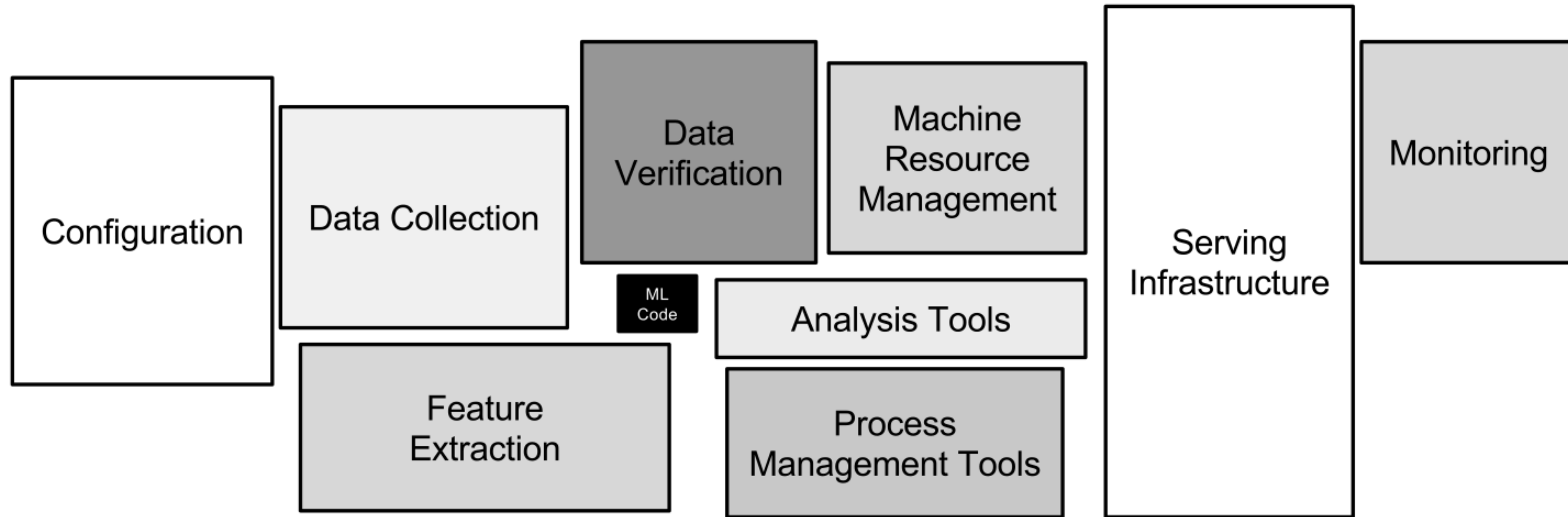


# 이제는 운영을 고민할때!

## ML 서비스 지속가능한 운영도구

### CLOW

유영상(Lead) 임준상 이승훈 장준영 최순원  
NAVER CLOVA AI SW Platform



**Figure 1: Only a small fraction of real-world ML systems is composed of the ML code, as shown by the small black box in the middle. The required surrounding infrastructure is vast and complex.**

# CONTENTS

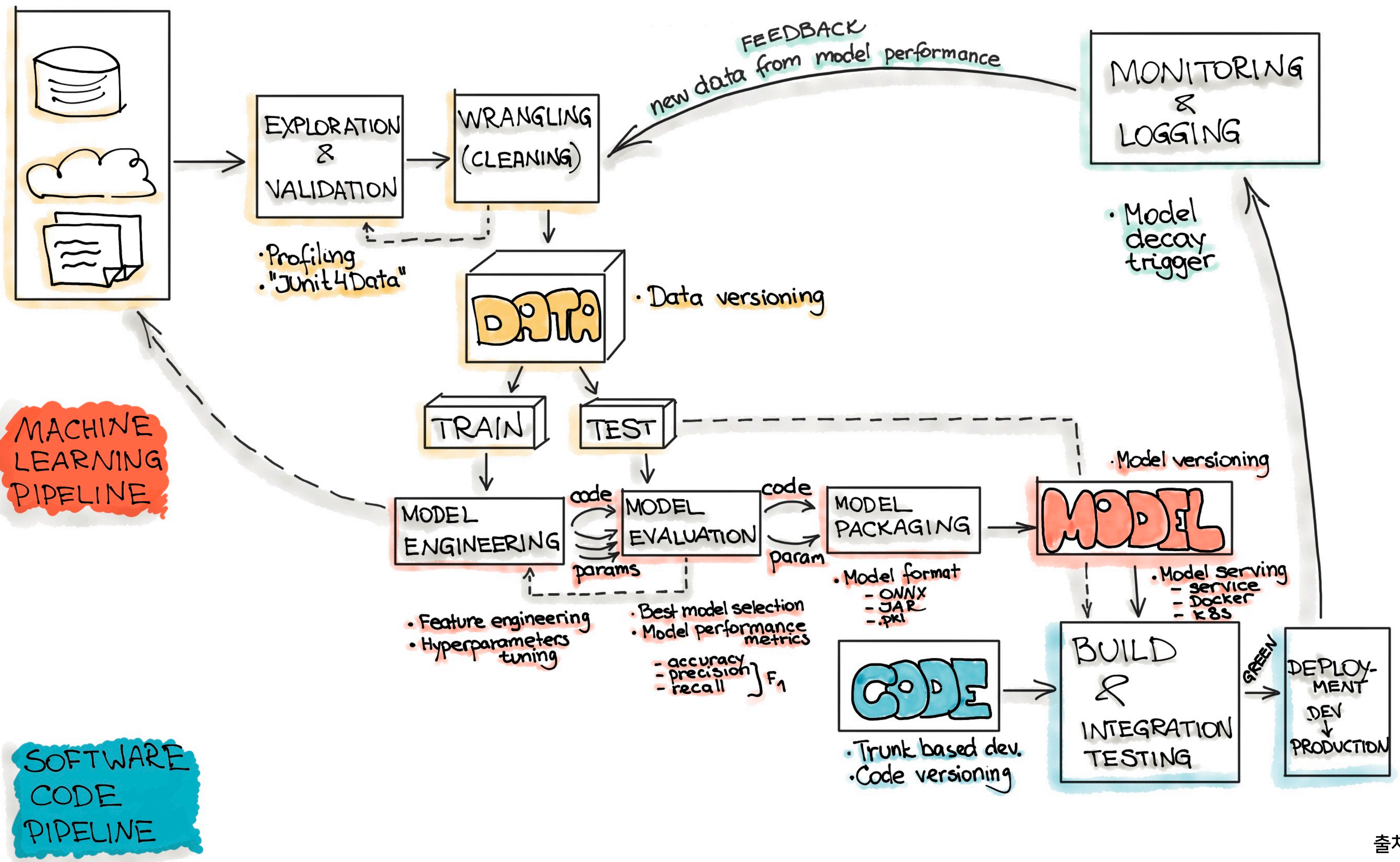
1. Background
2. CLOW Overview
3. Dataset and Rawdata
4. Training and Evaluation
5. Serving and Pipeline
6. What's Next



# 1. Background

# DATA PIPELINE

# MACHINE LEARNING ENGINEERING



# Why does ML Engineering need?

## 현재는 ML 엔지니어링과정을 어떻게 대응 했을까?

- 데이터 처리, 모델 개발, 평가, 배포
- 여전히 많은 부분에서 ML 모델러 및 AI 서비스 기획자들의 노동력에 의존
- 고비용, 휴먼에러, 오류 추적의 어려움

Excel

id	RawSentence	Label
1	우리은행 계좌 개설	weather, stock, sports, reminder, radio, news, music, movie, memo, image
2	alarm, auc 울었고 [cons_datetime] 있는한	video, reminder, music, movie, memo, imageapp
2	alarm, auc 우리은행 계좌	video, reminder, music, movie, memo, imagerejected
2	alarm, auc 지랄하지 마라	video, reminder, news, music, movie, memo, imageapp
3	alarm, auc 크롬 좀 열어	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc [cons_datetime]대 드는 거야	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc 그래서 뭐 어쩌라고	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc 바로 열어	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc 변호사 할꺼였어요	video, stock, sports, radio, people, news, music, morejected
3	alarm, auc 이제 [cons_age] 되지	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc 조심하 [cons_age]	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc 하면서 무슨	video, stock, sports, radio, people, news, music, morejected
2	alarm, auc 학회 좀 열어 주고 싶냐고	video, stock, sports, radio, people, news, music, morejected
3	alarm, auc [cons_datetime]무슨 말림해 주는	video, stock, sports, radio, people, news, music, morejected
3	alarm, auc [ett_address_world]나 수니	weather, stock, sports, news, movie, currency, calendar, audioclip, alarm
3	alarm, auc [ett_address_world]단체	weather, stock, sports, news, movie, currency, calendar, audioclip, alarm
2	alarm-> 나랑 섹스 할래	alarm
2	alarm-> 아지남이어서 정서 안정 시켜줘	alarm
3	alarm->m 알람 알람 틀어줘	alarm

Wiki

Product	Team	Client	Deployment	Release Date	Developer	Version	Notes	Invoice	Document	Category
OCB	OCB	OCB	OCB	09 Sep 2021	OCB	v1.8.1	Parse date refiner has been applied Compatible with ocb-cr-parser-api v1.8.1	invoice_it_v2.0	document_it_res504	general
OCB	OCB	OCB	OCB	08 Apr 2021	OCB	v1.8.0	OCB CRIS built-in parser AIB (rich-text-parser-doc/invoice-jmv)	invoice_it_v2.1	document_it_res504	general
OCB	OCB	OCB	OCB	19 Mar 2021	OCB	v1.6.0	OCB CRIS built-in parser AIB (rich-text-parser-doc/invoice-jmv)	invoice_it_v2.0	document_it_res504	general
OCB	OCB	OCB	OCB	03 Dec 2020	OCB	v1.4.0	OCB CRIS built-in parser AIB (rich-text-parser-doc/invoice-jmv)	invoice_it_v2.1.4	document_it_res504	general

RecommSet

Unit	Dataset	Version	Train Images	Test Images	Languages	Annotation	Details	Description
Word	kor	Kor v0.13	11530	1459	1428	✗	Quad	OCB
Word	ind	Indi v0.12	6224	728	763	✗	Quad	OCB

SynSet

Unit	Dataset	Train Images	Test Images	Languages	Annotation	Details
Char	syn	858750	-	-	Quad	http://www.nlp.go.kr/
Char	syn	351262	-	-	Quad	http://www.nlp.go.kr/

EvaluationSet

Unit	Dataset	Test Images	Train Lang	Languages	Annotation	Details	Last updated
Word	kor	2241	kor	kor	Quad	OCB, Naver, EventLine, GCrawDoc, LineProfile, Seoul, IR, HandWritten, NPA	19.04.07
Word	kor	618	-	-	-	(for qualitative evaluation)	19.04.09
Calligraphy	kor	14	-	-	-	(for qualitative evaluation)	19.04.09

Github

prant 210121 #1486

Merged myungjyou Merge

Conversation 0 Commits 1 Checks 0 Files changed 1

Changes from all commits File filter... Jump to... ⚙

22 prant\_corpus/prc\_jvc\_remain.txt

Line	Code	Label
55	music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> <ett_track>핑크	music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> <ett_track>핑크
56	music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> 노래 틀어줘	music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> 노래 틀어줘
57	music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> 음악 틀어줘	music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> 음악 틀어줘
58	- music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> 음악 틀어줘	+ music play track <cons_age_stage type="TODDLER">아기</cons_age_stage> 음악 틀어줘

# Why does ML Engineering need?

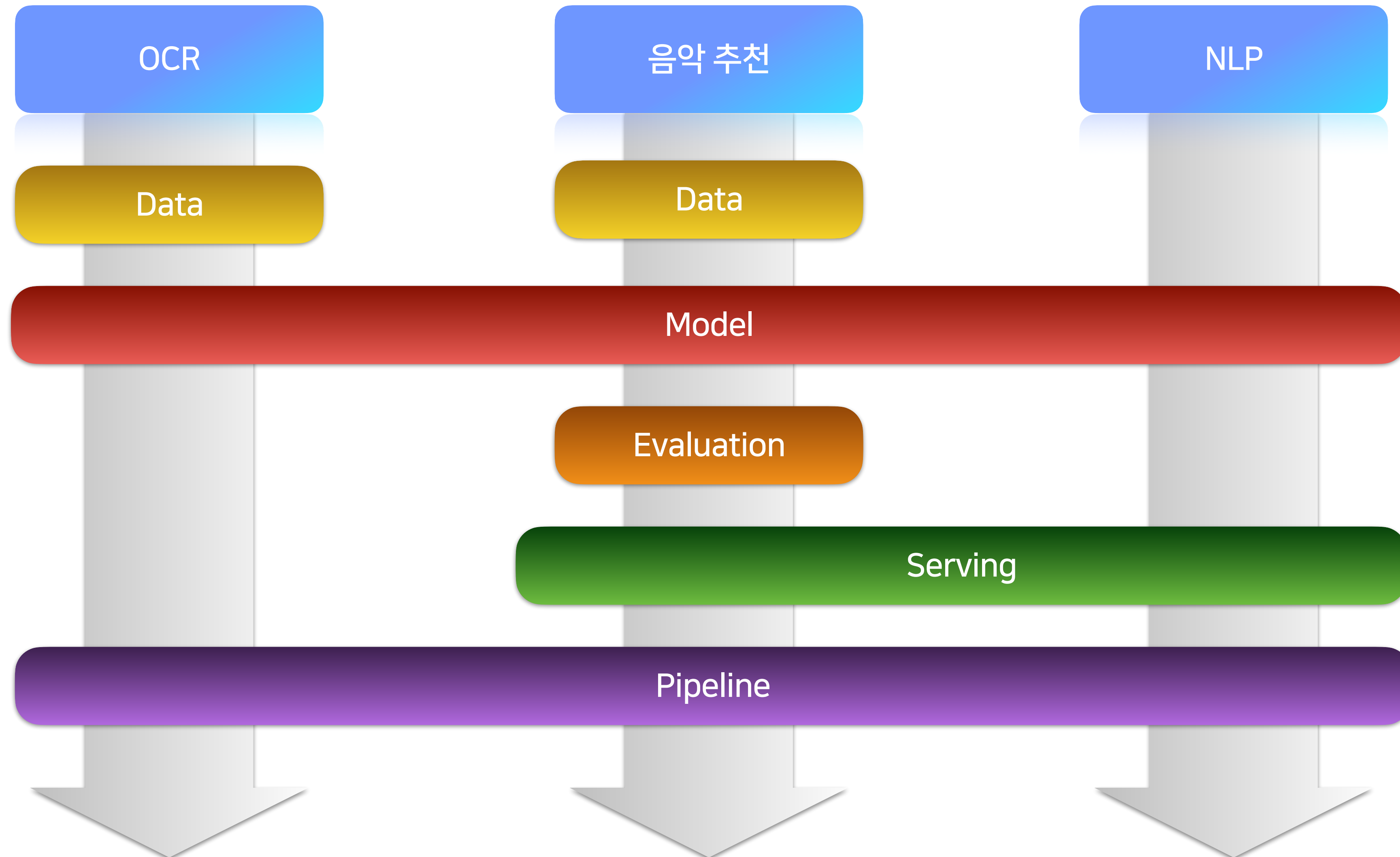
## ML 엔지니어링을 통한 자동화가 가능하다면?

- ML 모델러들은 **모델개발**에 집중할 수 있고, AI 서비스 기획자들은 **서비스**에 집중할 수 있다.
- 휴먼 에러를 예방 할 수 있다.
- **Backtracking.**
  - Useful paper trail
- 표준화된 **프로세스**를 만들 수 있다.
  - 표준화되 프로세스를 만들기 까지 삽질은 우리가...

## General purpose Tools

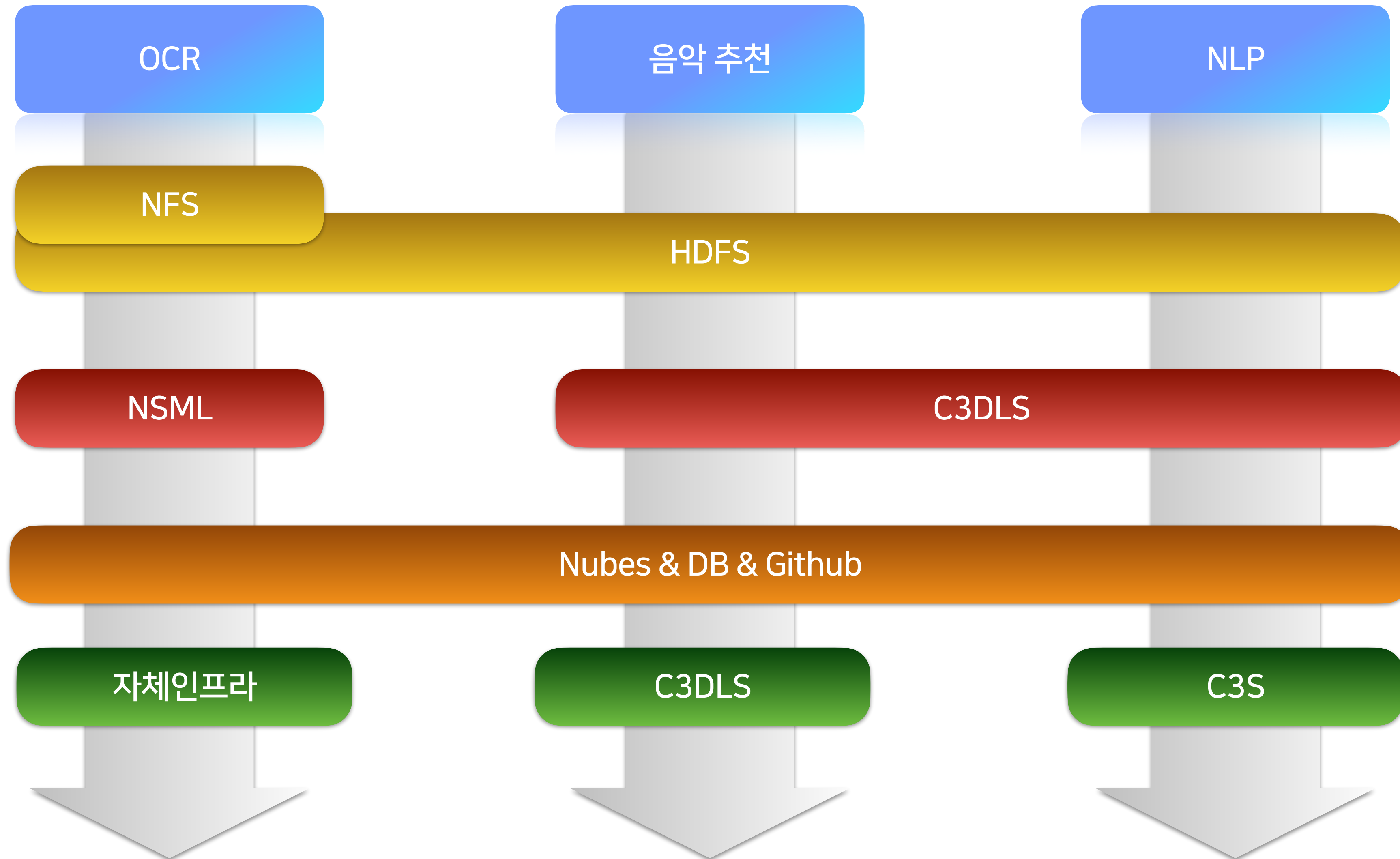
- Apache Beam
- Air Flow
- Kubeflow Pipeline on Kubernetes

# 문제점 1 다양한 Engineering 요구사항





# 문제점2 다양한 Infra 요구사항



# 그외에 풀어야할 문제점

- 멀티모델파이프라인을 위한 데이터가공
- Backtracking
- 모듈 디자인 & 외부 시스템 연동
- 운영자를 위한 쉬운 사용성과 범용성
- 지속적인 발전하는 MLOps 시스템

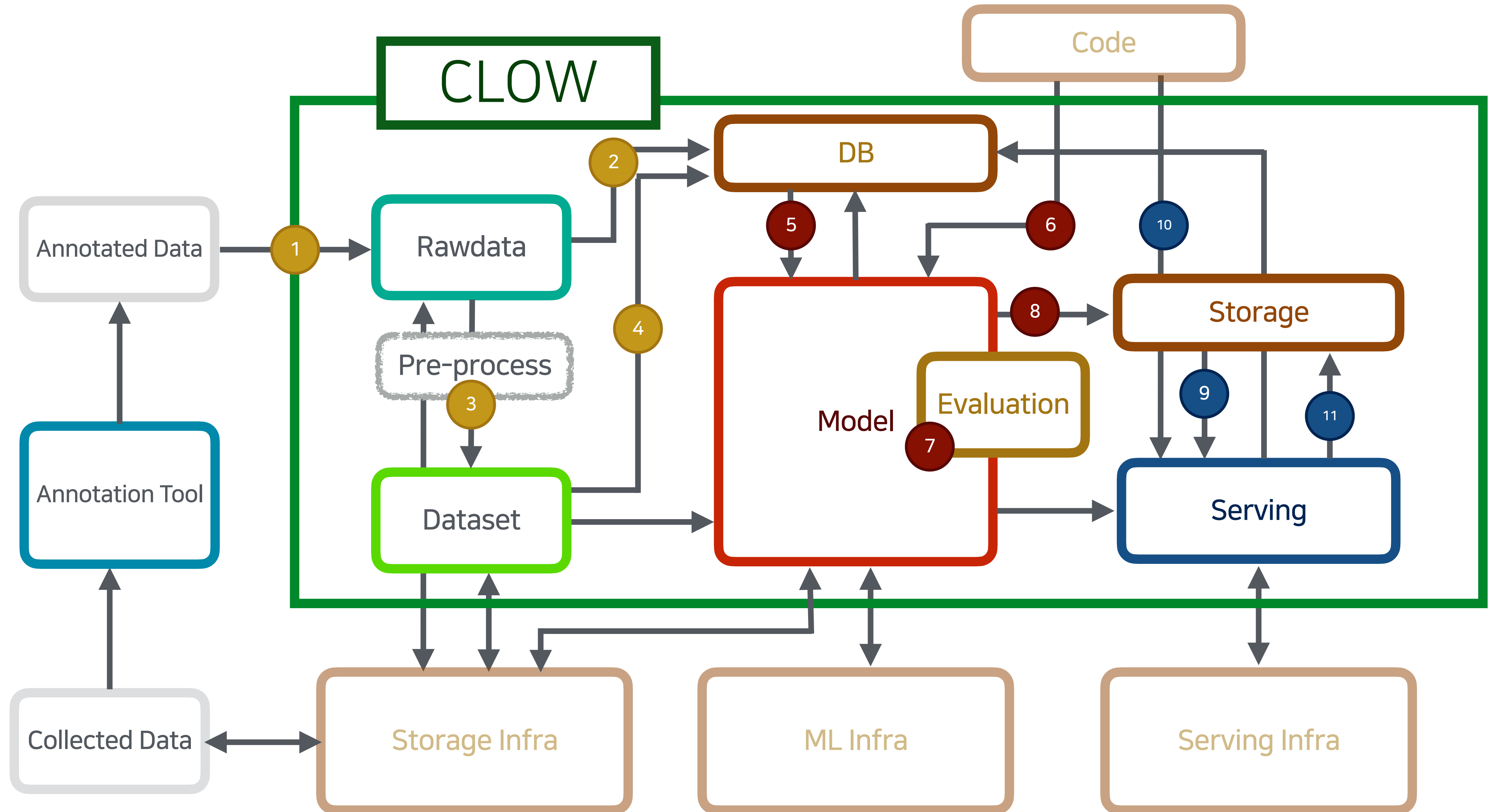
Rawdata 개념 도입  
Versioning 기능 개발 및 NoSQL 적용  
사내 표준 Object Storage인 Nubes 적용  
Public API 서버 & Callback  
Elegant WebUI

