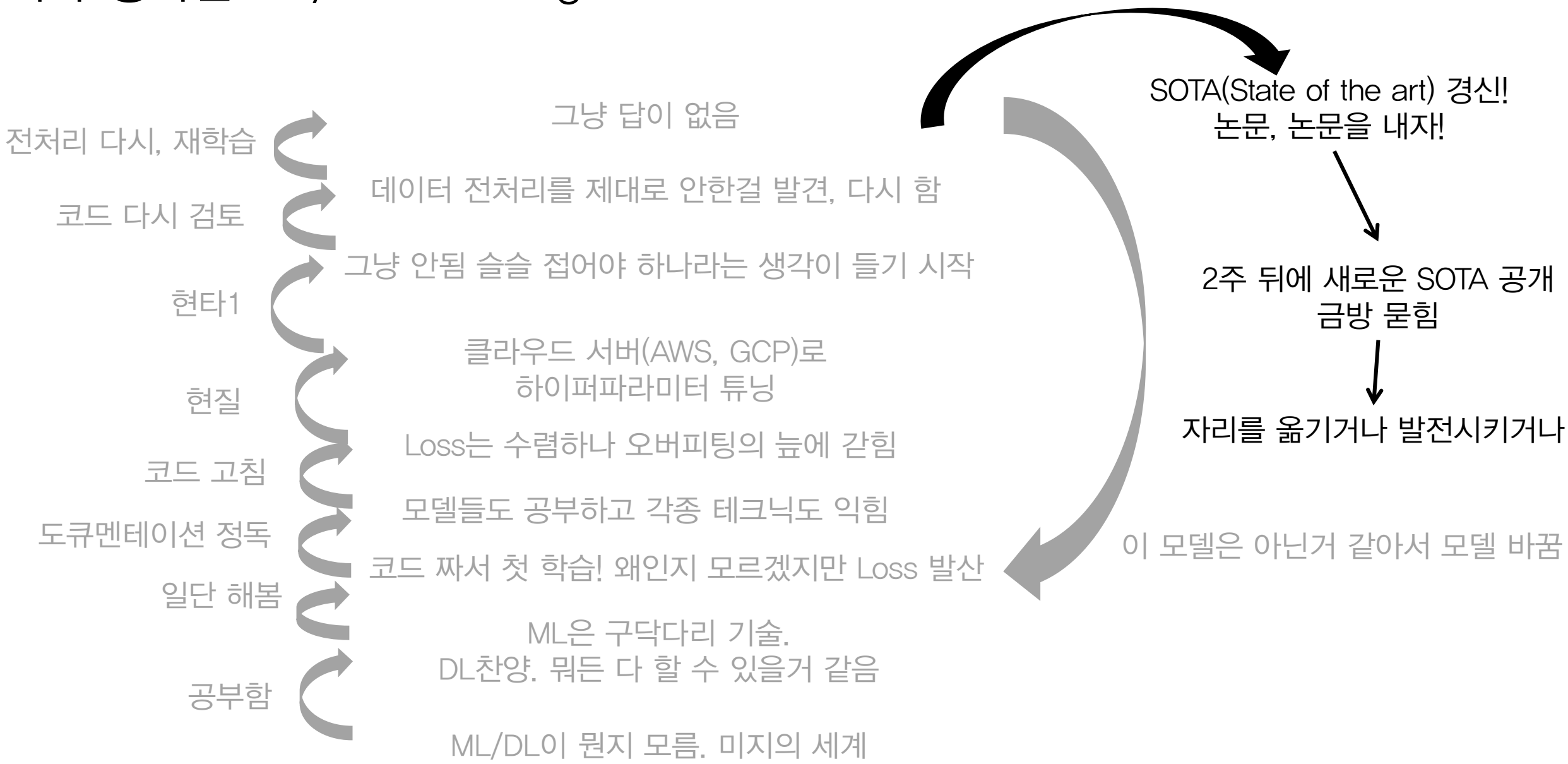
# 제가 생각한 ML/DL Learning Curve



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# 제가 생각한 ML/DL Learning Curve





그래서 딥러닝 홀로서기는..  
..뭘 하기 위한 수업인가요?