ML모델러, AI서비스기획자와  
지속적인 대화, 솔루션, 실험, 반복

자체 MLOps 시스템 Clova FLOW

# 2. Clova FLOW Overview

# Clova FLOW Overview



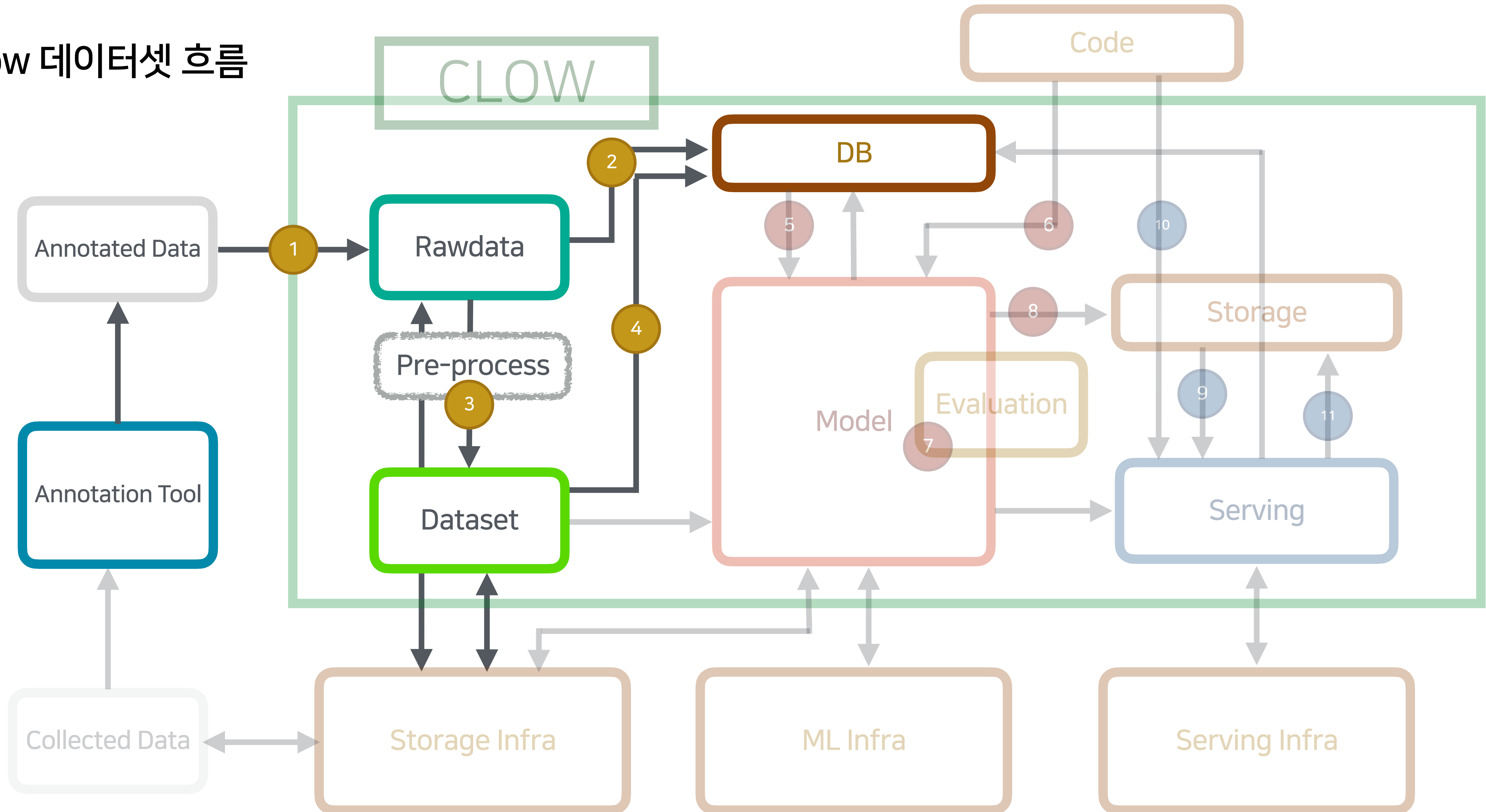
“The most complex task in an AI solution is **not to implement the machine learning algorithm** anymore—this is usually available as a set of functions in every tool—**but to collect the data,**”

Rosaria Silipo, a Ph.D. and a principal data scientist at KNIME.

# 3. Dataset & Rawdata

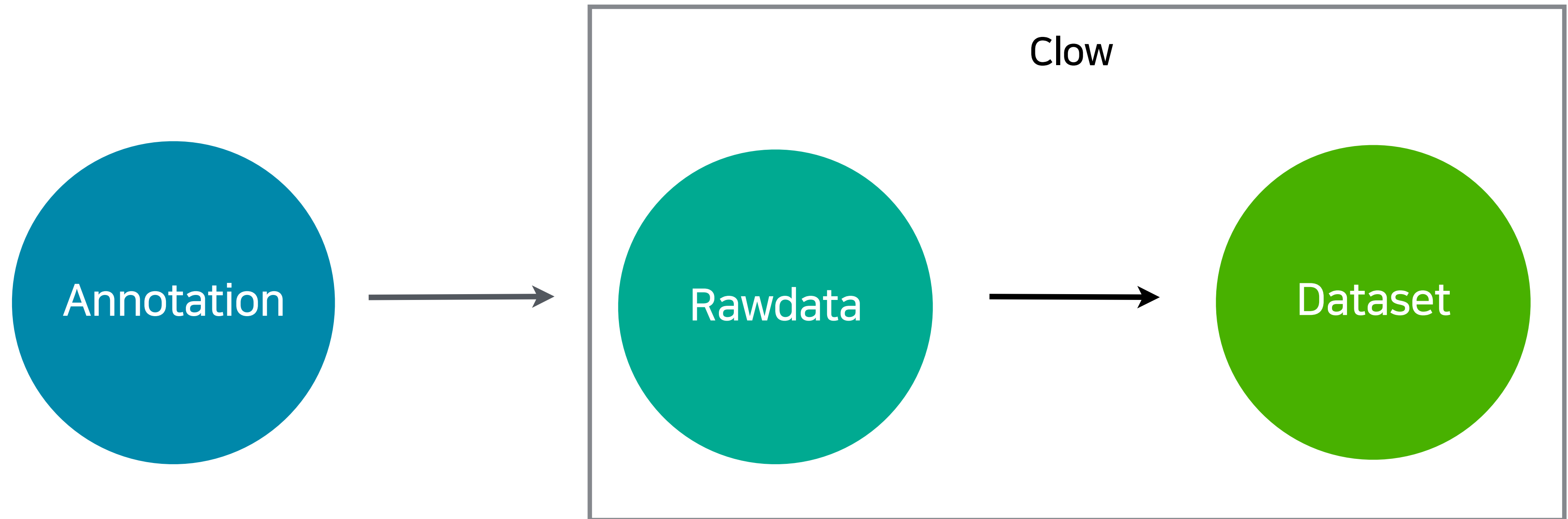
# Dataset & Rawdata Overview

Clow 데이터셋 흐름



# Dataset & Rawdata Overview

주요 개념 소개



데이터 라벨링

전처리 전 데이터

학습에 사용될 형태의 데이터



# 3.1 Dataset

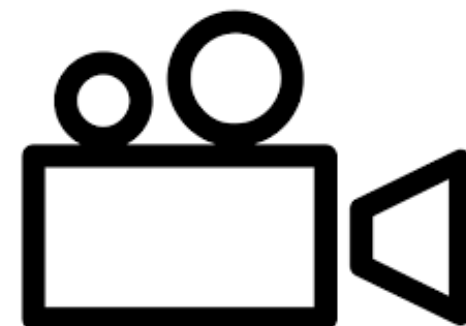
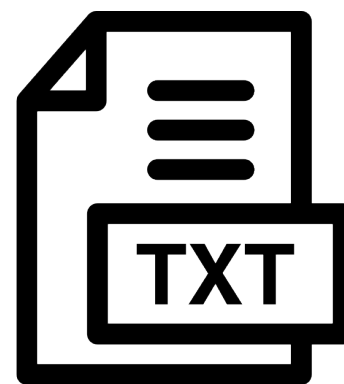
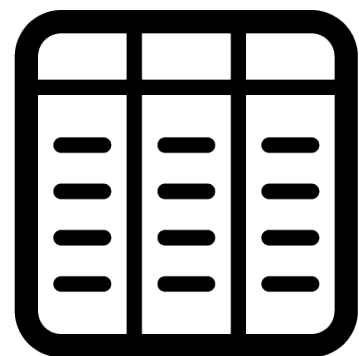
데이터셋은 ML 파이프라인을 설계하는데 가장 결정적인 요소다.



# 3.1 Dataset

다양한 구조를 어떻게 관리하지?

데이터셋 구조에 제한을 두거나.



데이터셋 구조에 제한을 두지 않거나.

# 3.1 Dataset

다양한 구조를 어떻게 관리하지?

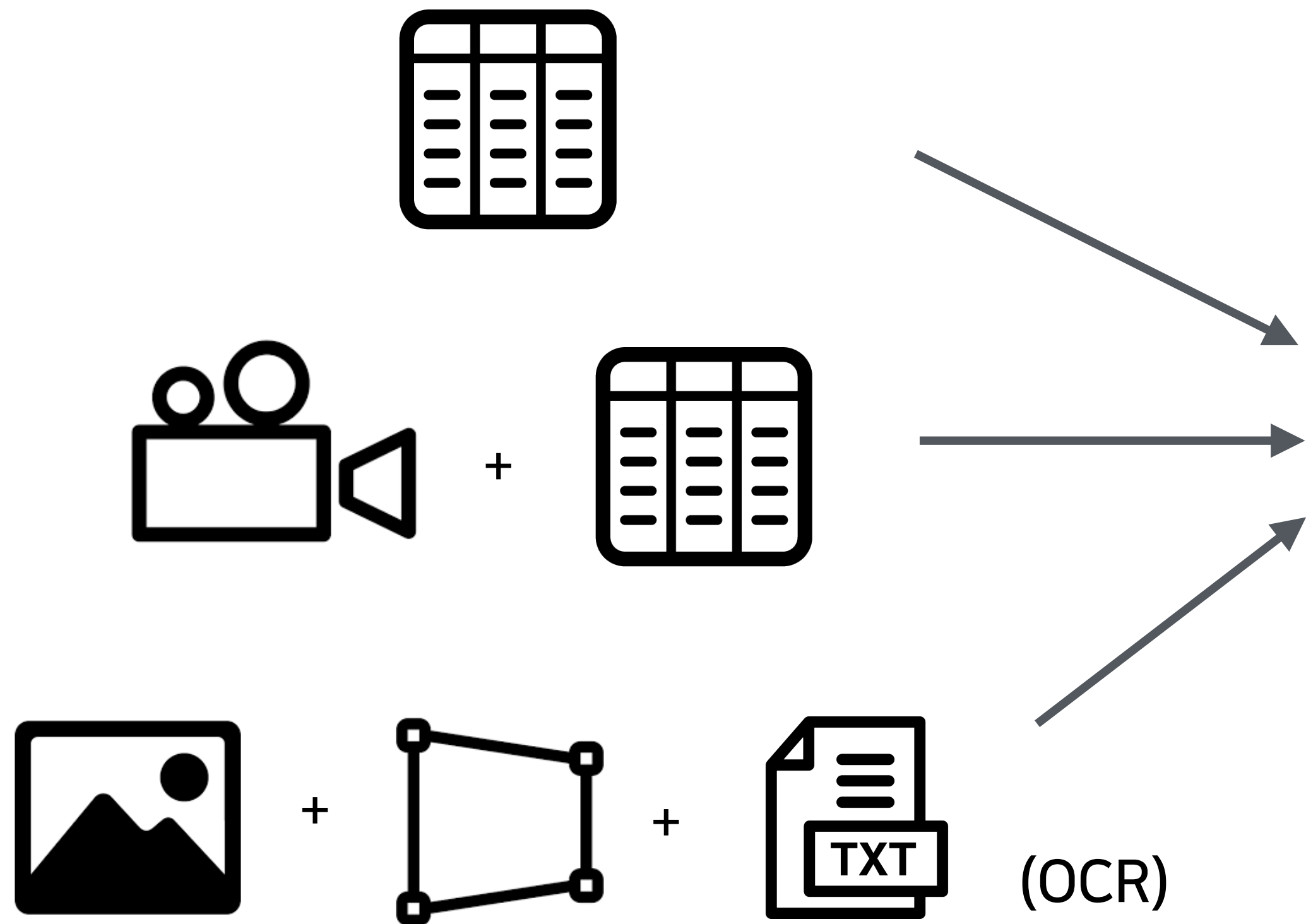
데이터셋 구조에 제한을 두거나.



데이터셋 구조에 제한을 두지 않거나.

# 3.1 Dataset

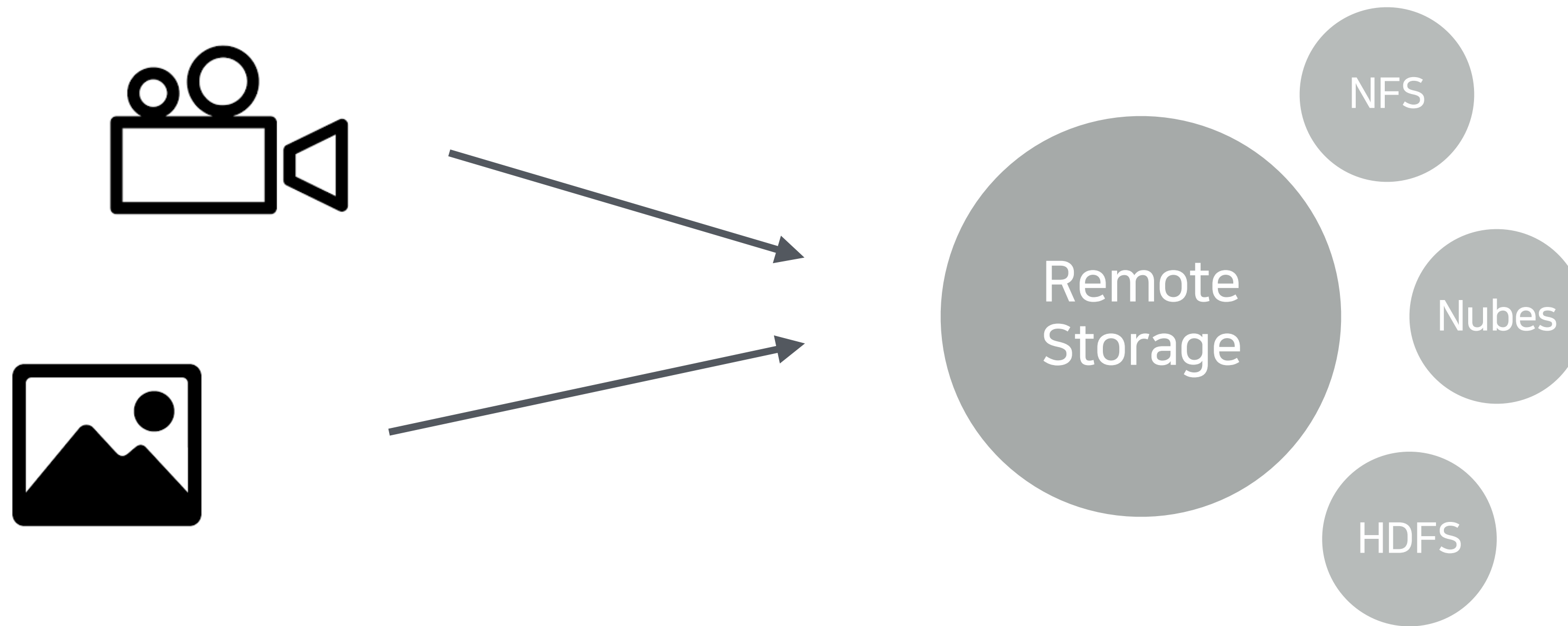
Schemaless 데이터 모델을 사용하자.



Our vision is to deliver an application data platform that provides a **unified data experience for any workload, anywhere.**

# 3.1 Dataset

원본 데이터는 사내 ML 인프라와 연동된 스토리지에 저장한다.




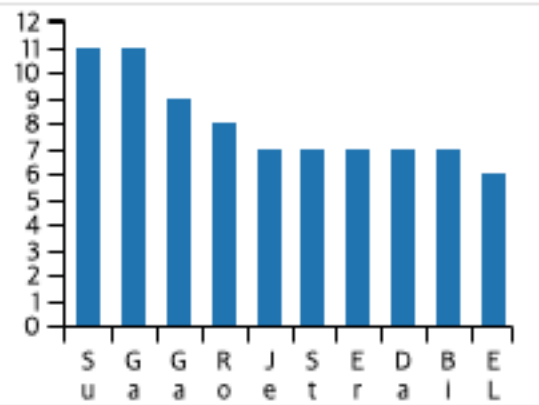
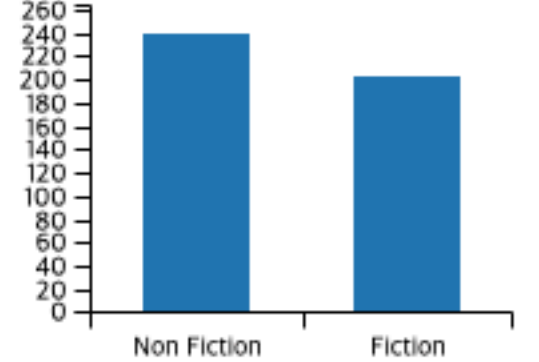
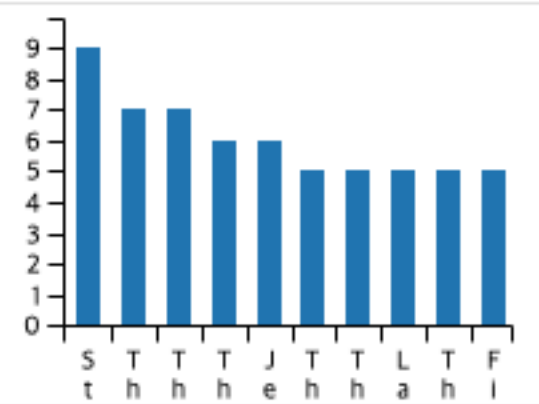
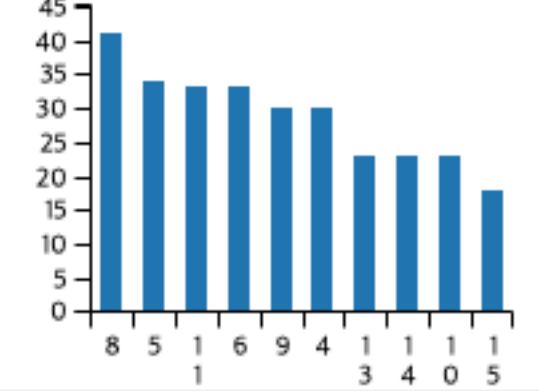
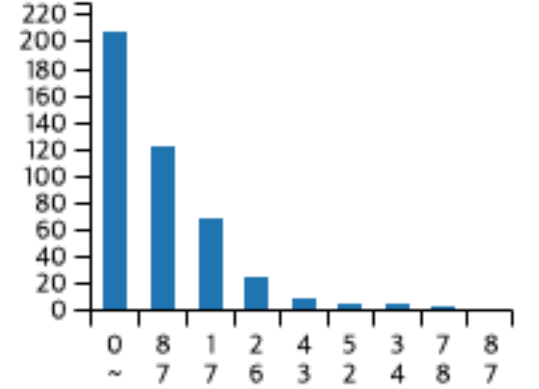

# 3.1 Dataset

## 데이터셋 조회와 수정

<input type="checkbox"/>	Author <small>press 'Enter'</small>	Genre <small>press 'Enter'</small>	Price	Year <small>press 'Enter'</small>	
<input type="checkbox"/>	Jen Sincero	Non Fiction	8	2019	
<input type="checkbox"/>	Jen Sincero	Non Fiction	8	2018	
<input type="checkbox"/>	Jen Sincero	Non Fiction	8	2017	
<input type="checkbox"/>	Jen Sincero	Non Fiction	8	2016	
<input type="checkbox"/>	Jeff Kinney	Fiction	8	2019	
<input type="checkbox"/>	R. J. Palacio	Fiction	9	2017	
<input type="checkbox"/>	R. J. Palacio	Fiction	9	2016	
<input type="checkbox"/>	R. J. Palacio	Fiction	9	2015	
<input type="checkbox"/>	R. J. Palacio	Fiction	9	2014	
<input type="checkbox"/>	R. J. Palacio	Fiction	9	2013	
<input type="checkbox"/>	Geneen Roth	Non Fiction	11	2010	
<input type="checkbox"/>	Ken Follett	Fiction	15	2012	
<input type="checkbox"/>	Cheryl Strayed	Non Fiction	18	2012	
<input type="checkbox"/>	The Staff of The Late Show with	Non Fiction	12	2018	
<input type="checkbox"/>	Maurice Sendak	Fiction	13	2009	
<input type="checkbox"/>	Delia Owens	Fiction	15	2019	