# 딥러닝 홀로서기를 들으면..

그냥 답이 없음

데이터 전처리를 제대로 안한걸 발견, 다시 함

그냥 안됨 슬슬 접어야 하나라는 생각이 들기 시작

클라우드 서버(AWS, GCP)로  
하이퍼파라미터 튜닝

Loss는 수렴하나 오버피팅의 늪에 갇힘

모델들도 공부하고 각종 테크닉도 익힘

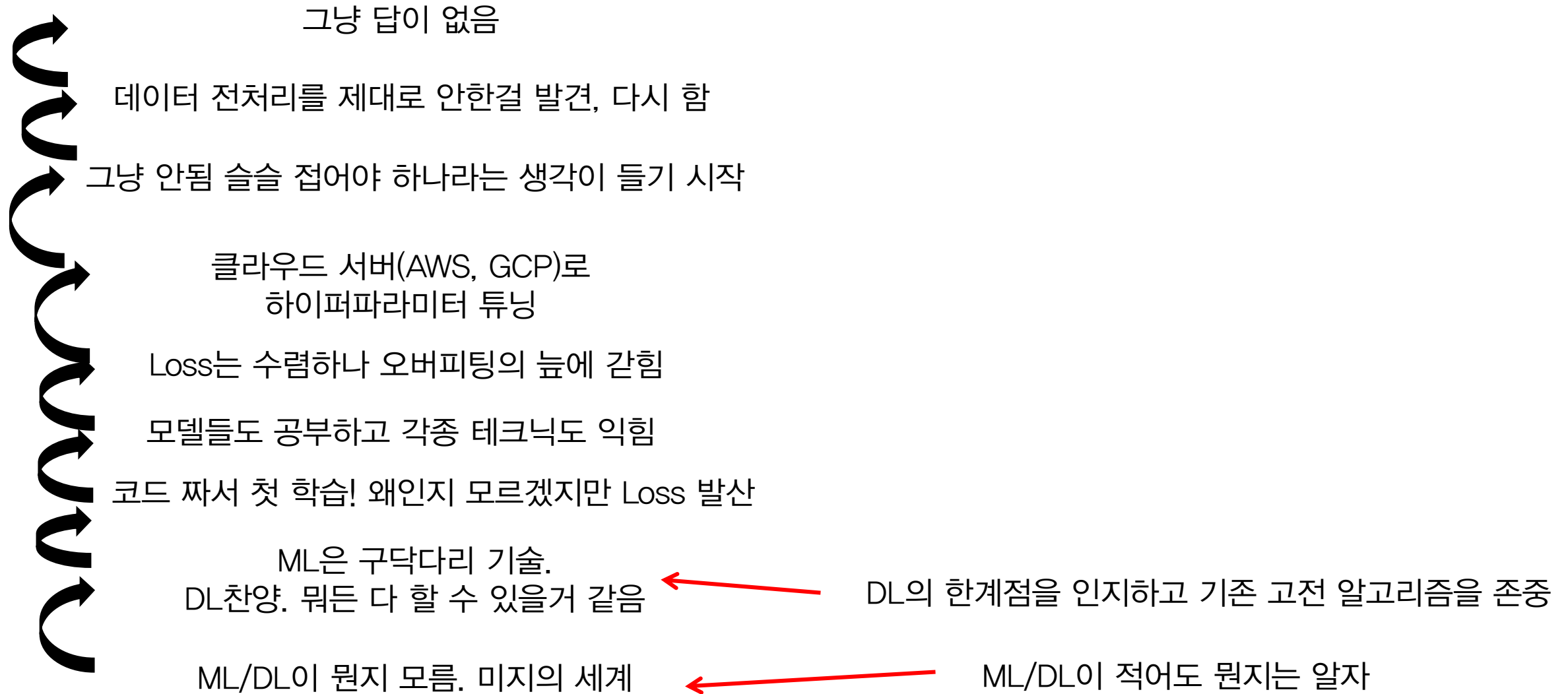
코드 짜서 첫 학습! 왜인지 모르겠지만 Loss 발산

ML은 구닥다리 기술.  
DL찬양. 뭐든 다 할 수 있을거 같음

ML/DL이 뭔지 모름. 미지의 세계

ML/DL이 적어도 뭘지는 알자

# 딥러닝 홀로서기를 들으면..



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그냥 답이 없음

데이터 전처리를 제대로 안한걸 발견, 다시 함

그냥 안됨 슬슬 접어야 하나라는 생각이 들기 시작

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코드 짜서 첫 학습! 왜인지 모르겠지만 Loss 발산

코드 단계별 검수는 필수!  
실험 과정 로깅하기

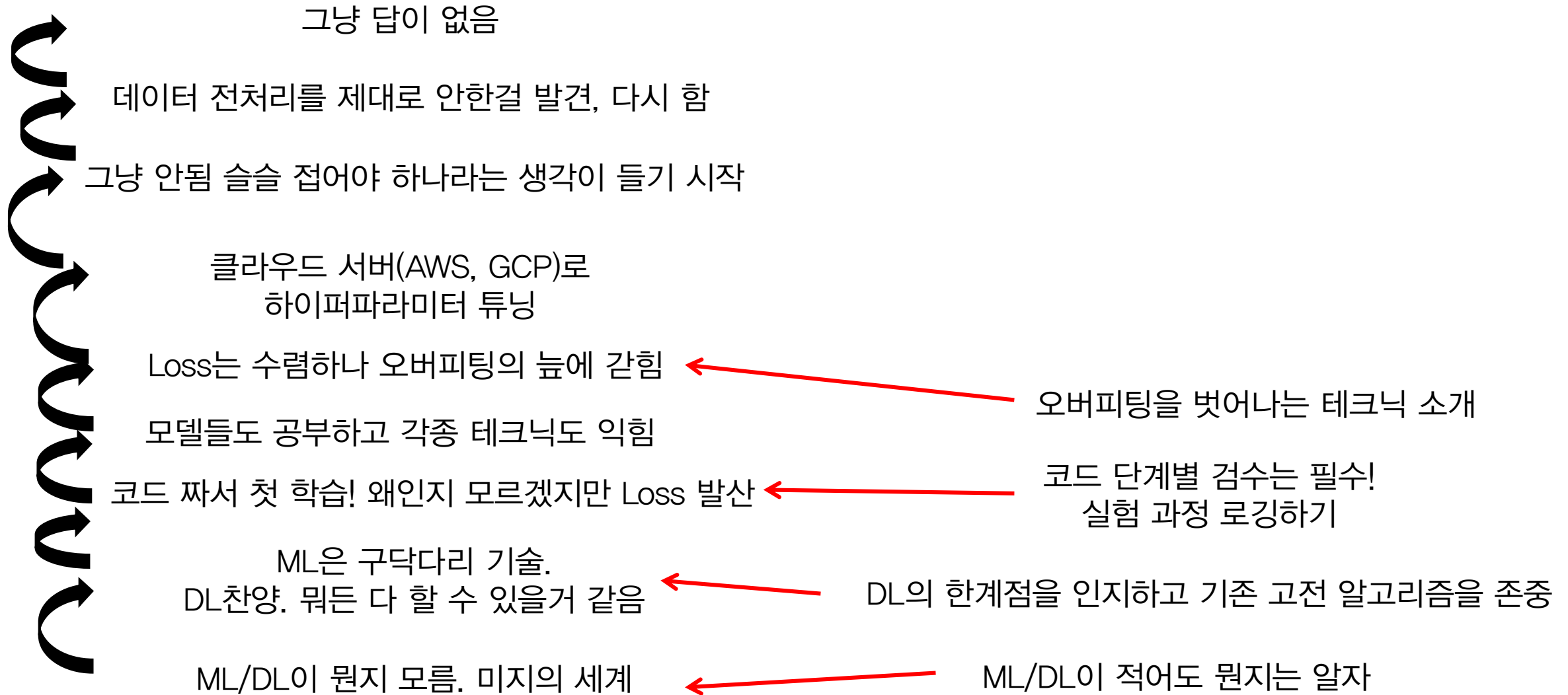
ML은 구닥다리 기술.  