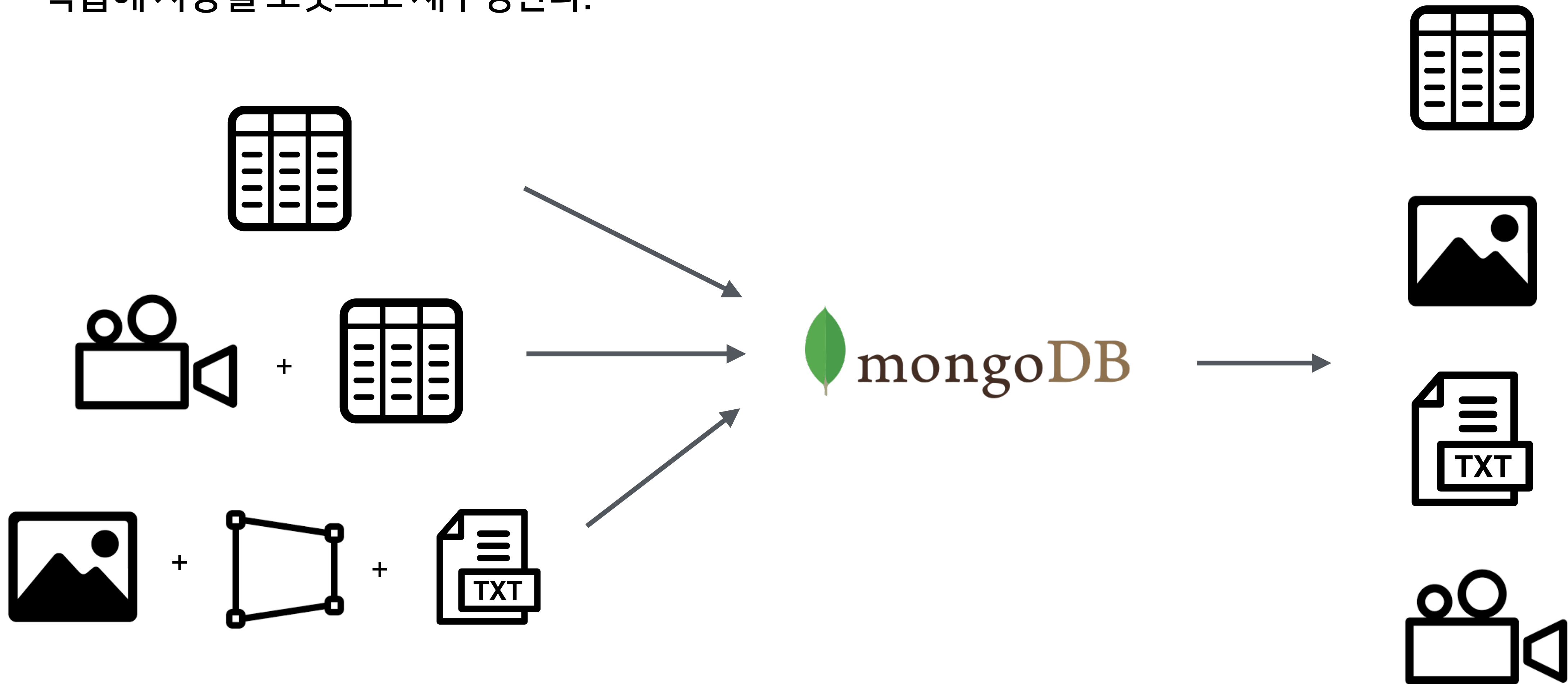
# 3.1 Dataset

## 데이터셋 통계

Statistics										
Key	Type	Category	Count	Missing	Zeros	Avg. (length)	Std dev. (length)	Min. (length)	Max. (length)	Chart (Top 10 except label) 
Author	string	text	441	0		13.09	3.31	2	32	
Genre	string	text	441	0		9.16	1.99	7	11	
Name	string	text	441	0		43.28	27.64	4	116	
Price	int	label	441	0	10	12.09	8.59		82	
Reviews	float	text	441	0	0	12766.58	12357.59	408	87841	
										

# 3.1 Dataset

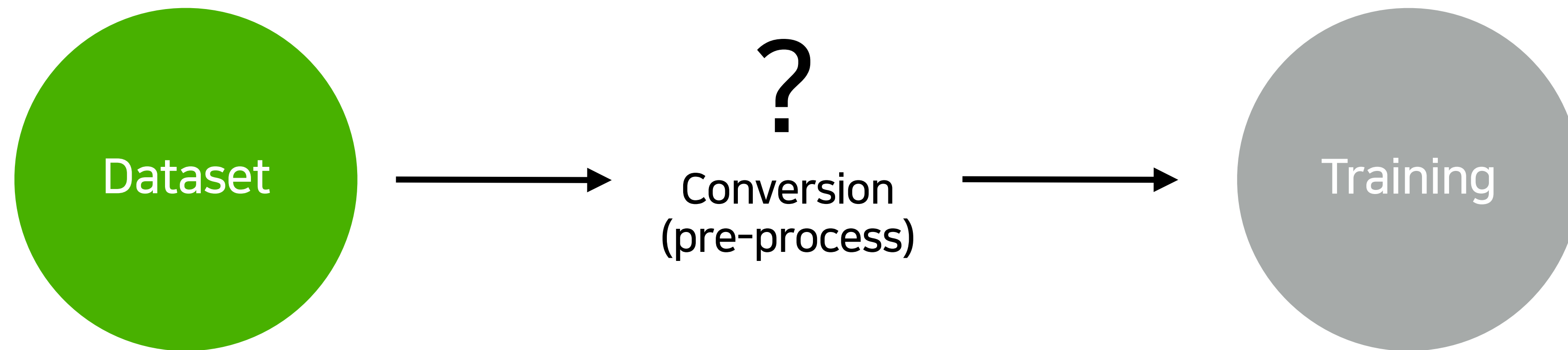
학습에 사용될 포맷으로 재구성한다.





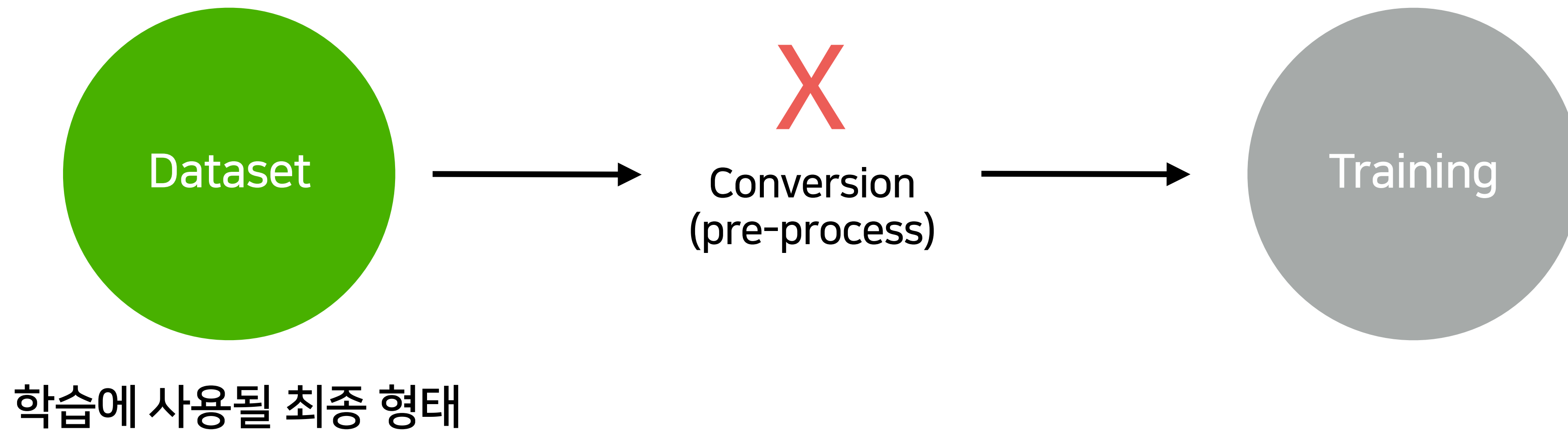
# 3.1 Dataset

필요에 따라, 학습 이전에 Dataset을 변환할 수 있을까?



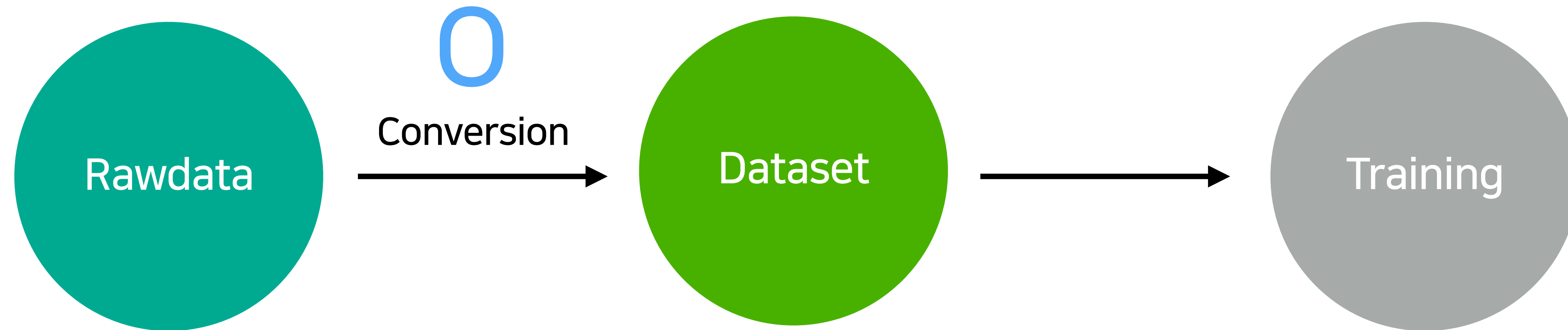
# 3.1 Dataset

필요에 따라, 학습 이전에 Dataset을 변환할 수 있을까?



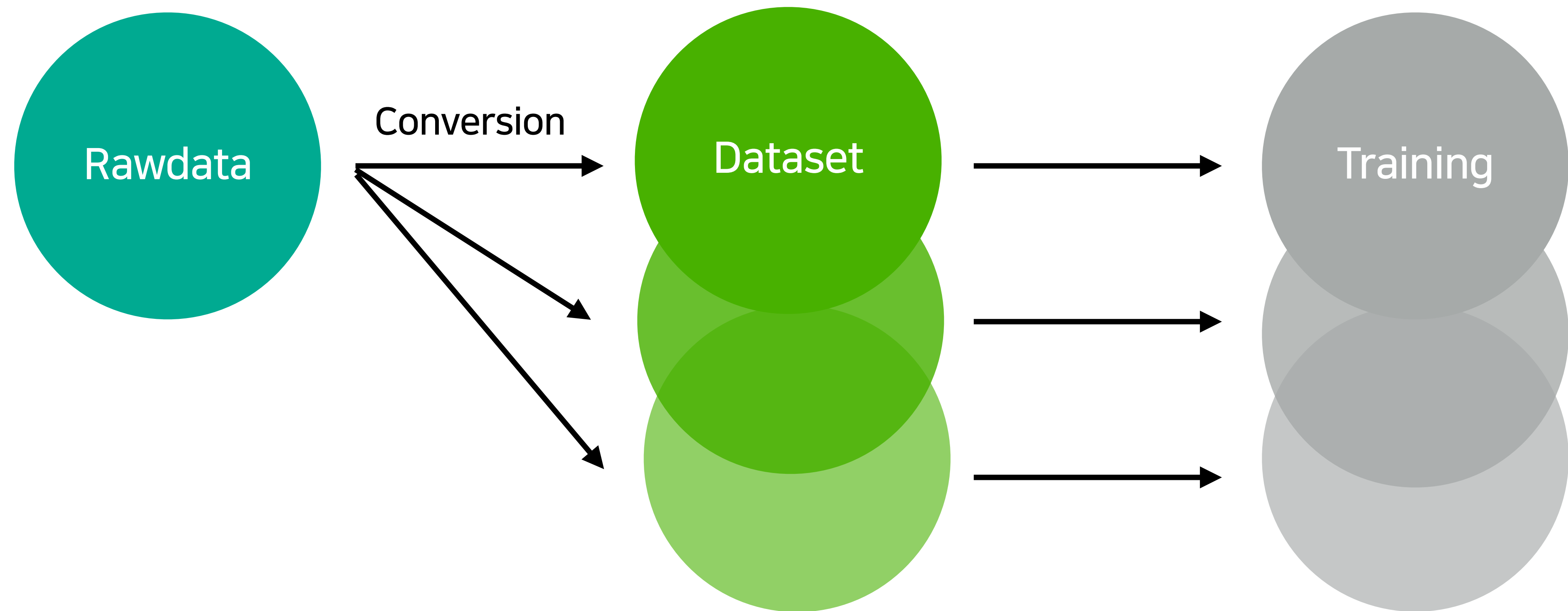
# 3.2 Rawdata

학습에 사용될 수 없는, 변환할 수 있는 Dataset 이전 단계의 데이터 모음



# 3.2 Rawdata

변환 코드에 따라 여러 데이터셋으로 변환하고 학습할 수 있다.



# 3.2 Rawdata

변환 코드를 실행하는 환경을 제공하고 있다.



Statistics
Browser
Converter

Convert Code Name

test ⊕ 🗑️ 📁 ❄️

```

1 from concurrent.futures
2
3 # json_input is a pymongo.Cursor(https://pymongo.readthedocs.io/en/stable/api/pymongo/cursor.html)
4 ### len : json_input.count()
5 #### act as generator in a for loop
6
7 # output is a list. To export, use 'output(dict_type)'.
8 def convert_single(json_input: any, raw_dataset_name: str, output: any):
9
10     # --- your conversion logic start ---
11
12     # example
13     with concurrent.futures.ThreadPoolExecutor(max_workers=2) as executor:
14         futures = set()
15         for json_single in json_input:
16             future = executor.submit(convert_single, json_single, output)
17             futures.add(future)
18
19     finished = set()
20     while len(futures) > 0:
21         done, futures = futures.wait(yet, return_when=futures.FIRST_COMPLETED)
22         finished.update(done)
23
24     return finished
25

```

convert.py
requirements.txt

convert.py requirements.txt

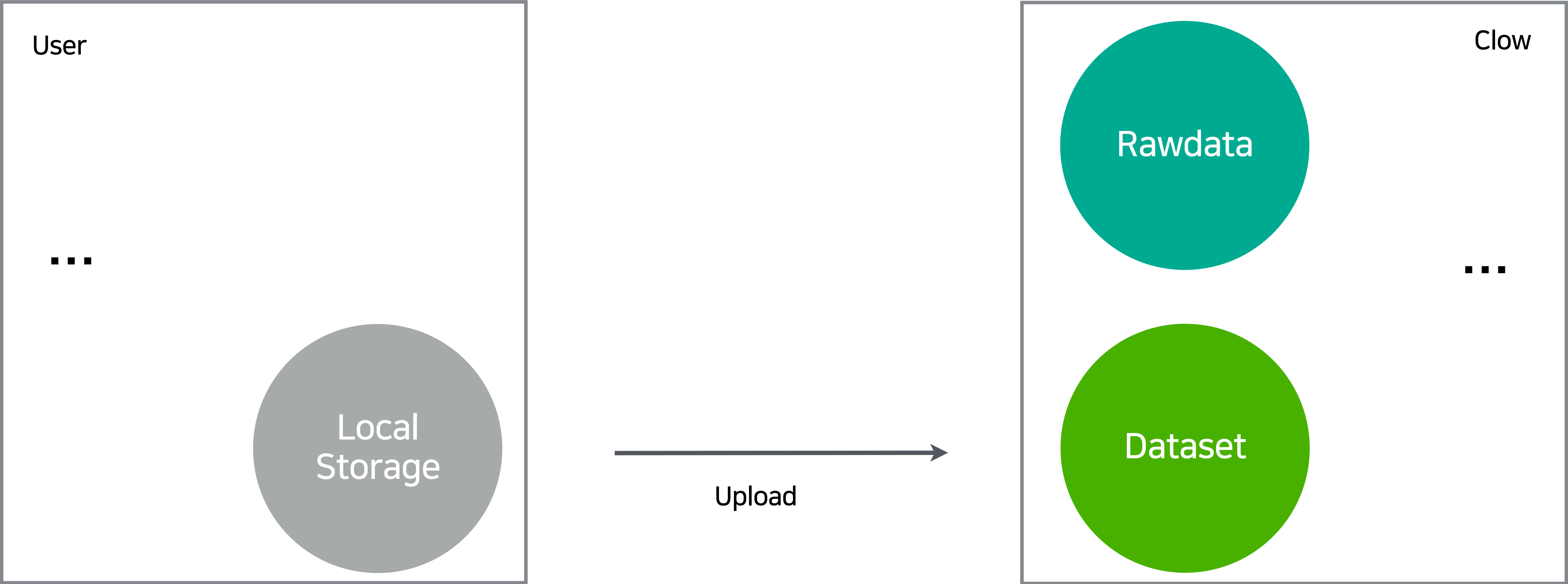
test ▼ craft\_script\_v1

Test 
 Dry Run 
 Export 
Run



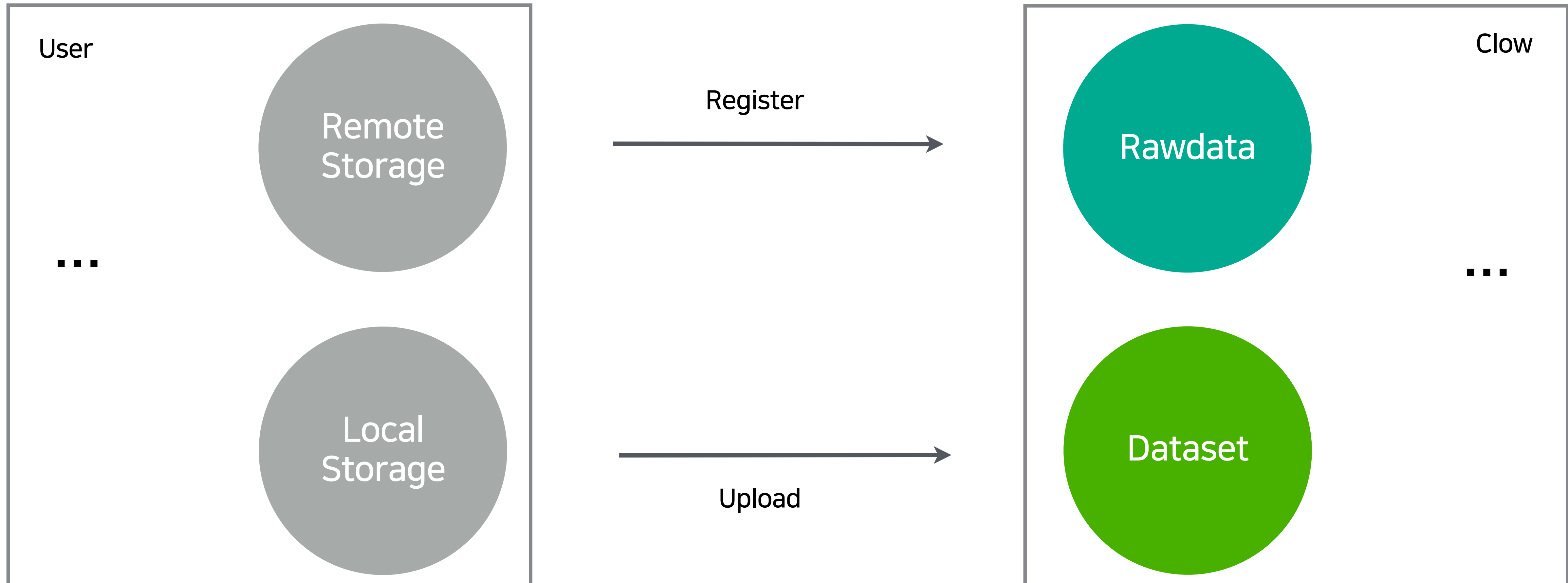
# 3.3 How to make a dataset

데이터를 직접 업로드



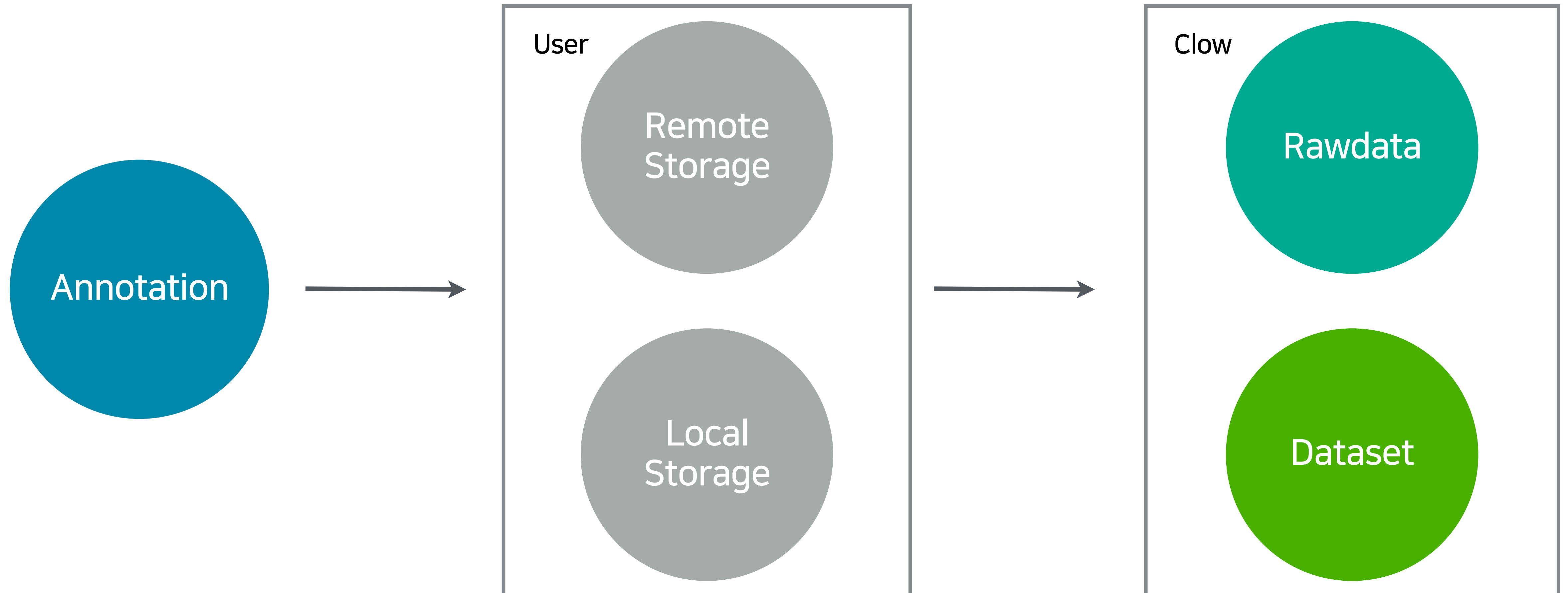
# 3.3 How to make a dataset

데이터를 직접 업로드 / 데이터 저장소를 등록



# 3.3 How to make a dataset

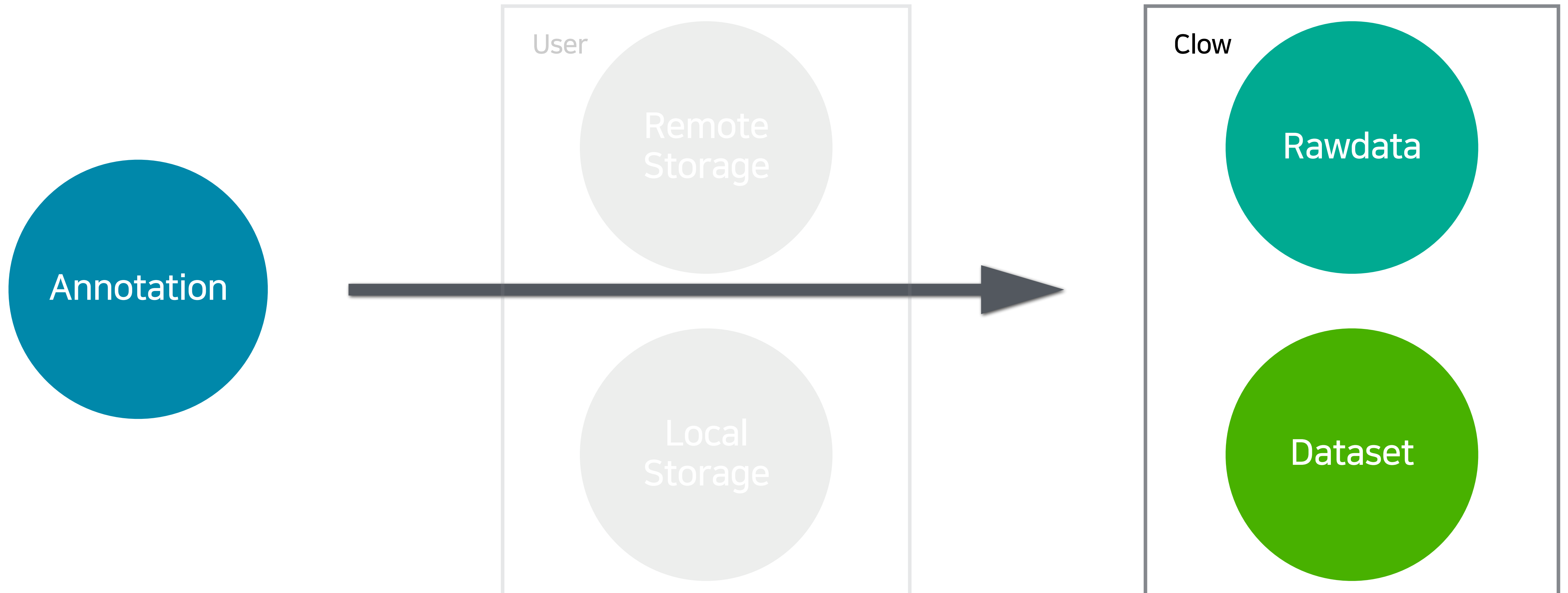
Annotation 도구로부터 데이터를 업로드하는 과정이 불편하다.