DL찬양. 뭐든 다 할 수 있을거 같음

DL의 한계점을 인지하고 기존 고전 알고리즘을 존중

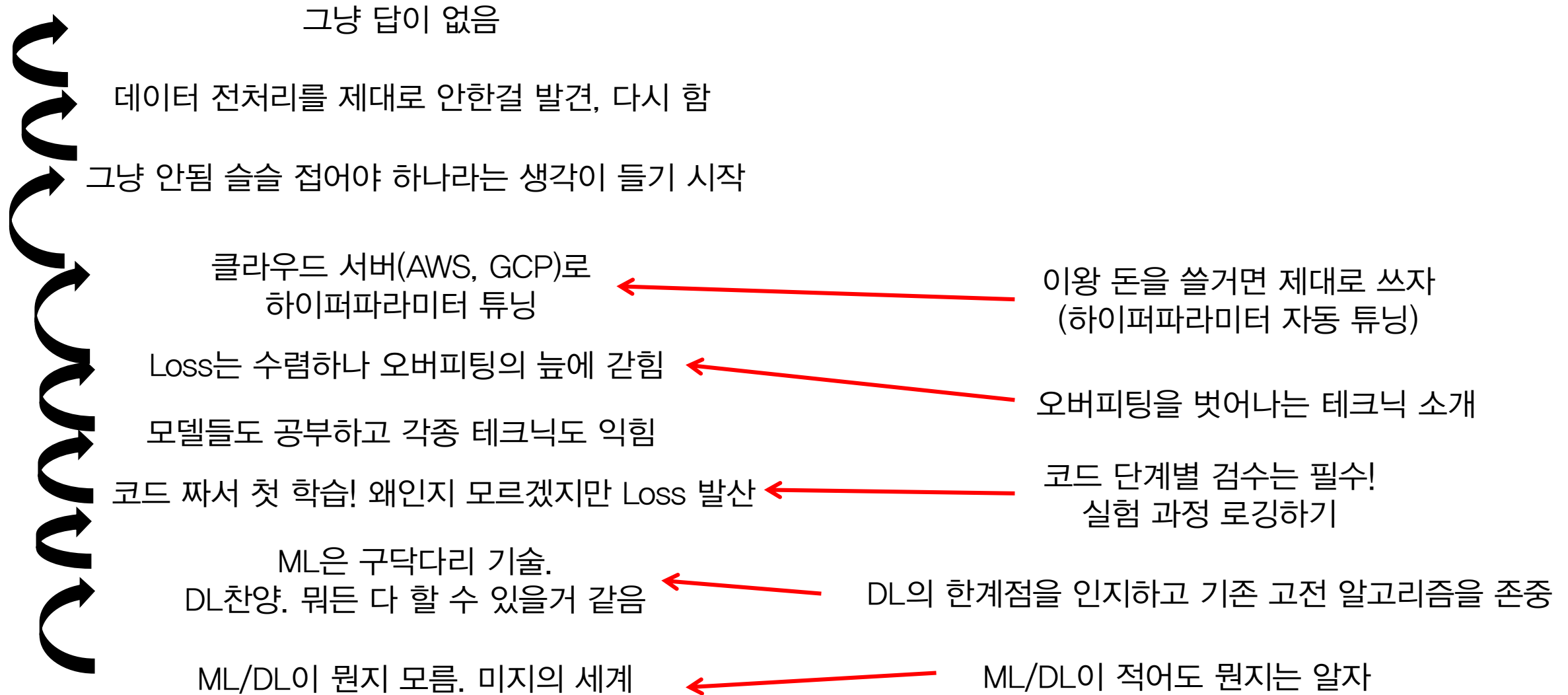