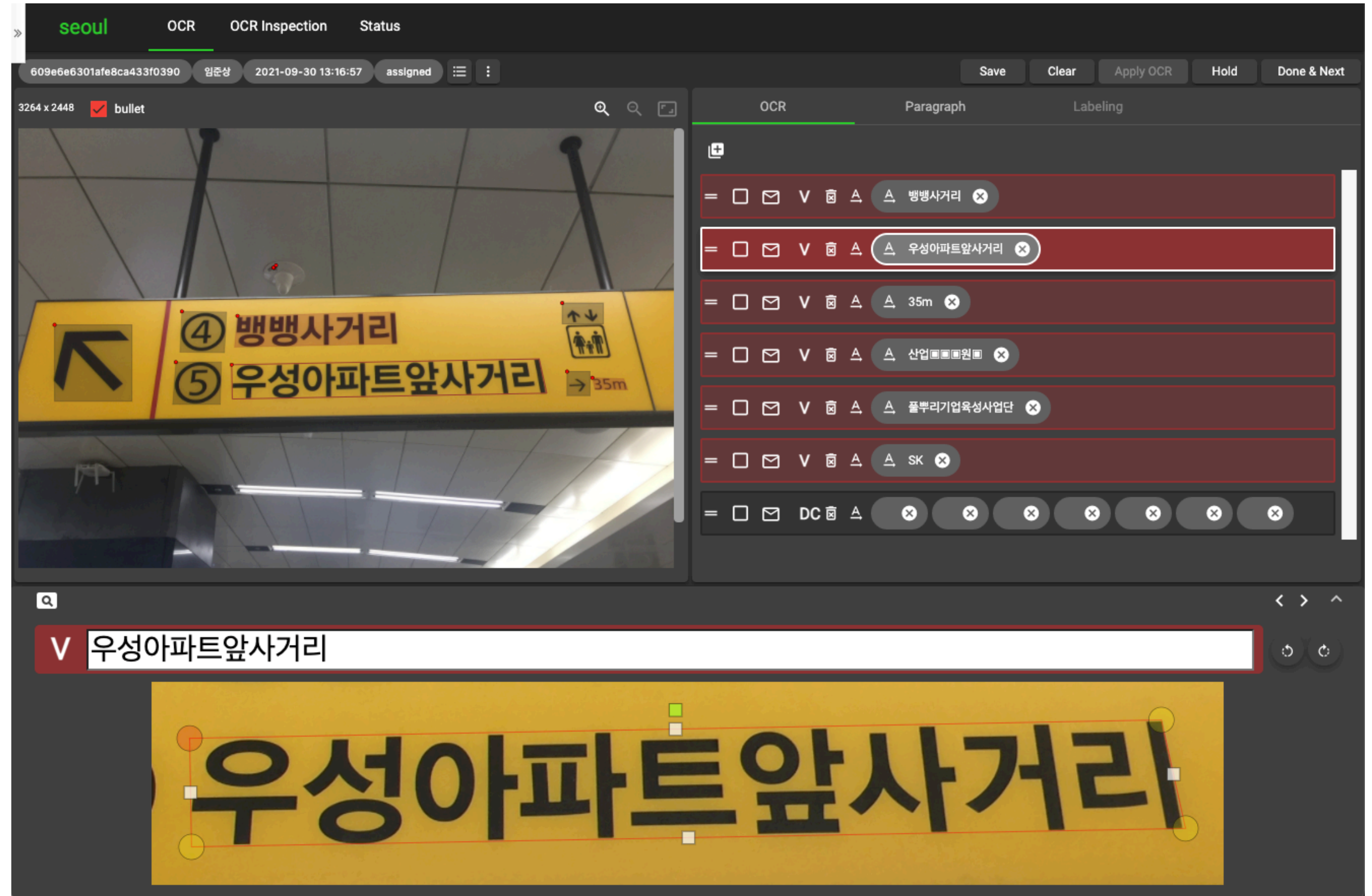
# 3.3 How to make a dataset

Annotation 도구와 Clow를 직접 연결



# 3.3 How to make a dataset

## OCR annotation tool



# 3.3 How to make a dataset

## OCR annotation tool export

Project seoul

Package Extract Export

OCR ✓

Name seoul\_20210930  
[a-zA-Z0-9][a-zA-Z0-9\.\_]\*[a-zA-Z0-9]

Description

Note

Ratio	train	valid	test
	8	1	1

Cancel Confirm



Rawdata: seoul-v0.0

Detail : 60792bf3e494e33c64a7547f

3264 x 2448

text bullet

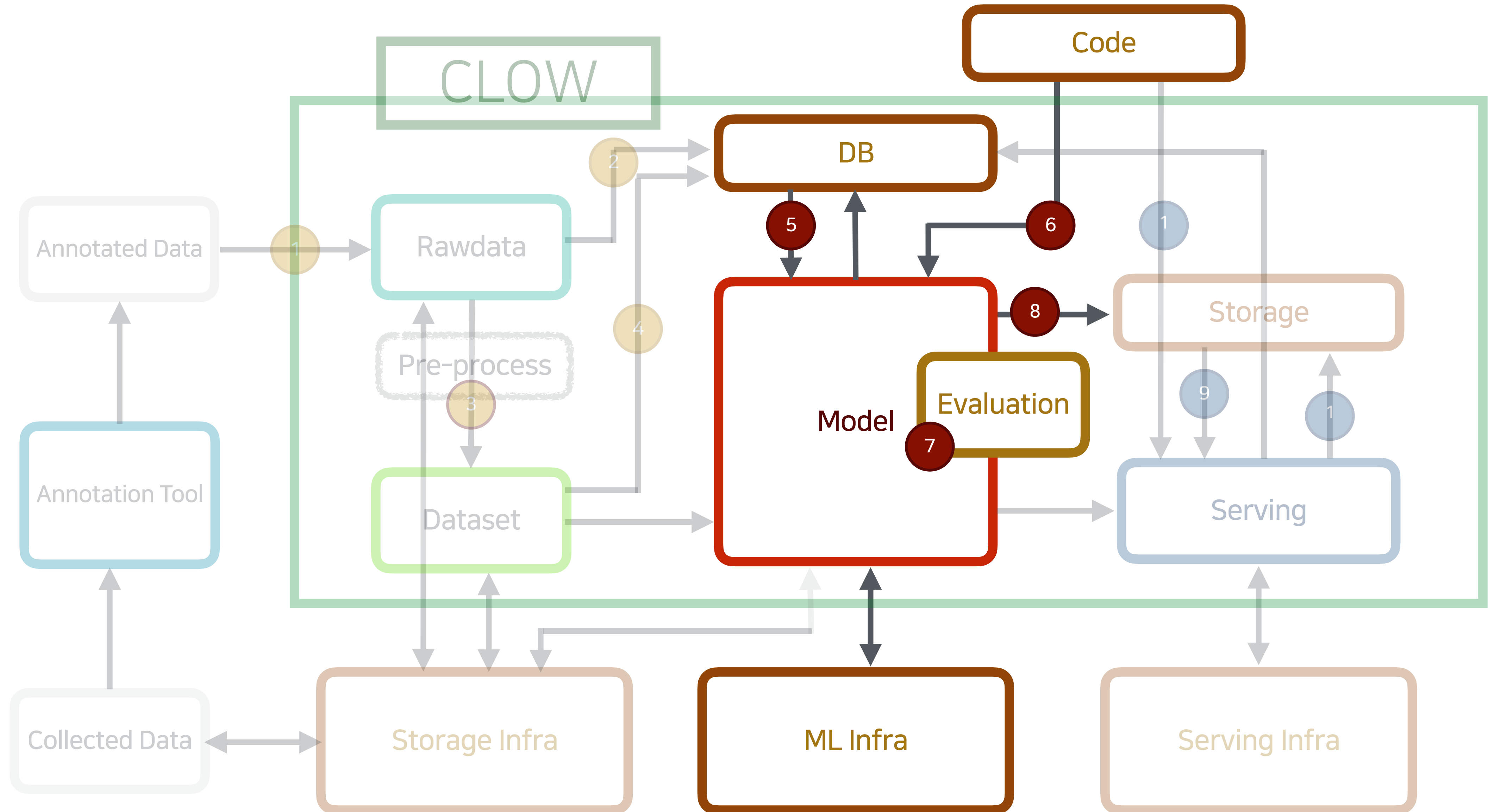
OCR

Line

Word

# 4. Model training & Evaluation

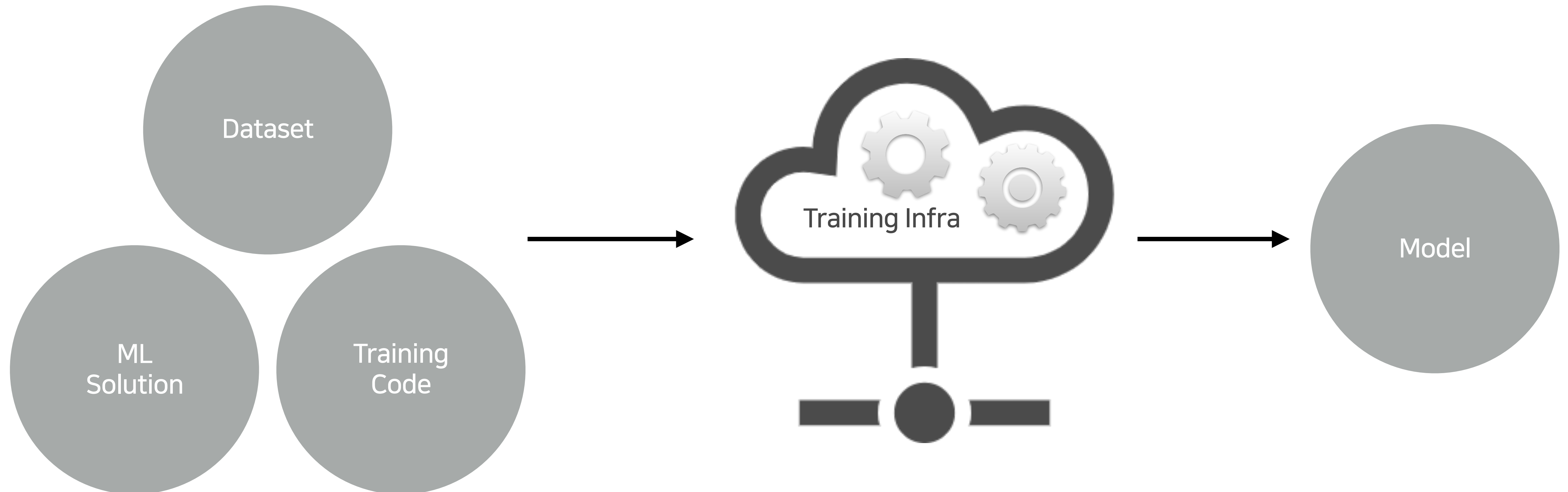
# Training & Evaluation Overview



# Training

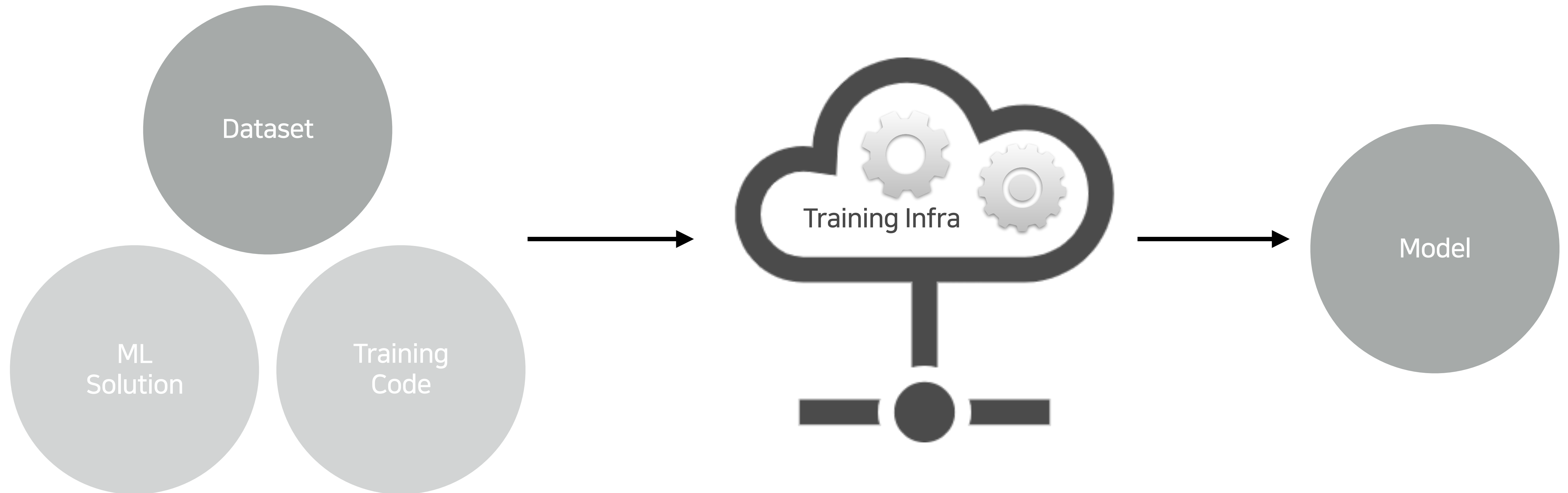
# 4.1 Training of MLOps

잘 정제된 데이터셋과 ML솔루션과 트레이닝코드는 효과적인 모델을 위한 요소이다.



# 4.1 Training of MLOps

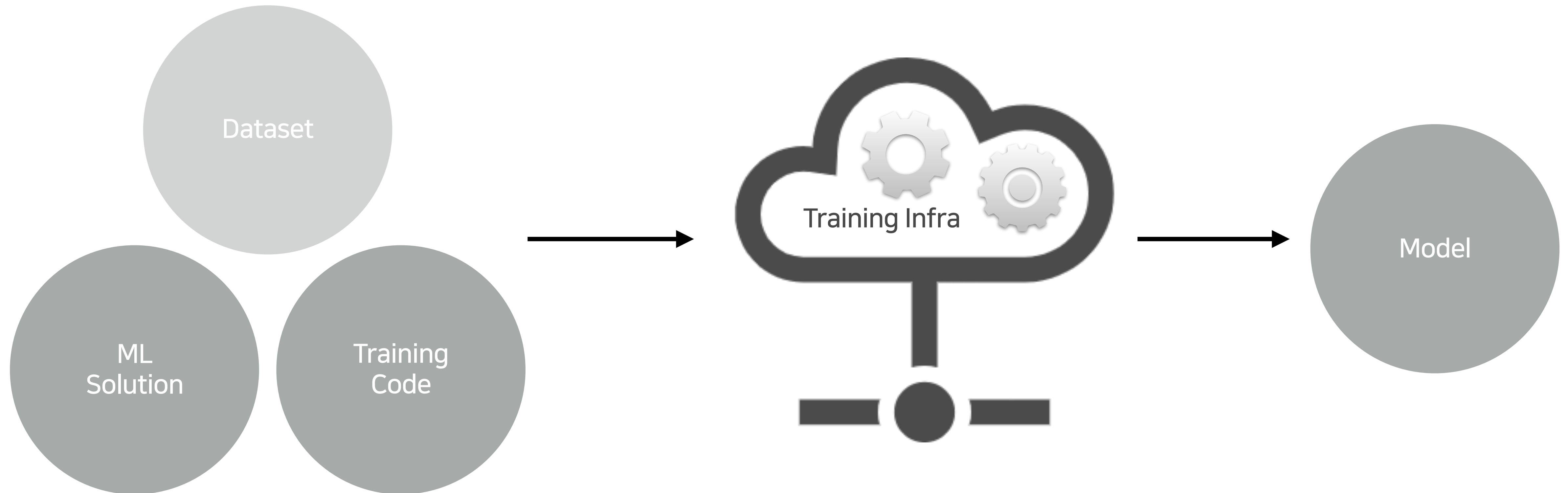
잘 정제된 데이터셋과 ML 솔루션과 트레이닝코드는 효과적인 모델을 위한 요소이다.





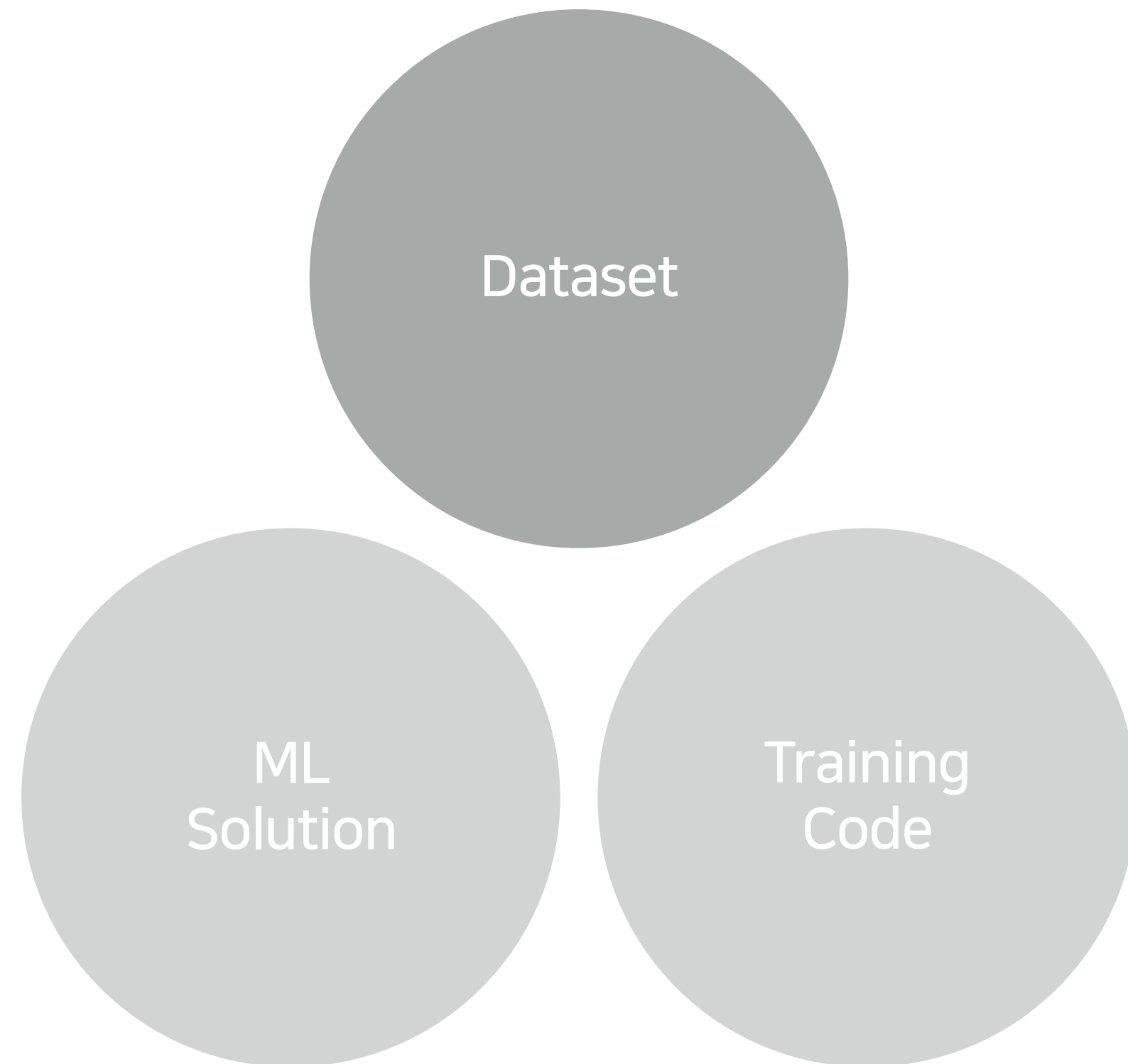
# 4.1 Training of MLOps

잘 정제된 데이터셋과 ML솔루션과 트레이닝코드는 효과적인 모델을 위한 요소이다.



# 4.2 Training의 생성과 수행

Dataset 선택



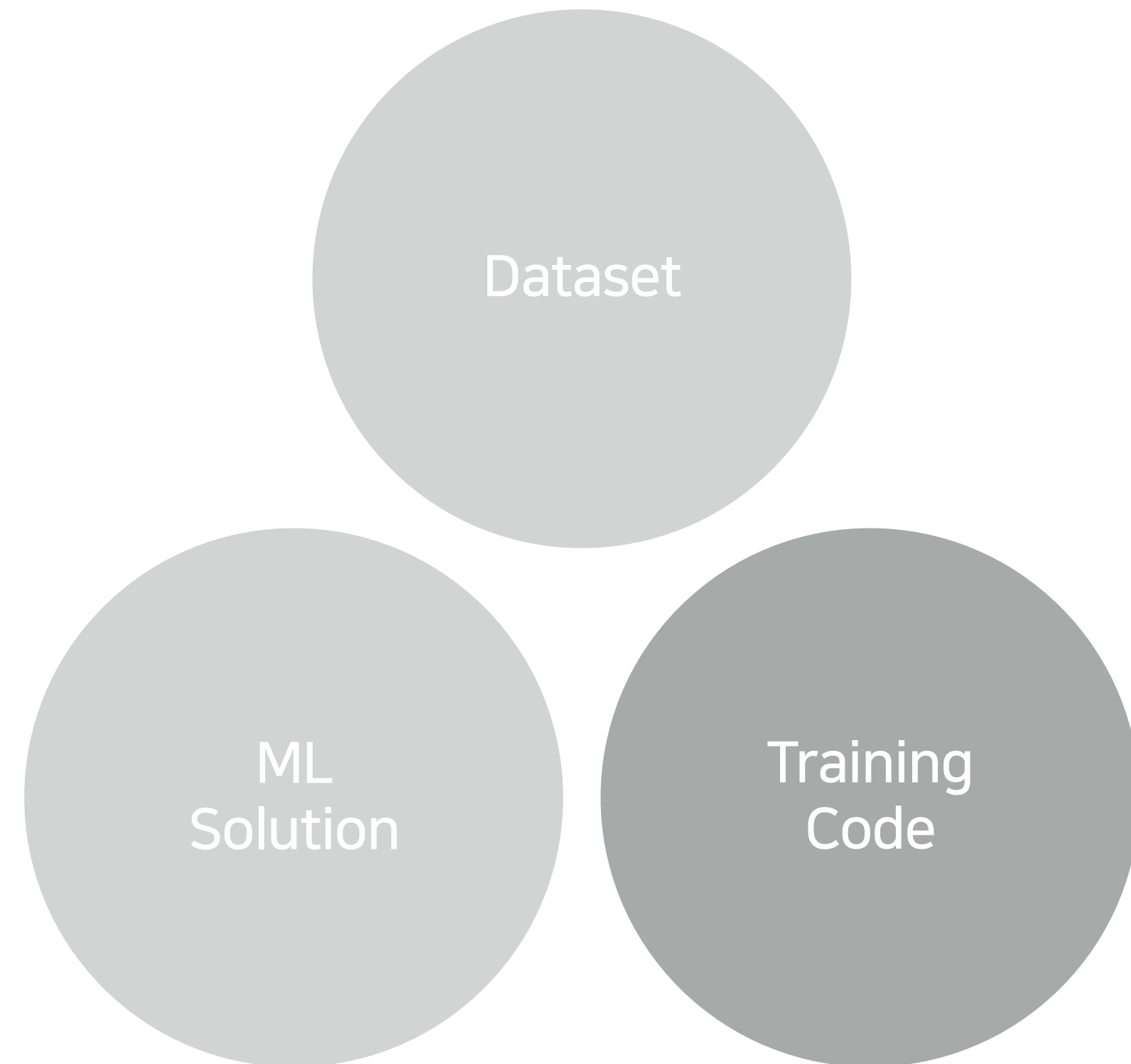
The screenshot shows a 'Create a training' form with the following fields and options:

- General** (selected tab), **Code**, **C3DL** (dropdown)
- Name:** deviat-sample (with a regex pattern [a-zA-Z0-9][a-zA-Z0-9]{1}[a-zA-Z0-9])
- Description:** for deviat2021
- Dataset:** d-torreta-training-torreta (highlighted)
- C3s Credit:** d-torreta-training-torreta-pushed, d-torreta-torreta-20210510, d-torreta-torreta-20210510-1, d-torreta-torreta-v1-1, d-torreta-torreta-v1-202105251000

Navigation buttons at the bottom: **PREV**, **NEXT**, **CANCEL**, **CREATE**.

# 4.2 Training의 생성과 수행

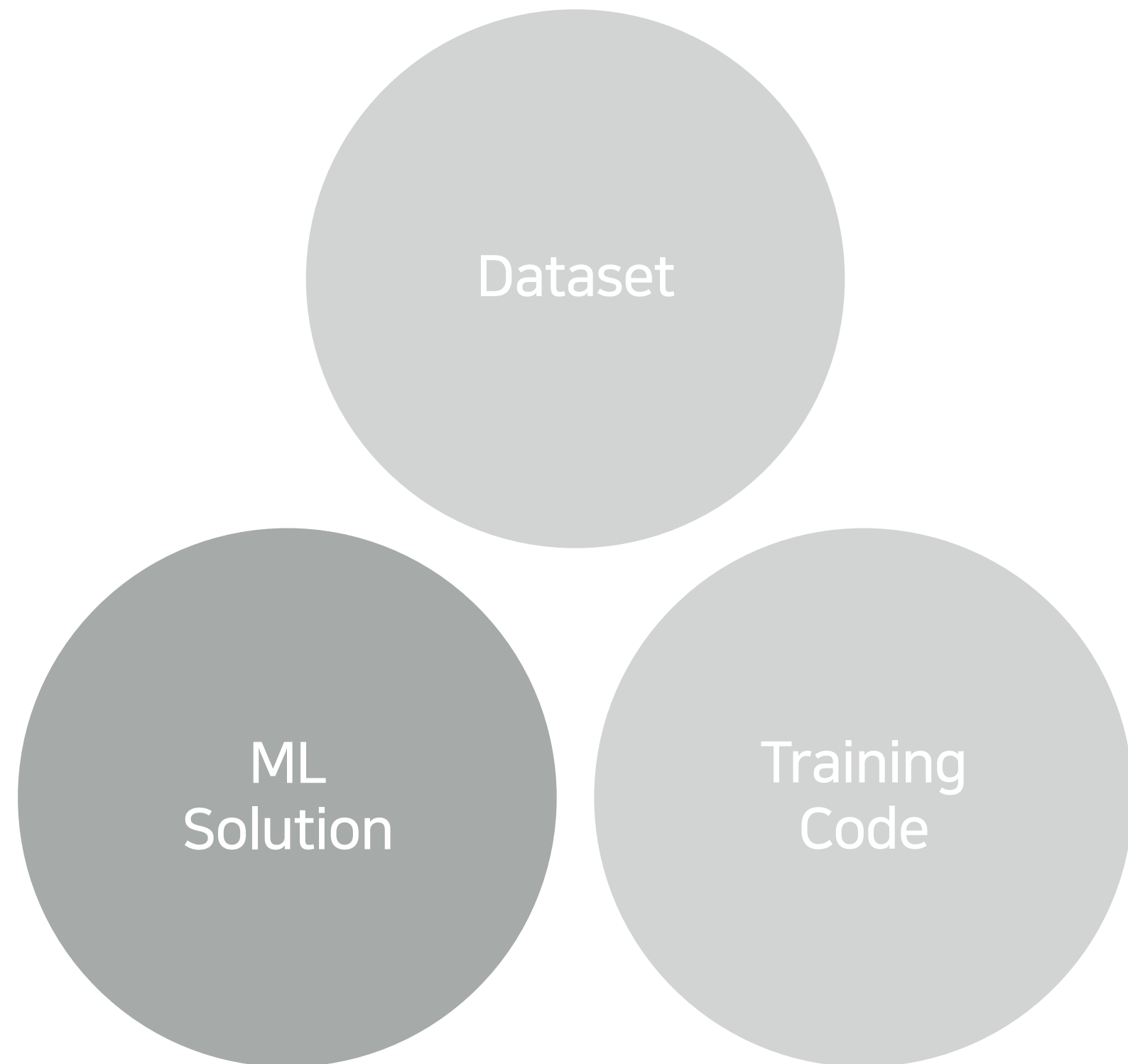
Training Code 선택



The screenshot shows a 'Create a training' interface with two overlapping windows. The background window is in the 'General' tab, showing fields for Name, Description, Dataset, and C3s Credit. The foreground window is in the 'Code' tab, showing a 'Gihub token' field with a green checkmark, a 'Repository' dropdown menu with a search box containing 'dlp/Torreta-NLU', and a list of repository suggestions including 'ai-engineering/autobal-server', 'bbololok/...', 'bbololok/...', and 'bbololok/A...'. The foreground window also has 'PREV', 'NEXT', 'CANCEL', and 'CREATE' buttons.

# 4.2 Training의 생성과 수행

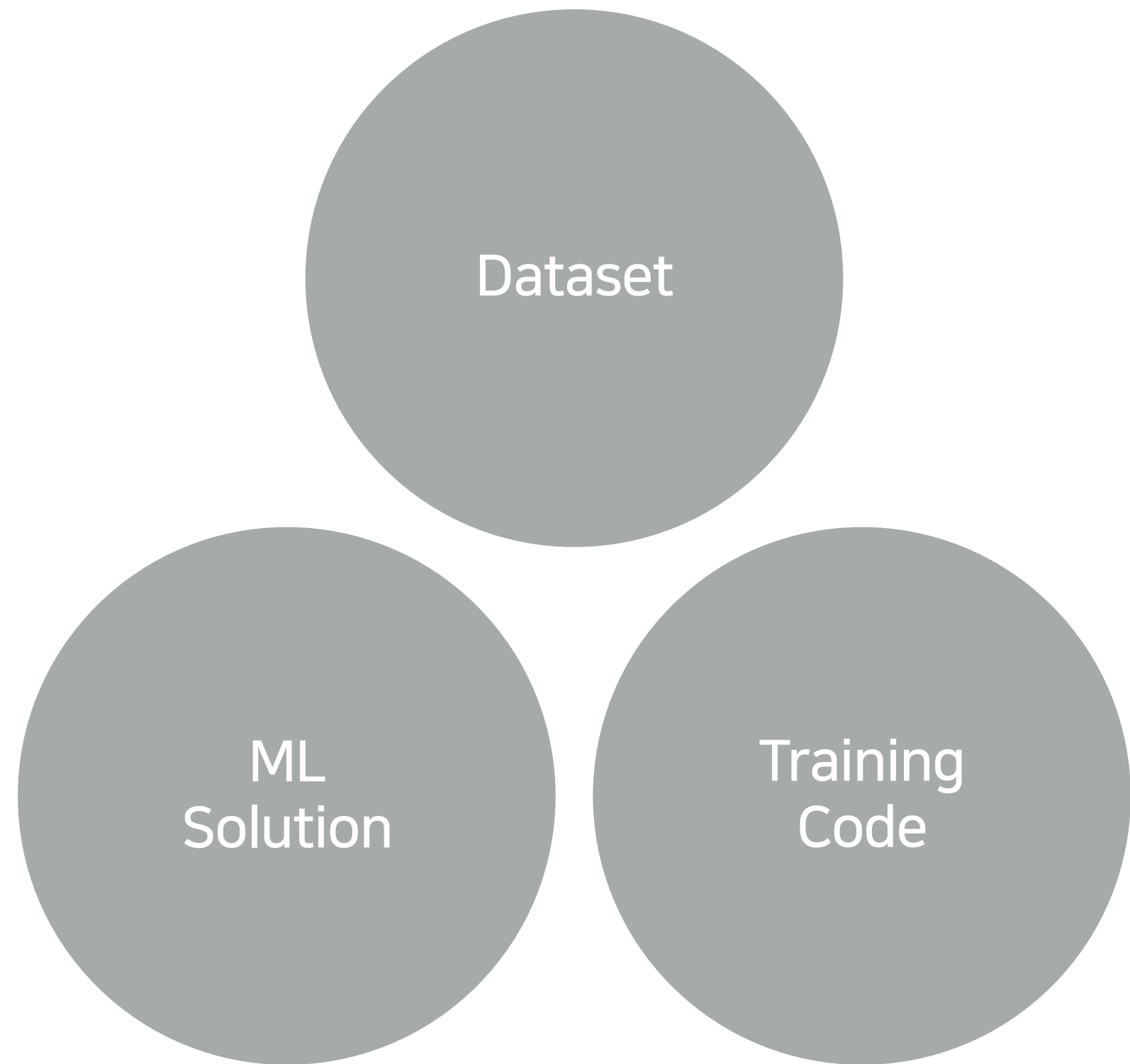
ML Solution 선택과 Infra 세팅 설정



The screenshot displays a multi-step 'Create a training' interface. The first step is 'General', which includes fields for Name, Description, Dataset, and C3s Credit. The second step is 'Code', which includes fields for Github token, Repository, Repository URL, Branch, and Tag. The third step is 'C3DL', which includes fields for Registry, Docker Image, Command, Working directory, Arguments, Client config, Tcp port, Resource (Memory, Cpu cores, Gpu cores, Gpu names), GPU driver version, File input from hdfs, and File output to hdfs. The interface includes 'PREV' and 'NEXT' navigation buttons and a 'CREATE' button at the bottom right.

# 4.2 Training의 생성과 수행

## CLOW의 Training 생성방법



Trainings

Name	Dataset	Platform	Modified time	Status	Action
deview-sample	d-torreta-evaluation-torreta	c3dl	2021-10-13 02:08:11	READY	▶ 📄 🗑️
qt	d-torreta-training-torreta	c3dl	2021-09-14 11:10:25	FAILED	▶ 📄 🗑️
queue	d-torreta-torreta-v1-202108261506	c3dl	2021-09-14 11:03:52	EXTRACTED	▶ 📄 🗑️
t-torreta-20210604131219	d-torreta-torreta-v1-	c3dl	2021-06-04 13:12:19	EXTRACTED	▶ 📄 🗑️
t-torreta-20210615112959	d-torreta-torreta-v1-202105251000	c3dl	2021-06-15 11:29:59	EXTRACTED	▶ 📄 🗑️
t-torreta-20210615113044	d-torreta-torreta-v1-202105251000	c3dl	2021-06-15 11:30:44	EXTRACTED	▶ 📄 🗑️
t-torreta-20210615124859	d-torreta-torreta-v1-202105251000	c3dl	2021-06-15 12:48:59	EXTRACTED	▶ 📄 🗑️
t-torreta-20210615191212	d-torreta-torreta-v1-202105151000	c3dl	2021-06-15 19:12:12	EXTRACTED	▶ 📄 🗑️
t-torreta-20210616141819	d-torreta-torreta-v1-202105151000	c3dl	2021-06-16 14:18:19	EXTRACTED	▶ 📄 🗑️
t-torreta-20210618141059	d-torreta-torreta-v1-202105151000	c3dl	2021-06-18 14:10:59	EXTRACTED	▶ 📄 🗑️
t-torreta-20210618160651	d-torreta-torreta-v1-202105151000	c3dl	2021-06-18 16:06:51	EXTRACTED	▶ 📄 🗑️
t-torreta-20210618160747	d-torreta-torreta-v1-202105151000	c3dl	2021-06-18 16:07:47	EXTRACTED	▶ 📄 🗑️
t-torreta-20210618174204	d-torreta-torreta-v1-202105151000	c3dl	2021-06-18 17:42:04	EXTRACTED	▶ 📄 🗑️
t-torreta-20210622154543	d-torreta-torreta-v1-202106151000	c3dl	2021-06-22 15:45:43	FAILED	▶ 📄 🗑️

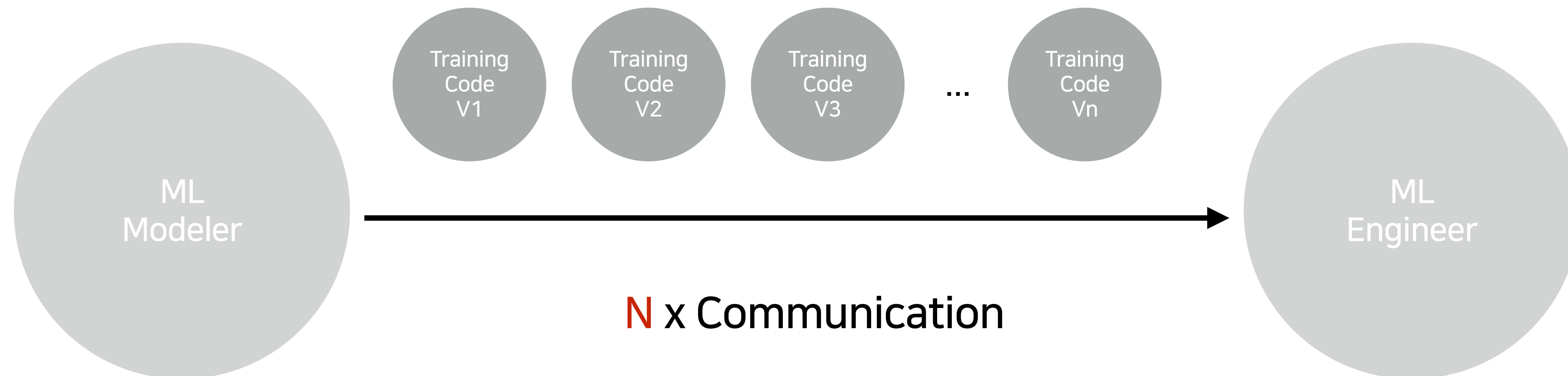
PREV NEXT

PREV NEXT

CANCEL CREATE

# 4.3 Training Code 관리

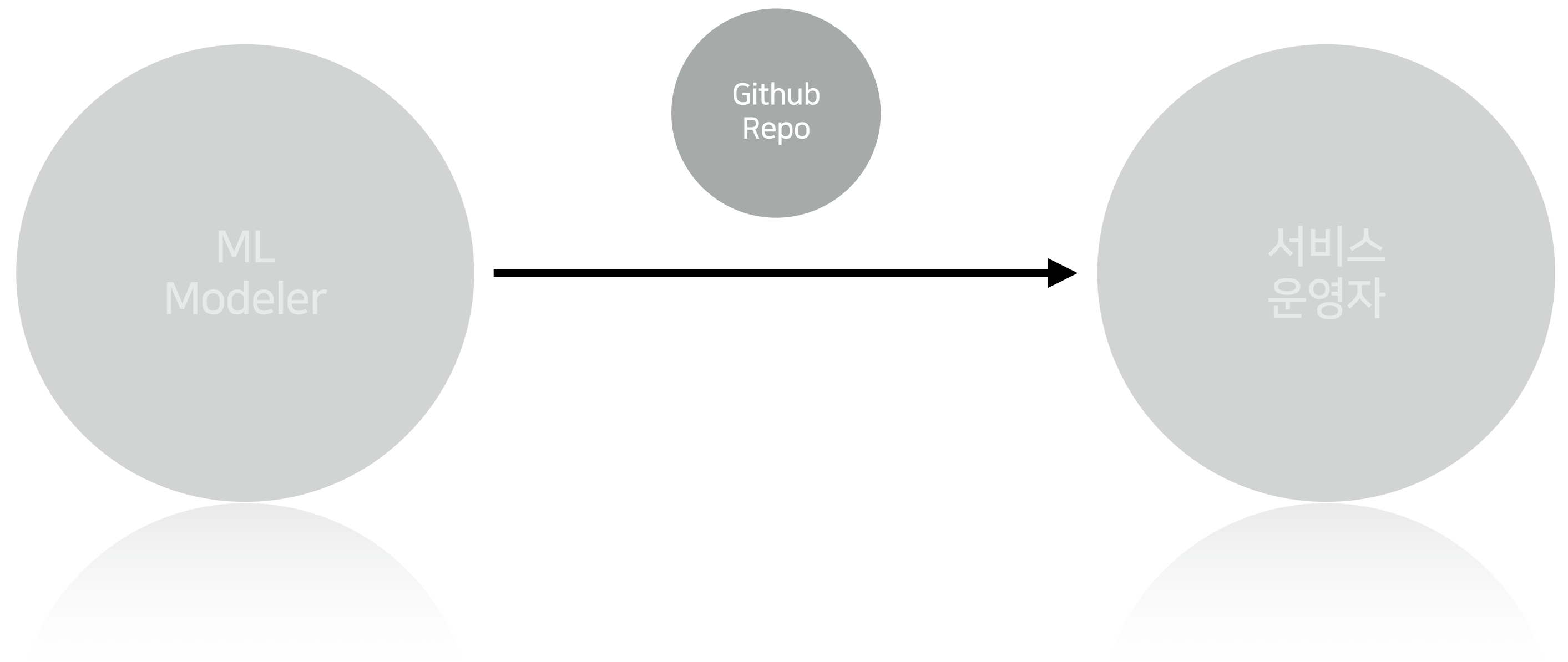
코드 업데이트는 과도한 커뮤니케이션 비용이 요구된다.



# 4.3 Training Code 관리

코드 대신 깃저장소를 전달하여 커뮤니케이션 비용을 줄였다.

The screenshot shows a 'Create a training' dialog box with the 'Code' tab selected. It includes a 'Gihub token' field with a green checkmark, a 'Repository' dropdown menu with several options, and 'Repository URL', 'Branch', and 'Tag' fields. At the bottom, there are 'PREV', 'NEXT', 'CANCEL', and 'CREATE' buttons.



# Evaluation

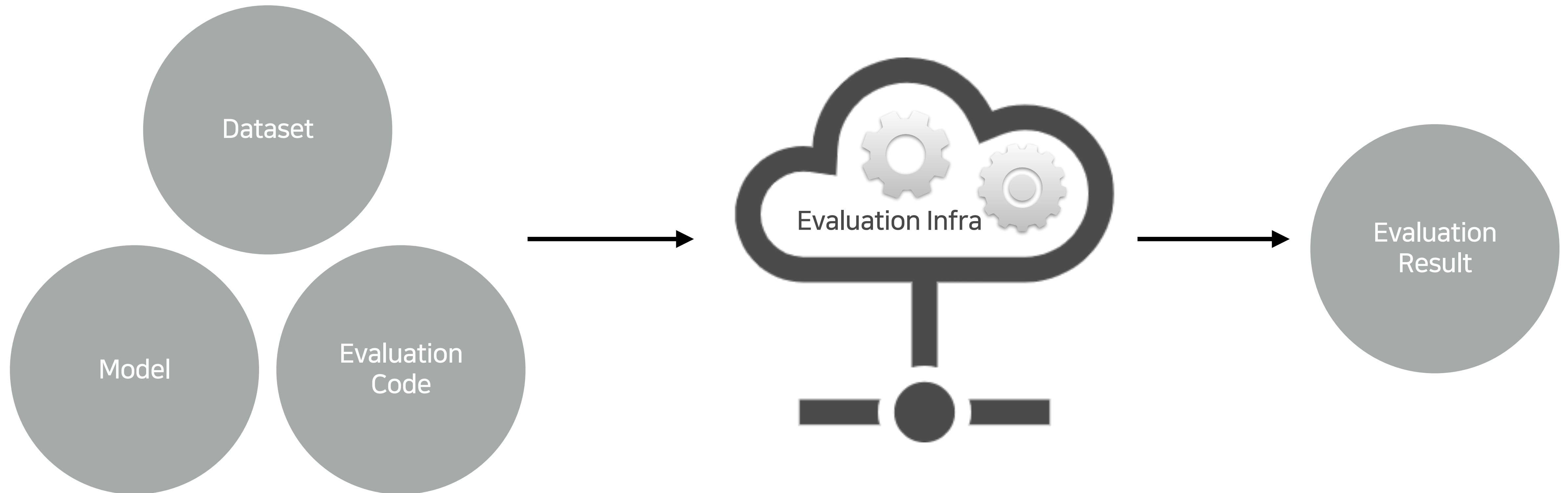


# 4.4 Evaluation of MLOps

- Dataset 구성이 적당한가?
- Annotation이 올바른가?
- 적합한 Deep Learning Solution인가?
- 적합한 Model Network인가?