ML/DL이 뭔지 모름. 미지의 세계

ML/DL이 적어도 뭔지는 알자

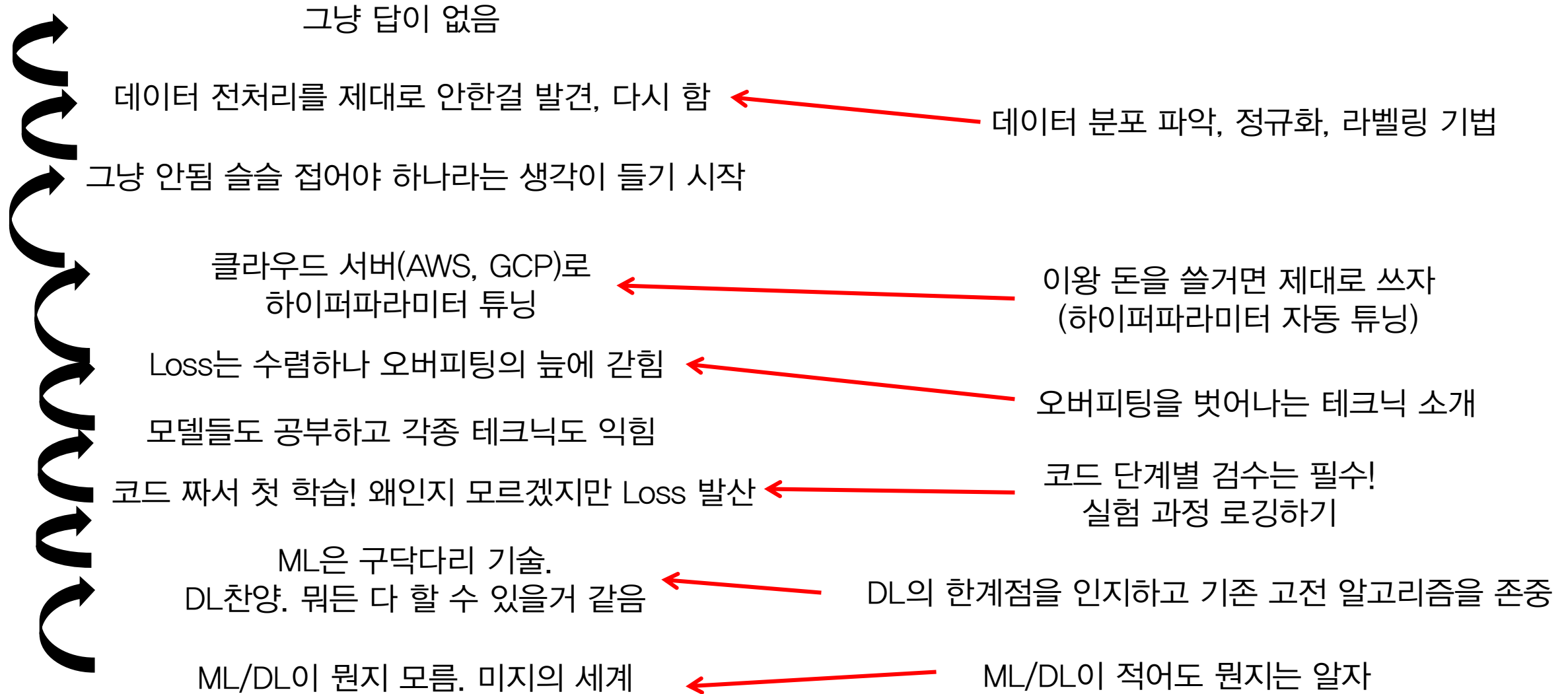
# 딥러닝 홀로서기를 들으면..