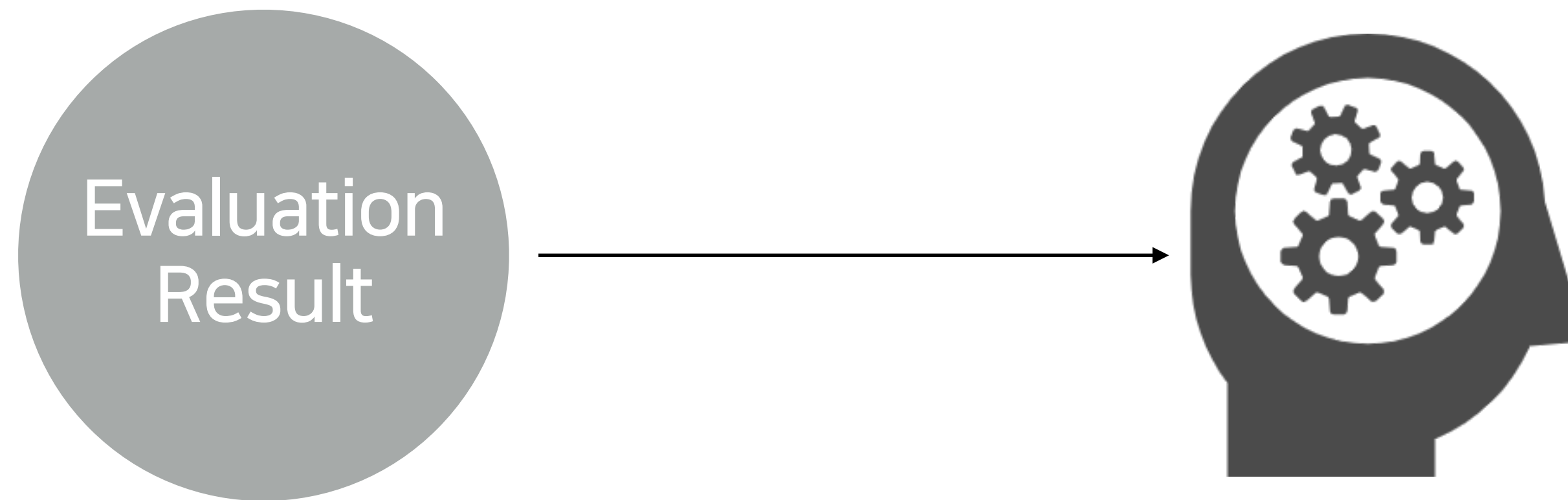
# 4.4 Evaluation of MLOps

CLOW의 EVALUATION 수행은 TRAINING 수행과 유사하다.



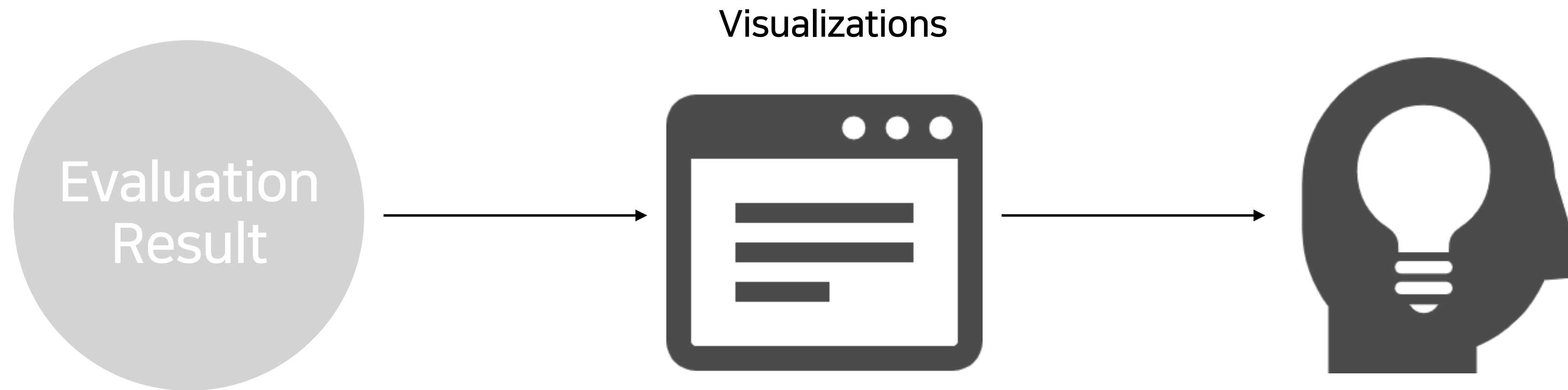
# 4.5 Visualizations

결과는 사용자의 행동을 유도한다.



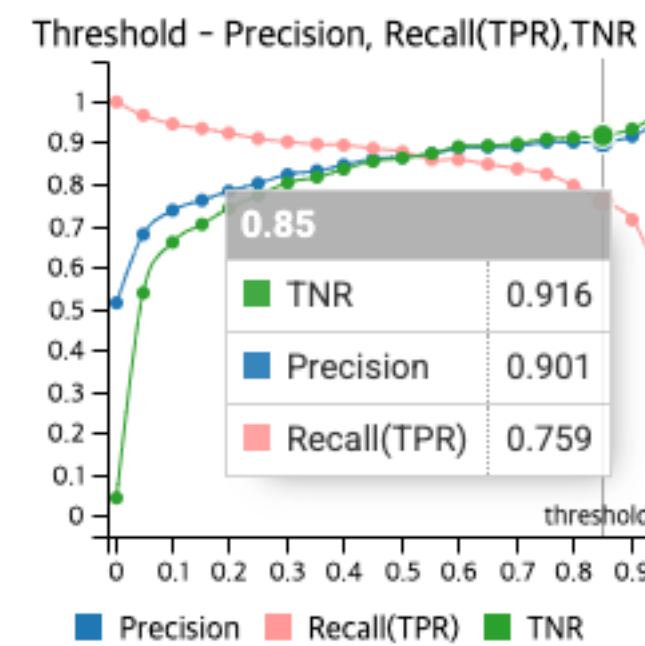
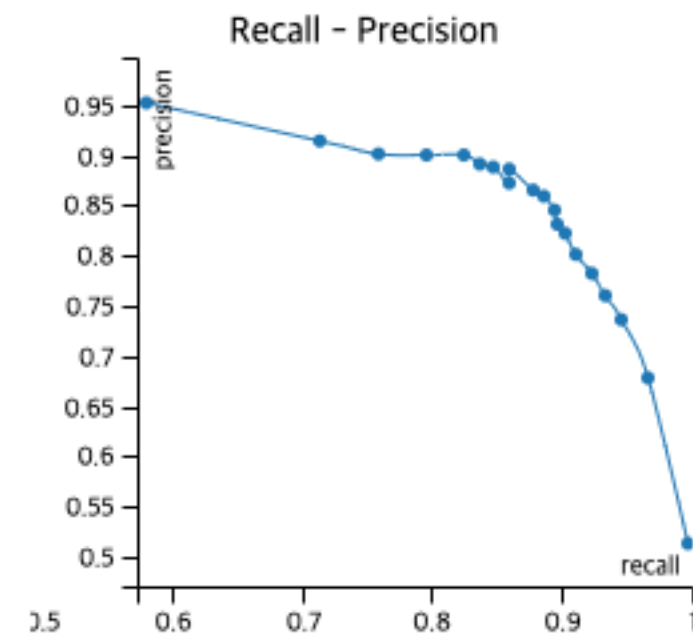
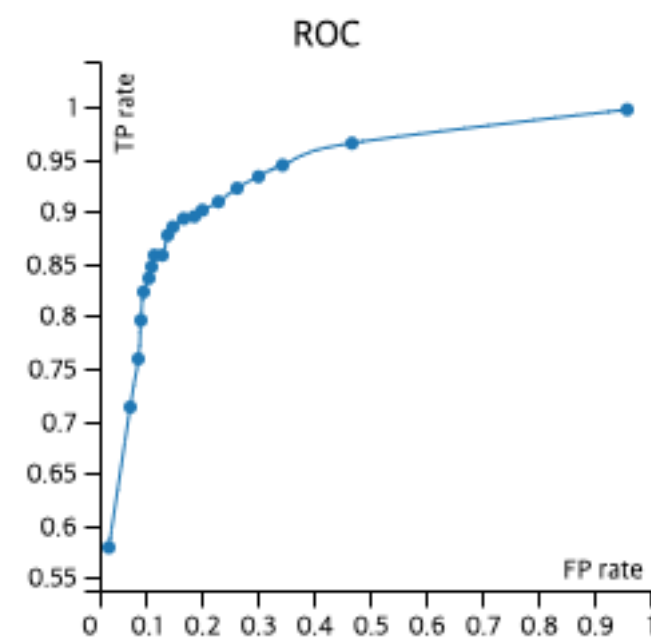
# 4.5 Visualizations

효과적인 전달을 위한 시각화가 필요하다.

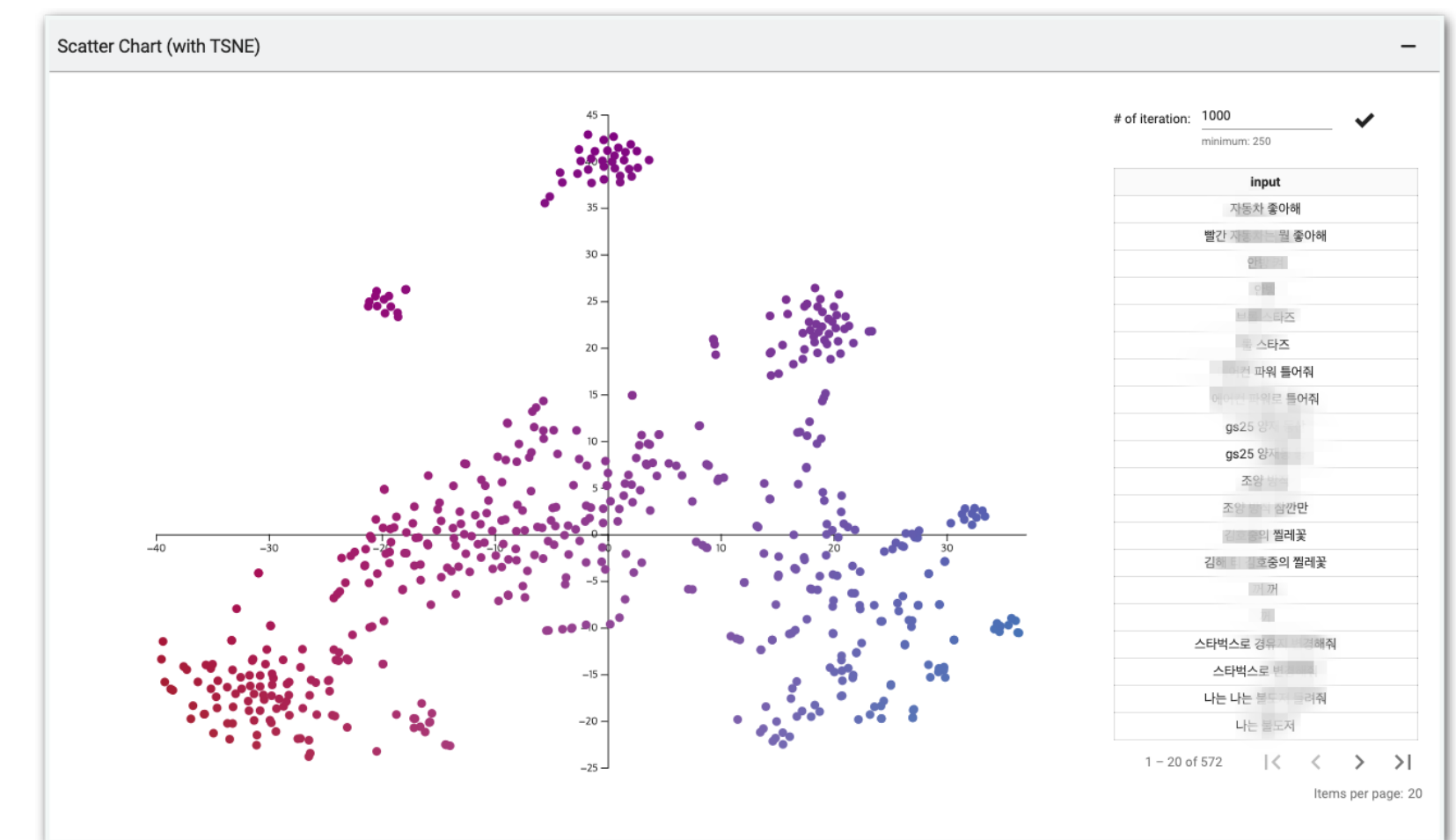
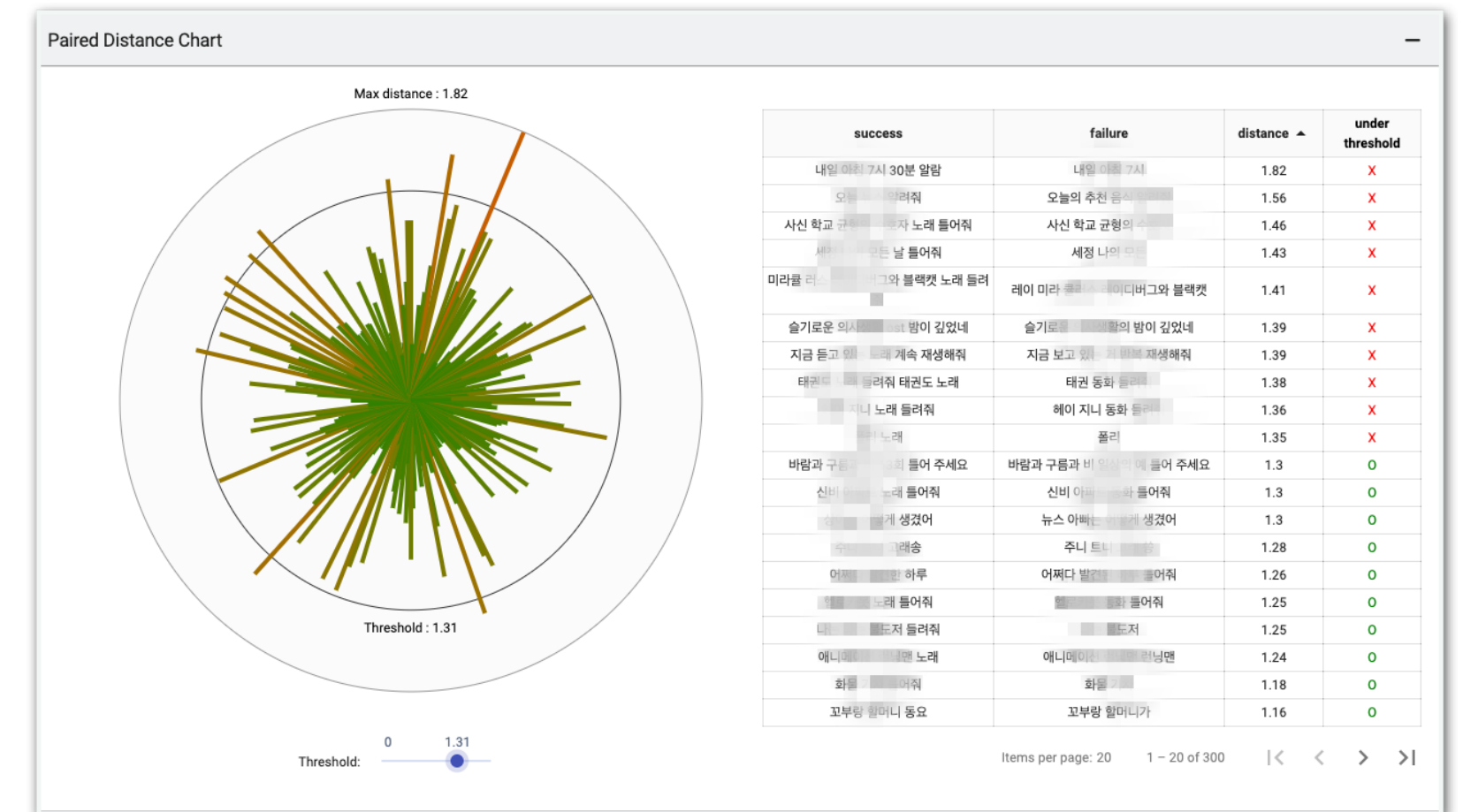


# 4.5 Visualizations

시각화템플릿들은 다양하지만 모두에게 유용하지 않다.

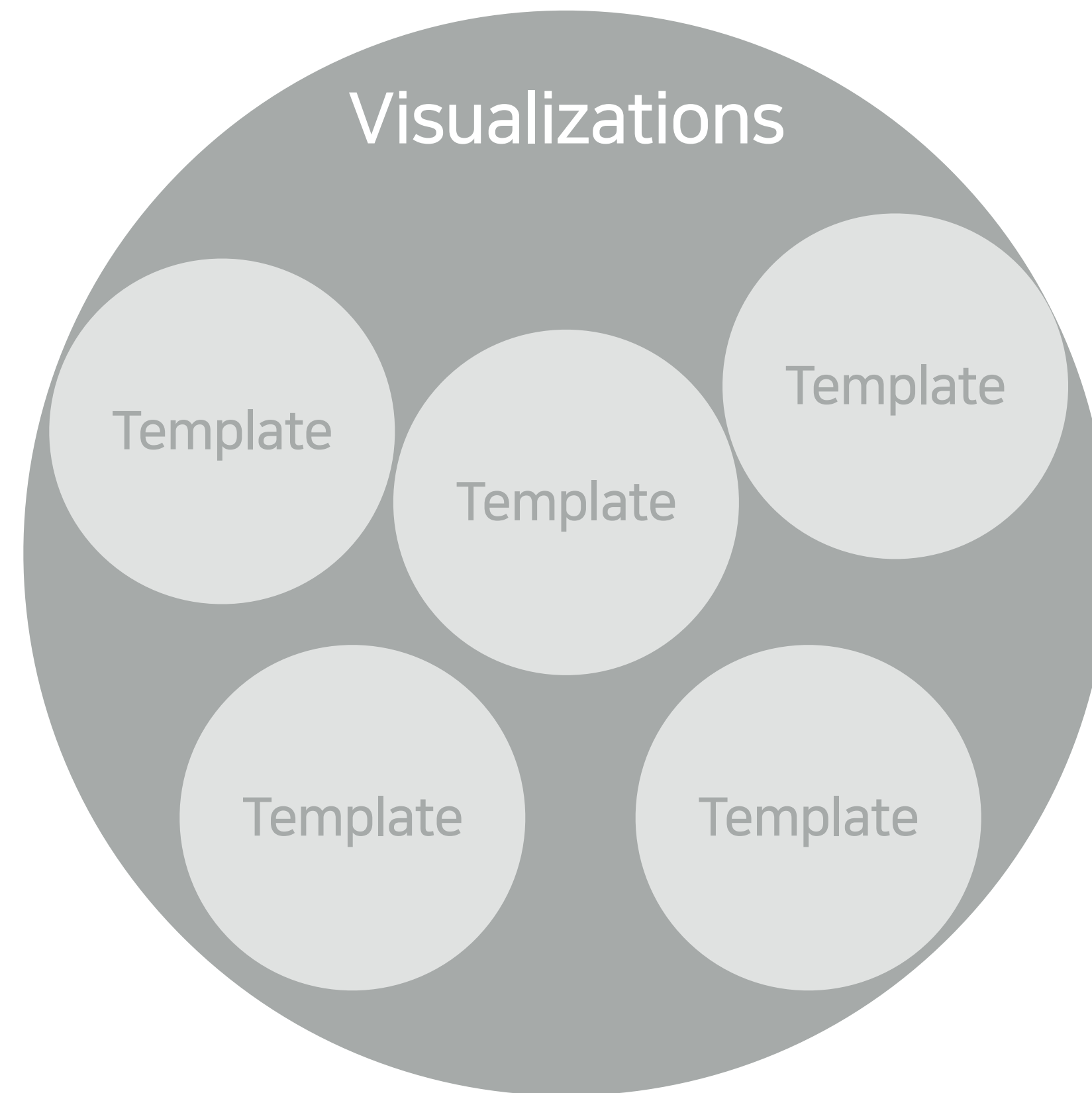


		Predicted			Precision	Recall	F1	Accuracy
		True	False	Total				
Actual	True	327	46	373	0.86508	0.87668	0.87084	0.86927
	False	51	318	369				
	Total	378	364	742				



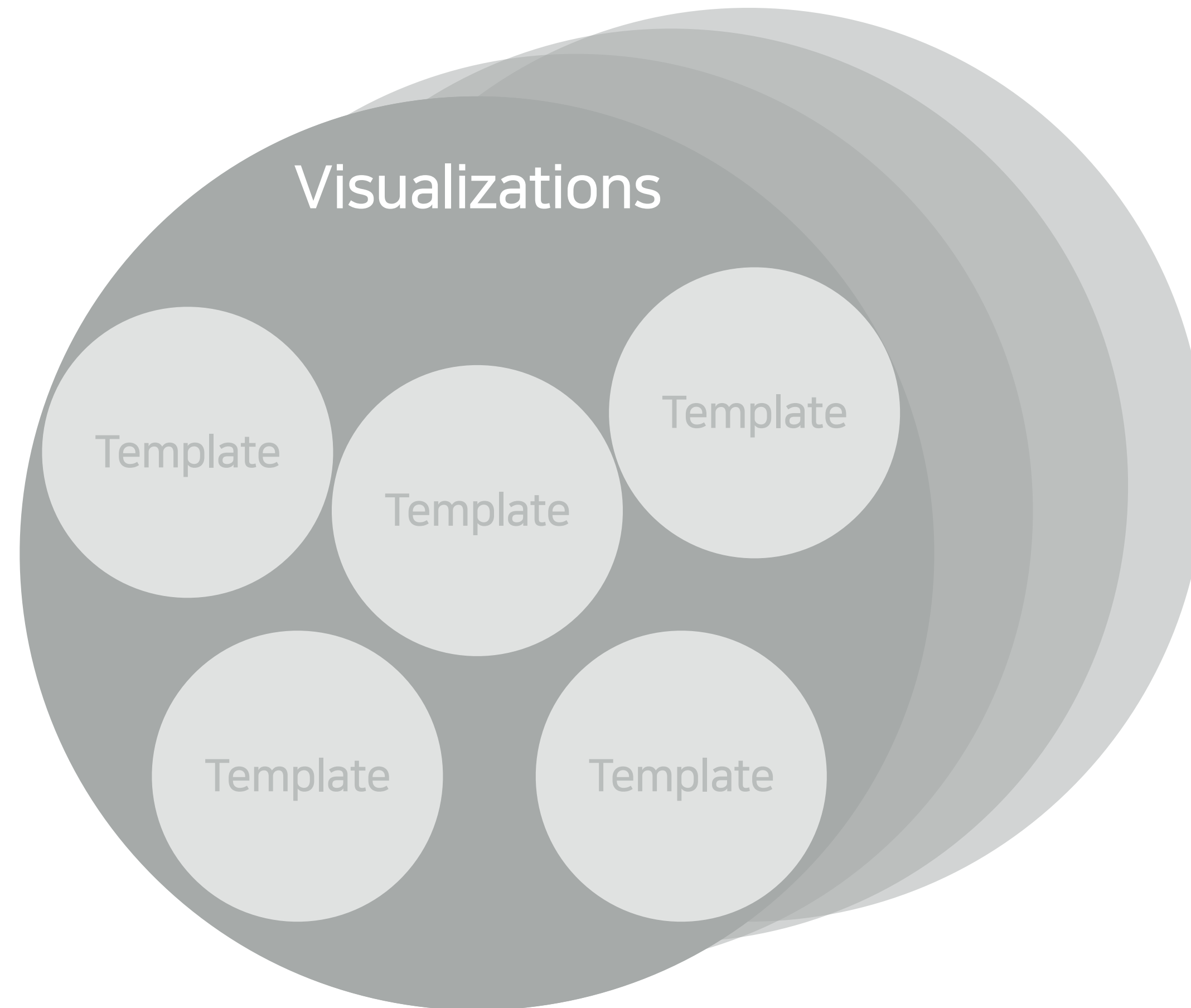
# 4.5 Visualizations

다양한 템플릿만큼 다양한 시각화 화면의 구성이 가능하다.



# 4.5 Visualizations

다양한 사용자만큼 다양한 시각화 화면의 요구가 있다.



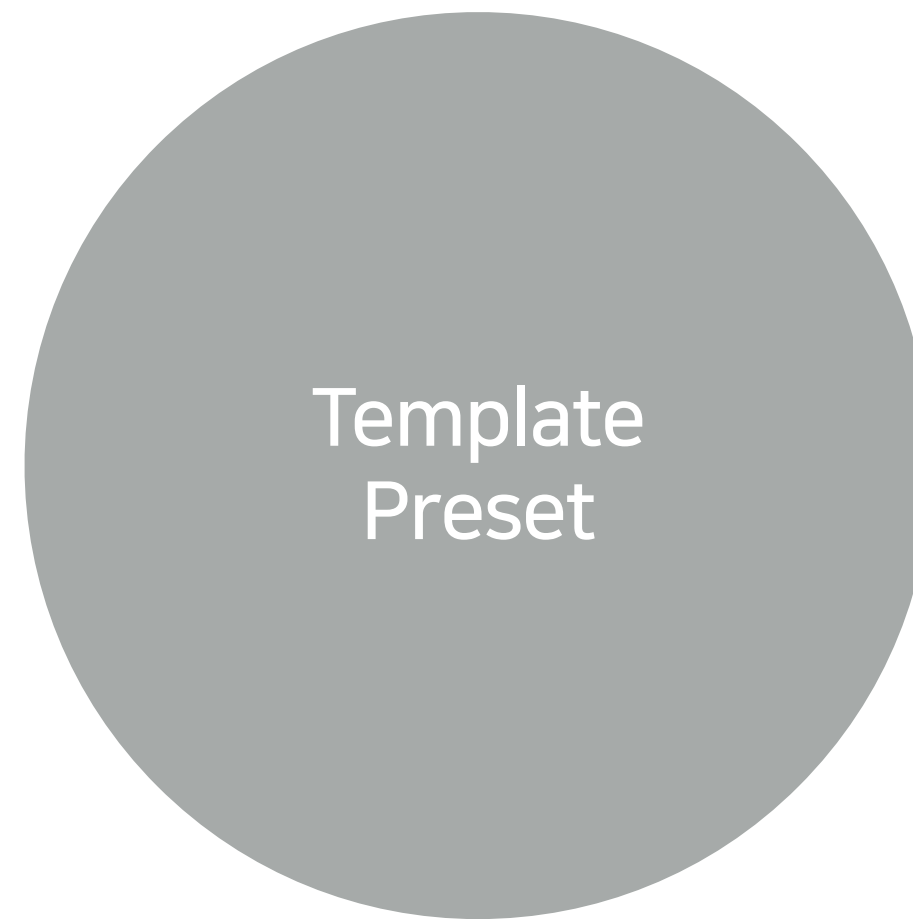
# 4.5 Visualizations

CLOW는 다양성과 일반화의 조화를 추구한다.

다양성

Template  
Preset

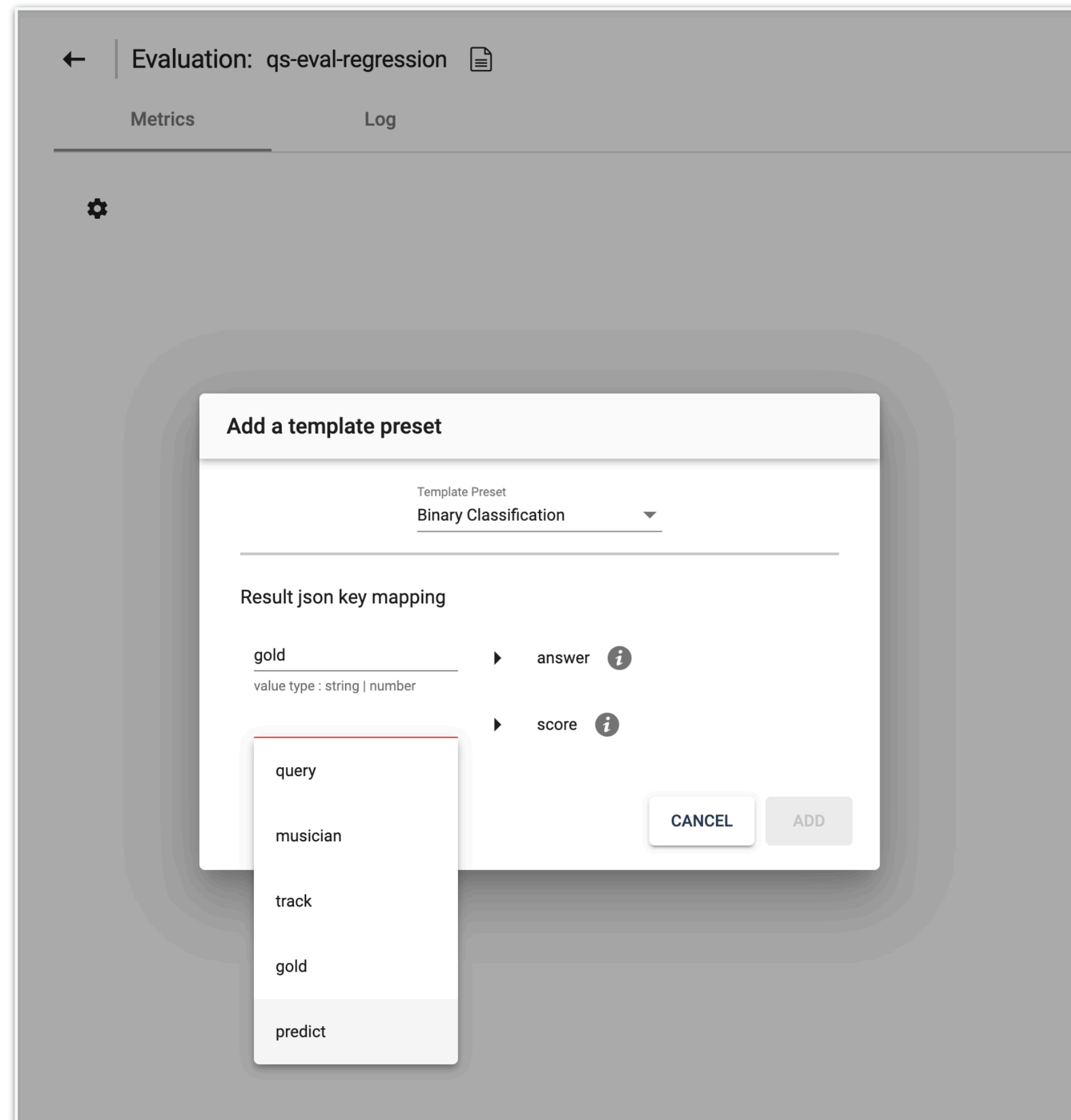
일반화





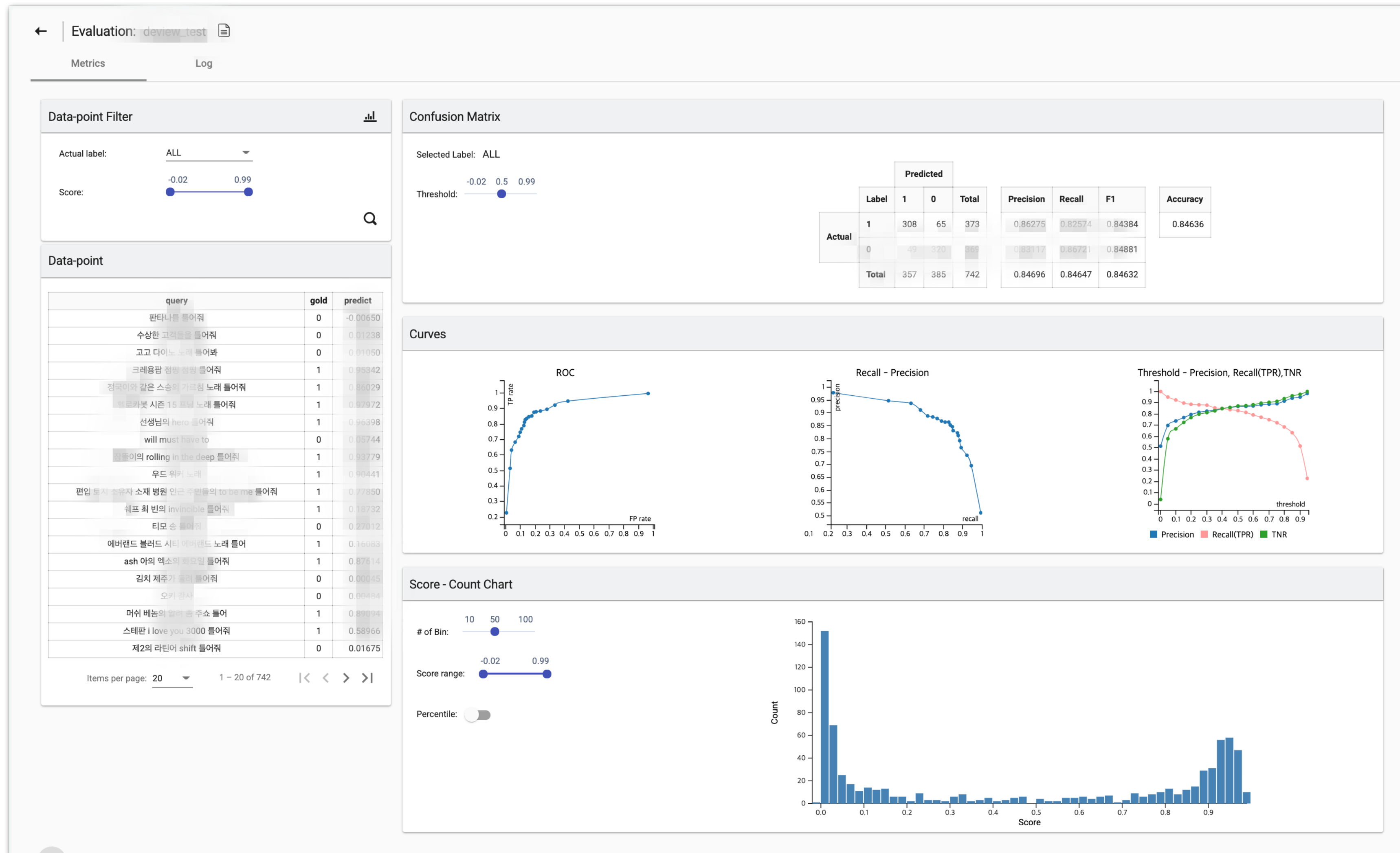
# 4.5 Visualizations

## 사용자의 템플릿 프리셋 설정



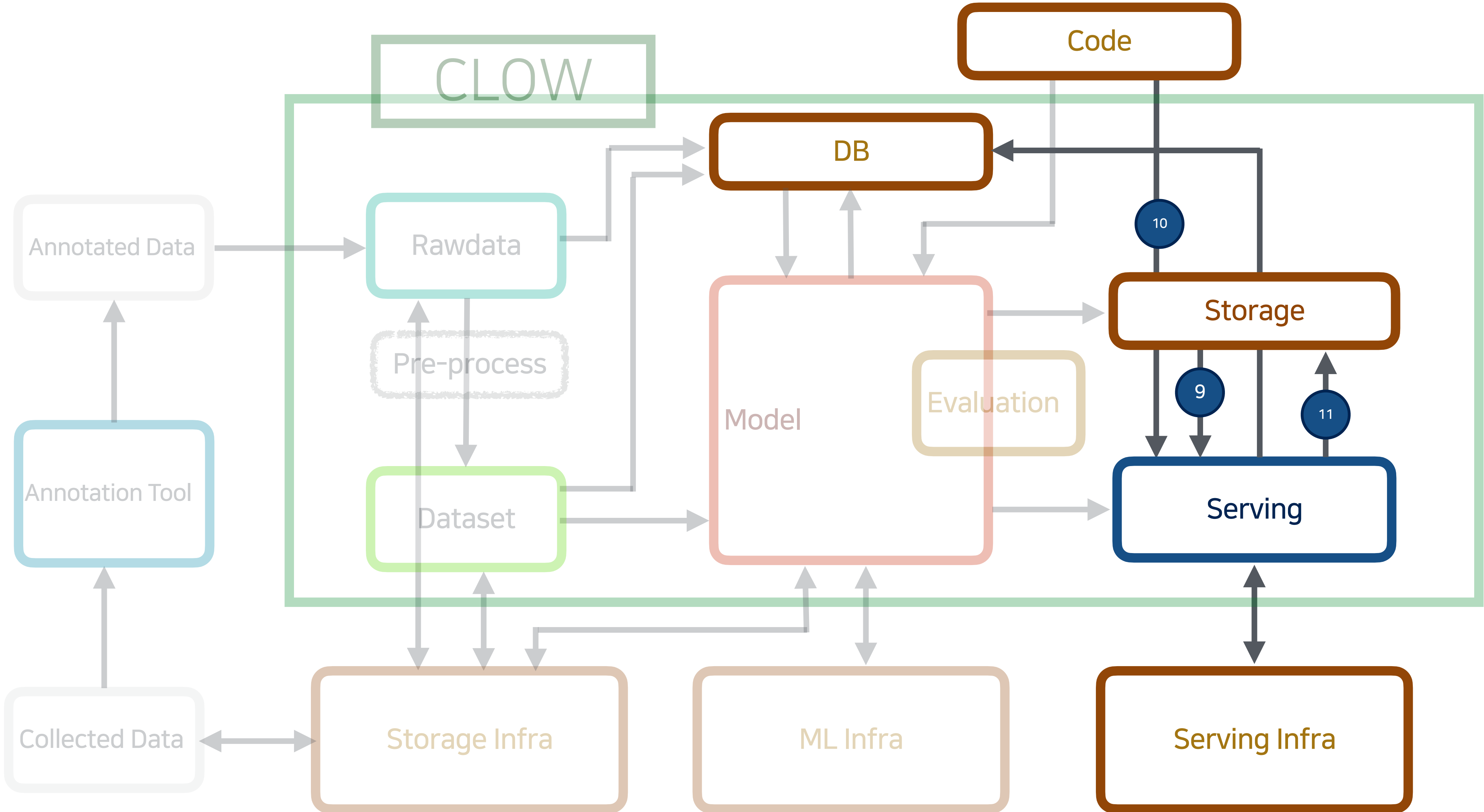
# 4.5 Visualizations

## 템플릿 프리셋을 이용한 시각화 화면 노출

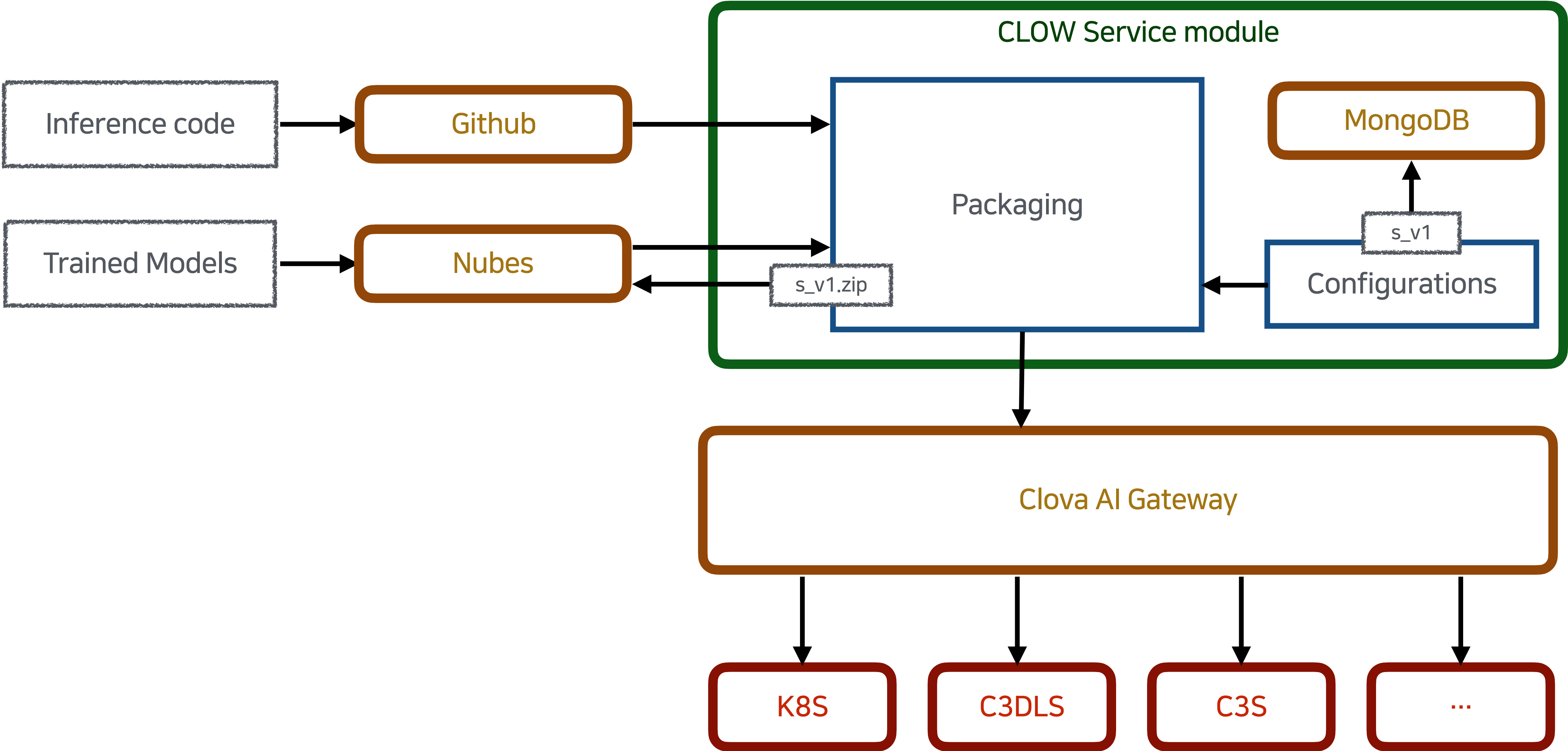


# 5. Serving & Pipeline

# Serving Overview



# Serving Overview



# Web UI for Configuration

### Create a service version

General Code Details

Version: v10  
[a-zA-Z0-9][a-zA-Z0-9\~]\*[a-zA-Z0-9]

Description: t-torreta-torch

Trainings: t-torreta-202103131219

+ ADD MODEL

t-torreta-202103112959

t-torreta-20210314

t-torreta-202103124859

t-torreta-202103191212

t-torreta-20210316141819

PREV NEXT

### Create a service version

General Code Details

Github token: .....

Repo: ai-engineering/sof

Repo URL: https://github.com/

Branch: dev\_esc

Tag:

PREV NEXT

### Create a service version

General Code Details

Platform: Cuda

GPU Cores: 0

CPU cores: 1

Workers: 1

Threads: 1

Memory(MB): 1536

Replicas: 1

docker

PREV NEXT

Navigation: s-reputati... Versions

### Service: s-reputation-analysis

Overview

#### Monthly

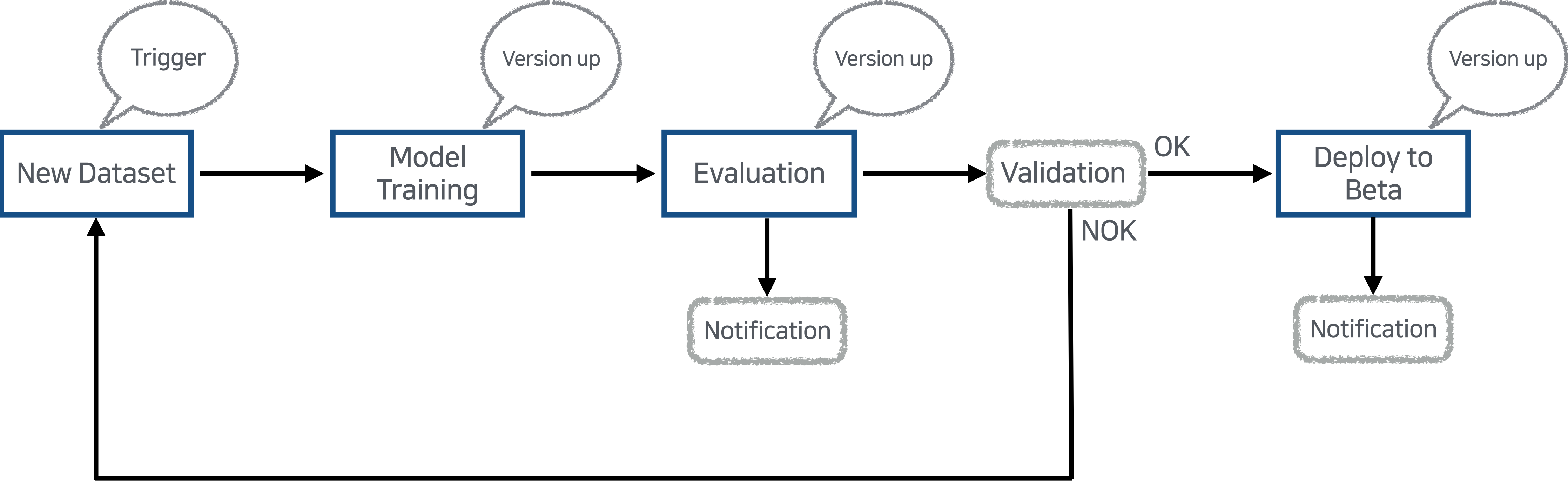
#### Daily

Service versions				
Version	Description	Modified time	Status	Action
v1	평판분석 서비스	2021-03-10 15:04:34		

Type to search...