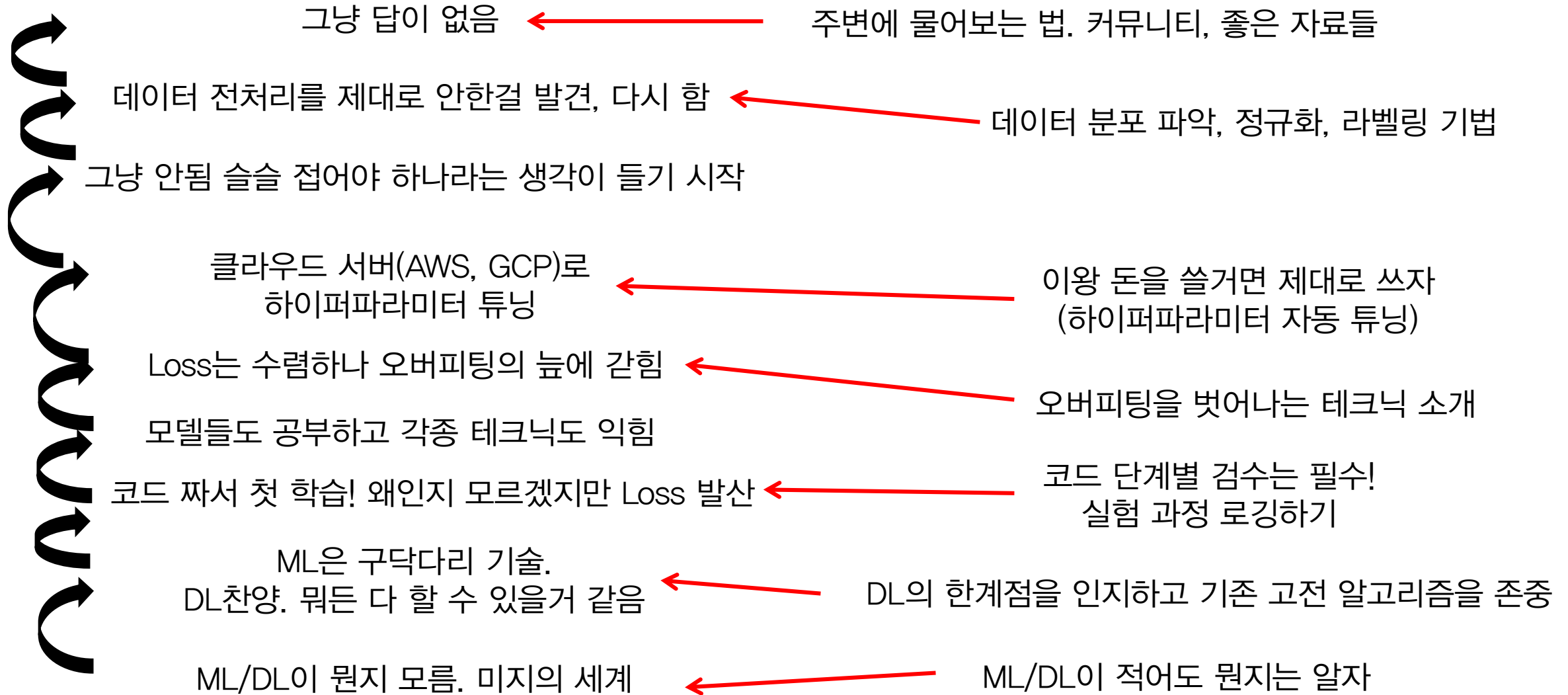
# 딥러닝 홀로서기를 들으면..



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# 딥러닝 홀로서기를 들으면..





# Summary

# Summary

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