1 - 1 of 1 < >

# Pipeline Overview



# Web UI for Pipeline

### Create a Pipeline

Name   
[a-zA-Z0-9][a-zA-Z0-9\-\\_]\*[a-zA-Z0-9]

Description

Triggers

Dataset *i*

Name Prefix

Tasks

Training *i*

Name Pattern

Model

Base Training

Evaluation *i*

Name Pattern

Base Evaluation

Service *i*

Version Pattern

← Pipeline: pl-torreta

Overview

#### Pipeline Runs

ID	Start time	Finish time	Status	Action
6140067134906799a93658a0	2021-09-14 11:18:25		RUNNING	
61272f71446fb21707447f7	2021-08-26 15:06:41	2021-08-26 15:26:56	SUCCEEDED	
612615d594626868567447f7	2021-08-25 19:05:09	2021-08-25 19:24:16	SUCCEEDED	
6125e81573e13ff6904f2575	2021-08-25 15:49:57		RUNNING	
6125e6f568f405286dc87ece	2021-08-25 15:45:09		RUNNING	
6125e4e1831e6228aa4f2579	2021-08-25 15:36:17		RUNNING	
6125db82960b262150c87ecc	2021-08-25 14:56:18		RUNNING	
6125ccb3cd61bc0c87ecf	2021-08-25 13:53:18		RUNNING	
6125c8b3b28a0778e04f257b	2021-08-25 13:36:03		RUNNING	
6125a5dc5e88aee79ac87ece	2021-08-25 11:07:24	2021-08-25 11:53:25	SUCCEEDED	
6124ecf1b28a0778e04f2579	2021-08-24 21:58:39		RUNNING	
6123753368c550385b4f257a	2021-08-23 19:15:15		RUNNING	
612331e08ee77137c3c87ecb	2021-08-23 14:27:28	2021-08-24 22:06:40	SUCCEEDED	
6110858bb28a0778e04f2573	2021-08-09 10:31:55	2021-08-09 10:57:58	SUCCEEDED	
610ce07b987cfbcd6cc87ec9	2021-08-06 16:10:51	2021-08-06 16:26:26	SUCCEEDED	
60f7d57b8c77137c3c87ec3	2021-07-21 17:06:19	2021-07-21 17:22:26	SUCCEEDED	
60f7c8bd18445476bd4f2572	2021-07-21 16:11:57	2021-07-21 16:27:27	SUCCEEDED	
60f7b8e3987cfbcd6cc87ec2	2021-07-21 15:04:19	2021-07-21 15:20:01	SUCCEEDED	
60f69faf18445476bd4f2570	2021-07-20 19:04:31	2021-07-20 19:21:15	SUCCEEDED	
60f62ef468f405286dc87ec2	2021-07-20 11:03:32	2021-07-20 11:18:01	SUCCEEDED	

Type to search...

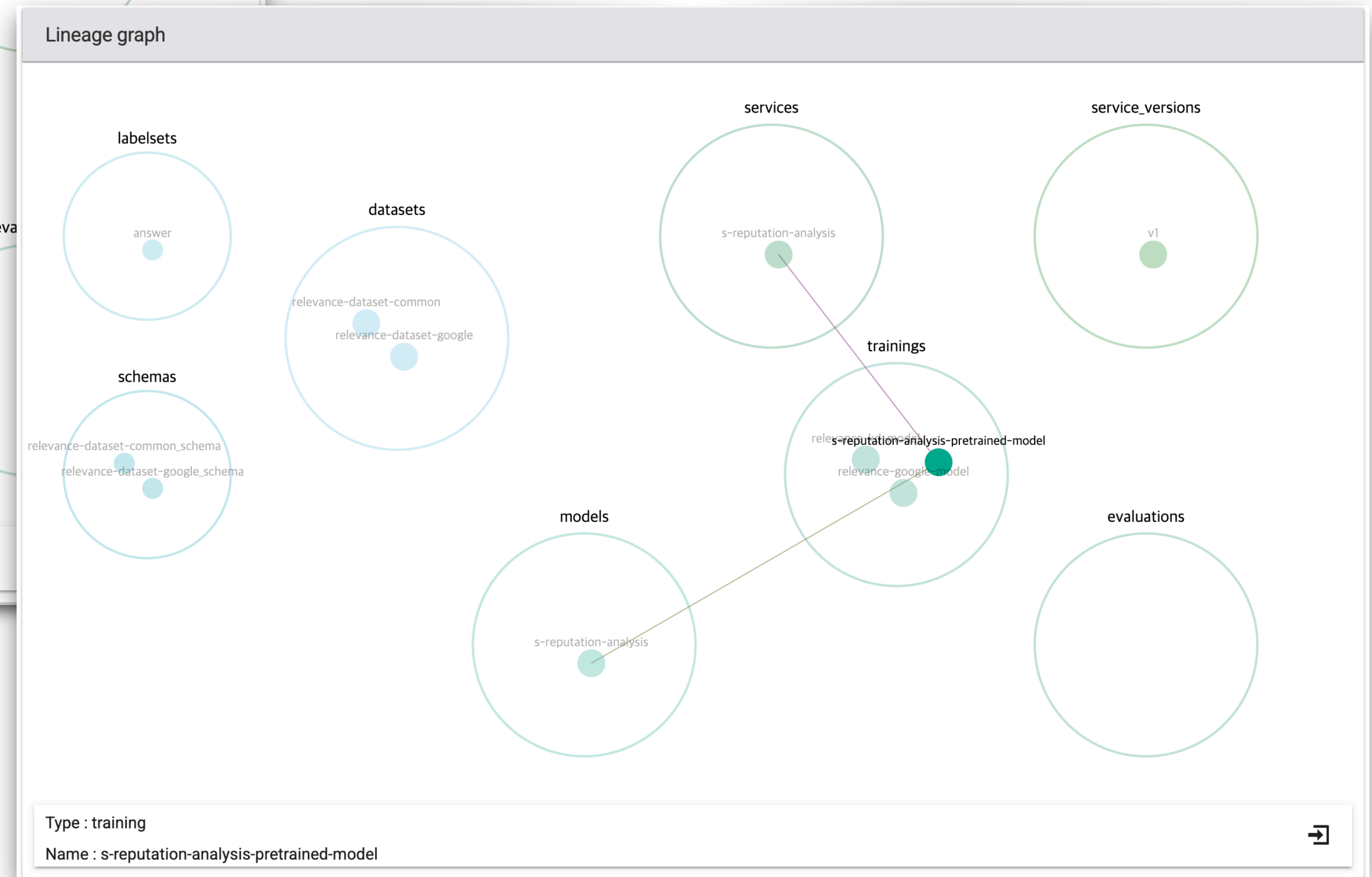
1 - 20 of 87



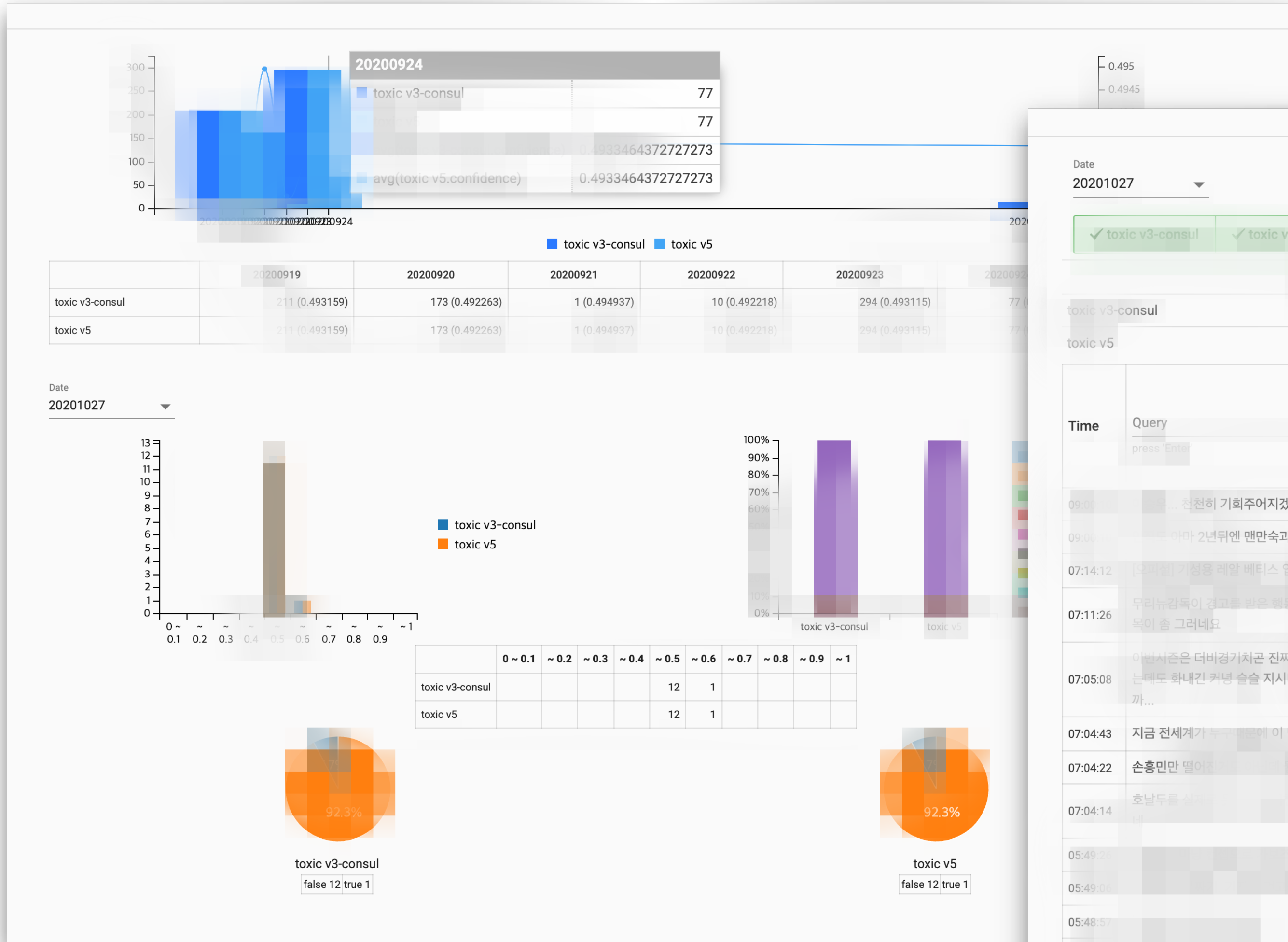
# 6. What's NEXT



# 6.1 리니지그래프



# 6.2 실서비스 리뷰



Date: 20201027

toxic v3-consul ✓ toxic v5 ✓

decision confidence latency

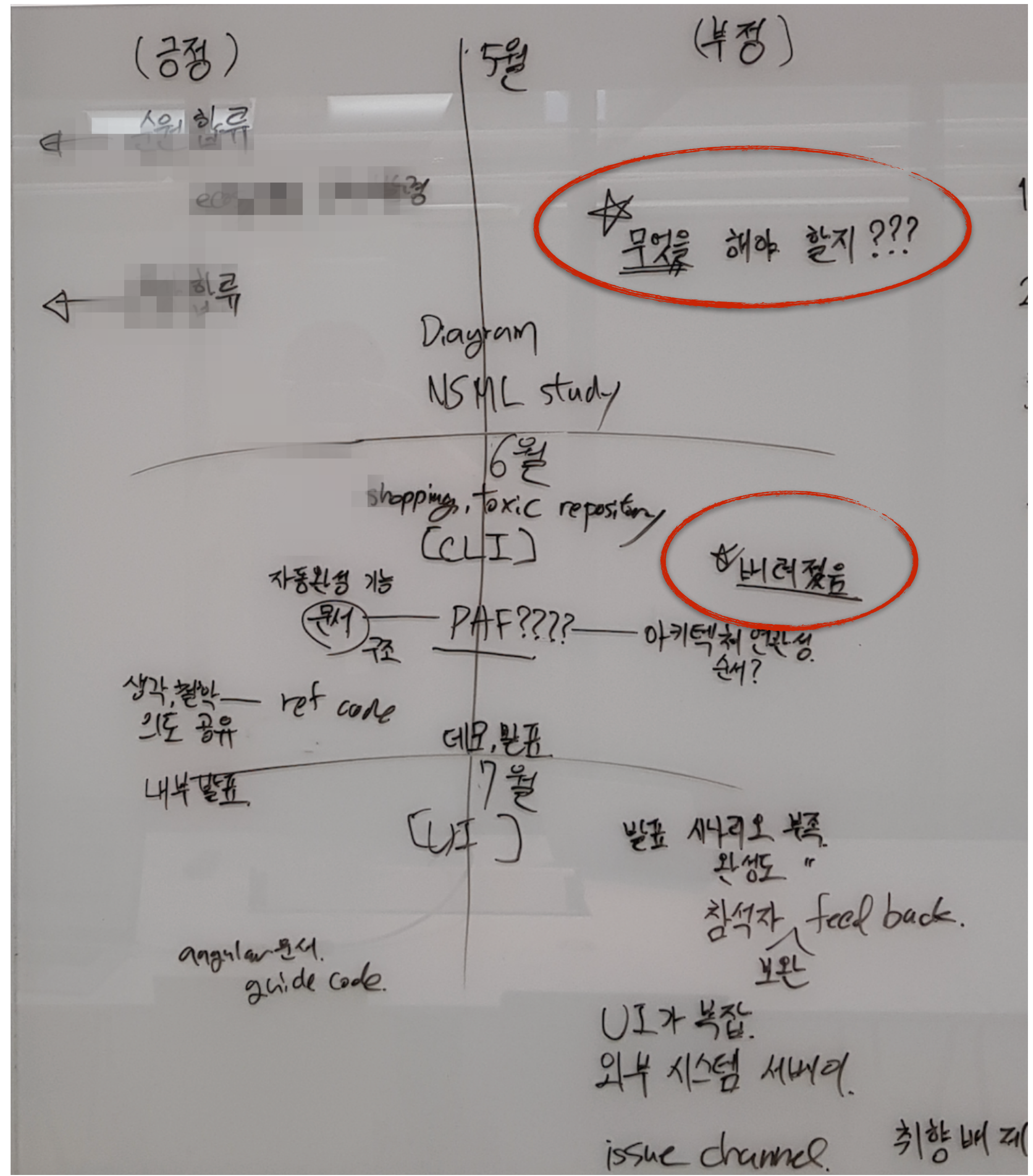
	0 ~	0.1 ~	0.2 ~	0.3 ~	0.4 ~	0.5 ~	0.6 ~	0.7 ~	0.8 ~	0.9 ~
toxic v3-consul	0	0	0	0	12	1	0	0	0	0
toxic v5	0	0	0	0	12	1	0	0	0	0

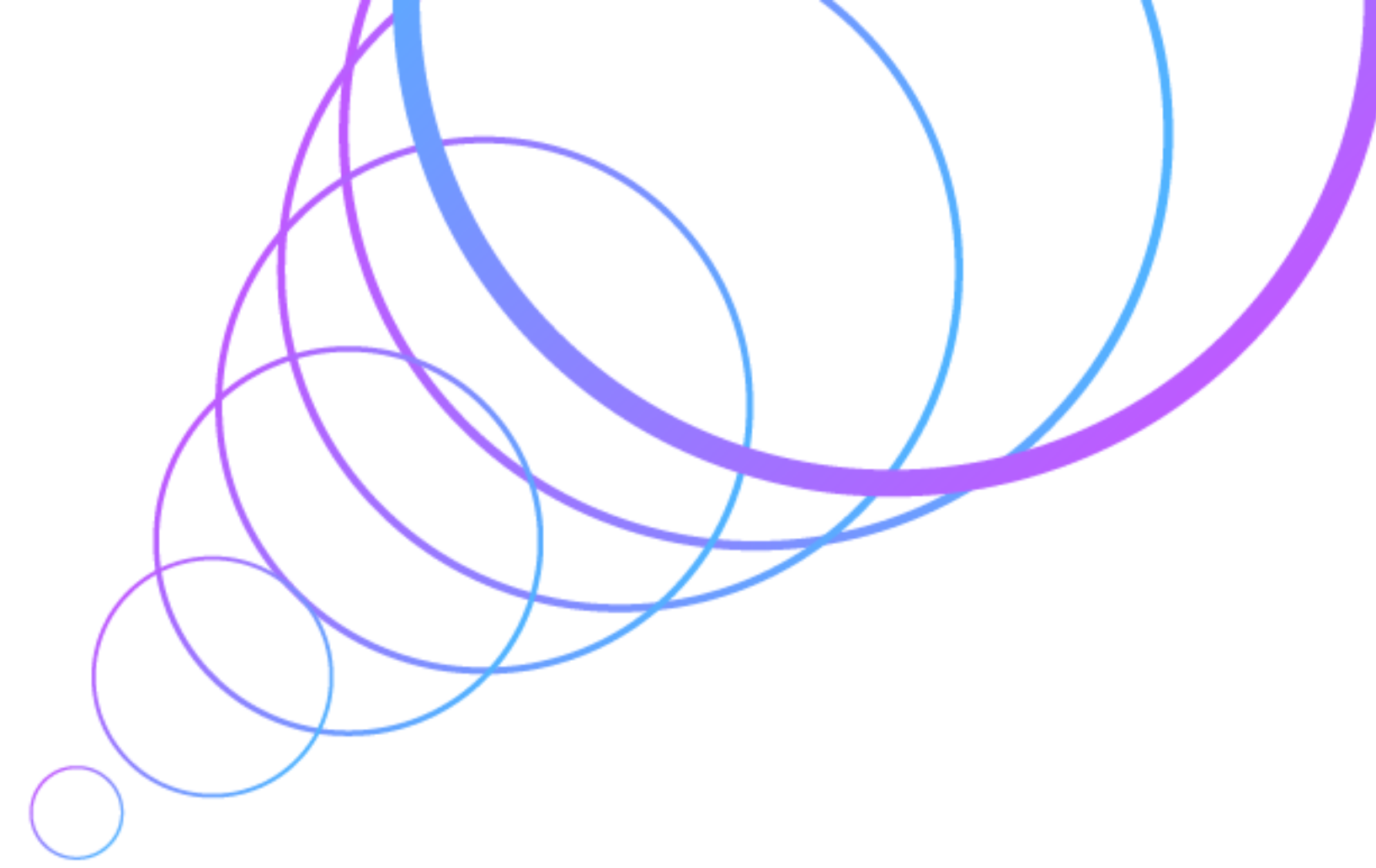
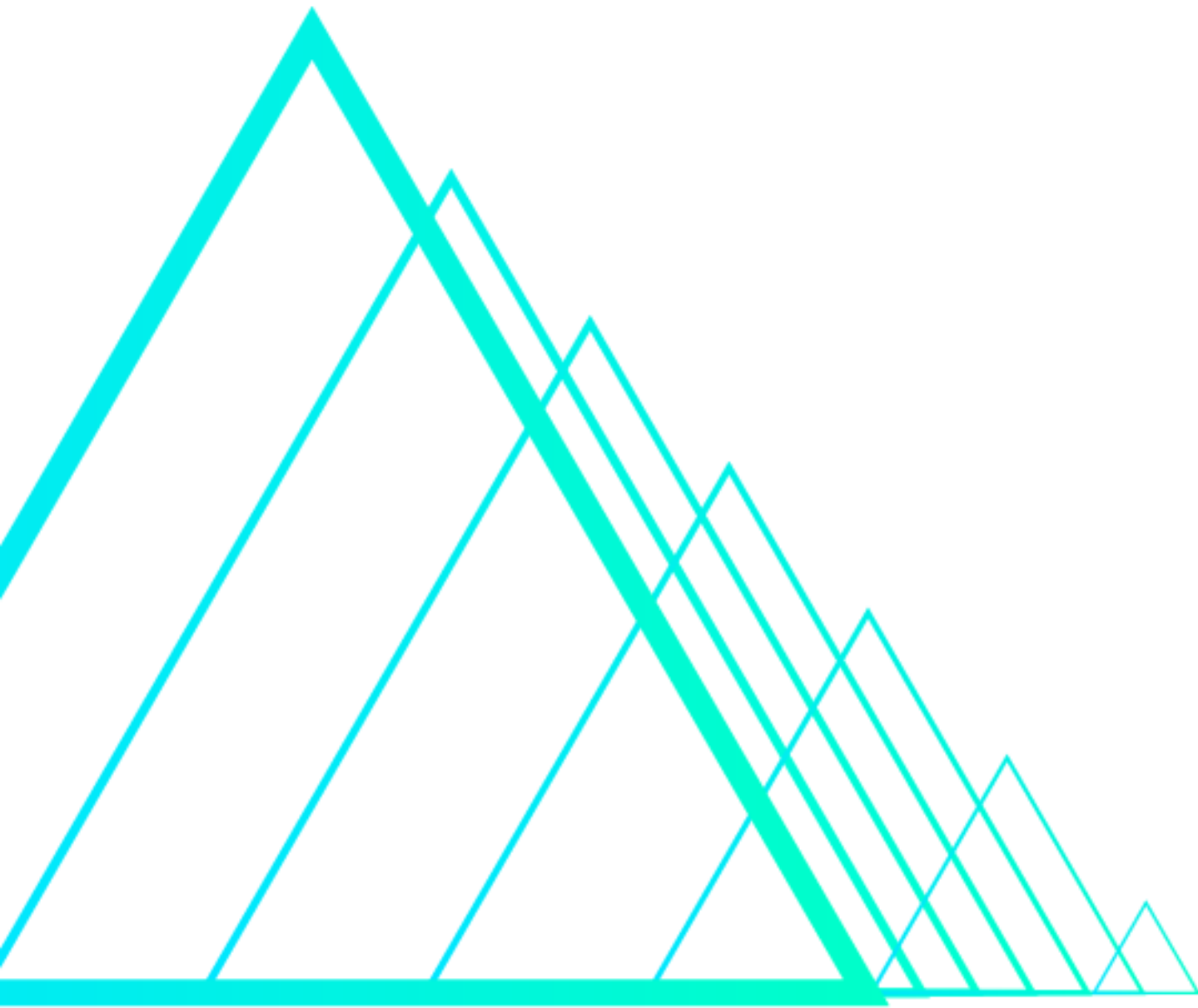
  

Time	Query	Decision	toxic v3-consul	toxic v5	toxic v3-consul	toxic v5
09:00:00	... 천천히 기회주어지겠죠 기다려보세요 아마 2년뒤에 EPL에서 뛰시않을까요?	false	false	0.49566	0.49566	
09:00:00	... 아마 2년뒤엔 맨만숙과 결혼하지 않을까요?	false	false	0.49272	0.49272	
07:14:12	[오리집] 기성용 레알 베타스 입단	false	false	0.48972	0.48972	
07:11:26	두리뉴감독이 경고를 받은 행동을 인터뷰에서 직접 얘기했조 "내 행동은 무례했지만 바보에게 무례했다" 상대 작전을 훑쳐본거에 대해서는 무슨 말이나고 모르는 얘기다" 기사 제목이 좀 그러네요	false	false	0.49113	0.49113	
07:05:08	이번시즌은 더비경기차곤 진짜 재미있었던 경기들이... 원가 두팀다 이기겠다고 생각했었는데... 이 경기한건지 끝내고 치고있는데도 화내긴 커녕 슬슬 지시나 선수들도 것처럼 죽어도 이기겠다 뛰지않고 맨유도... 이 부분은 거 같지가 않았달까...	false	false	0.49697	0.49697	
07:04:43	지금 전세계가 누구한테 이 난리인데... 역시 착썬썬이라고 과학이다 과학	false	false	0.49254	0.49254	
07:04:22	손흥민만 떨어지면... 이 팀이 이기까지	false	false	0.49005	0.49005	
07:04:14	호날두를 상대... 호날두는 머리가 큰건가요 아님 어깨가 좁은건가요. 평사진보면 머리가 큰건 아닌거 같고, 운동량 생각하면 어깨가 좁을리었는데 진짜 궁금하	false	false	0.49482	0.49482	
05:49:20	... 아...	false	false	0.49144	0.49144	
05:49:00	... 이 팀이 이기까지	false	false	0.48732	0.48732	
05:48:57	...	false	false	0.49303	0.49303	
05:48:56	...	true	true	0.50122	0.50122	
05:48:43	하원미씨의 내조가 보가 좋습니다 매경기 하얗게 불태워 주세요~	false	false	0.49620	0.49620	

Items per page: 20 1 - 13 of 13

# 6.3 마치면서





**Thank You**

