

Brain and AI



Chungbuk National University Visual C++ Club

Name

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AI

■ AI란?

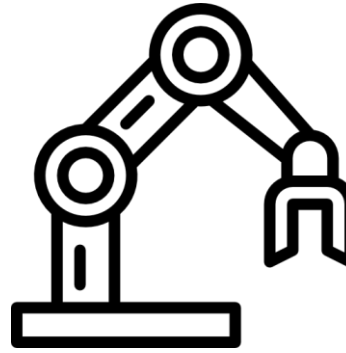
- AI (Artificial intelligence)
- 학습, 창조, 이미지 인식과 같이 인간 지능과 연결된 인지 문제를 해결하는데 주력하는 컴퓨터 공학 분야



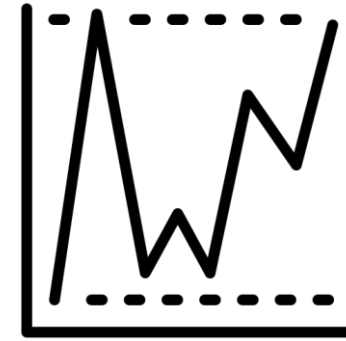
컴퓨터 비전



자연어 처리



로보틱스



패턴 인식

AI

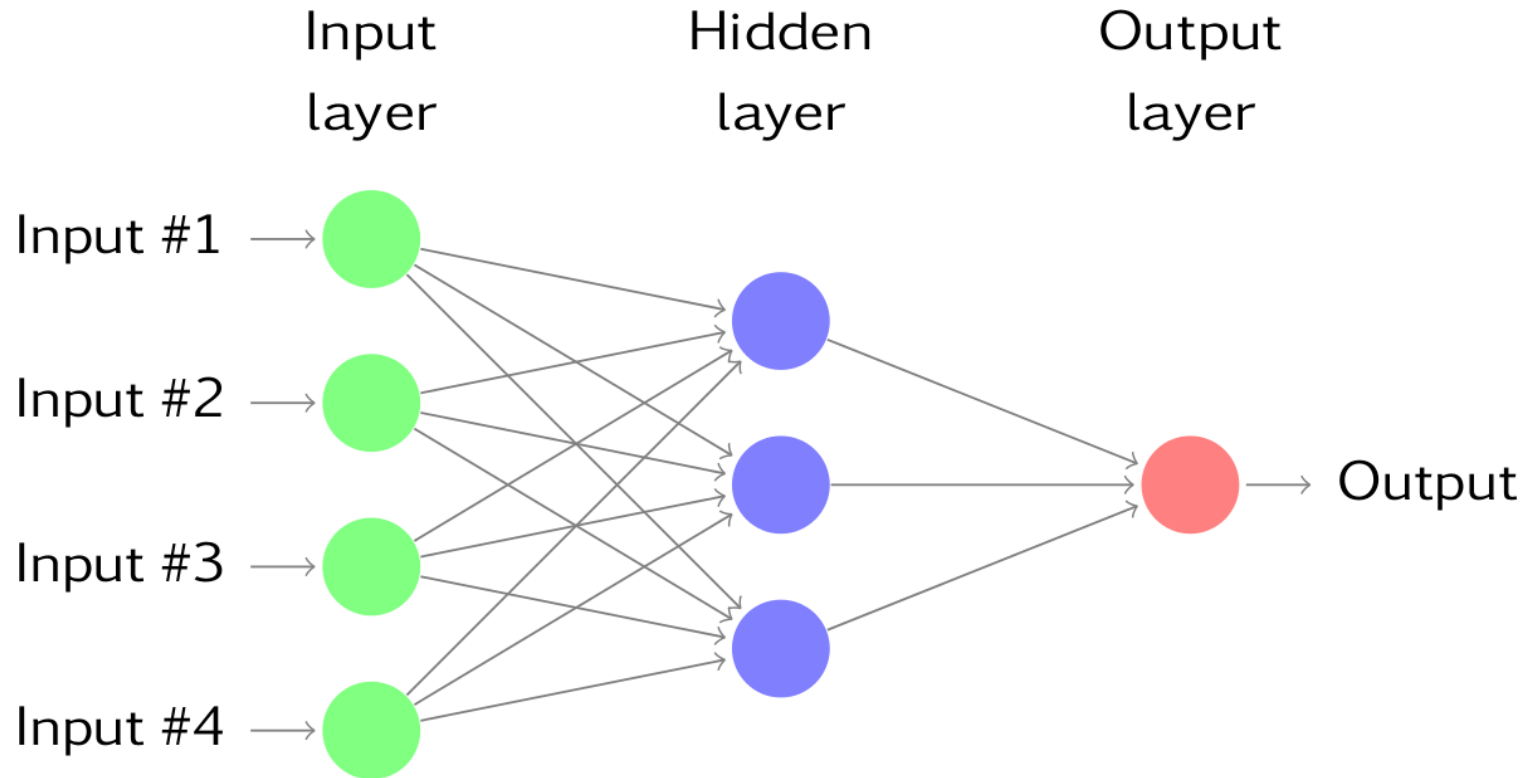
▪ AI, ML, DL



■ Neural Network

➤ 인간의 뇌 신경 구조에서 영감을 받아 개발된 모델

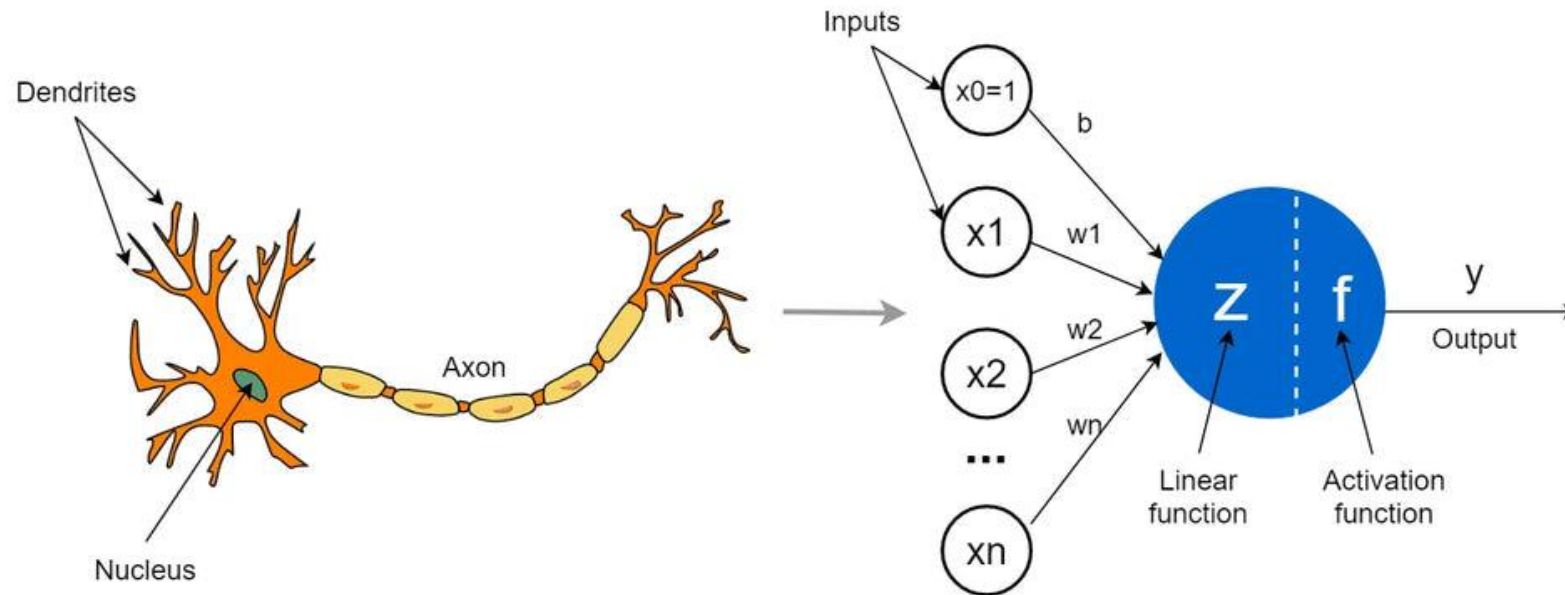
- ✓ 노드 (뉴런)
- ✓ 입력, 은닉, 출력 계층



■ Neural Network

➤ Perceptron

- ✓ 신경망의 기본 단위로, 하나의 노드(뉴런)처럼 작동
- ✓ 단일 계층
- ✓ 입력 값의 선형 결합을 통해 이진 분류를 수행
 - 비선형 구조 해결 불가능



■ Method

➤ Supervised Learning

- ✓ 지도 학습
- ✓ 입력과 출력 데이터가 주어지고, 모델은 이를 바탕으로 출력 값을 예측하는 방법
- ✓ 주요 알고리즘: 선형 회귀, 의사결정트리, 신경망, 서포트 벡터 머신(SVM)

➤ Unsupervised Learning

- ✓ 비지도 학습
- ✓ 출력 데이터 없이 입력 데이터만을 이용해 패턴이나 구조를 찾는 방법
- ✓ 주요 알고리즘: K-평균 군집화, 주성분 분석(PCA), Autoencoder

➤ Reinforcement Learning

- ✓ 강화 학습
- ✓ 에이전트가 환경과 상호작용하면서 보상을 최대화하는 방향으로 학습하는 방법
- ✓ 주요 알고리즘: Q-learning, Deep Q-Network(DQN), Policy Gradient

▪ Method

➤ Semi-supervised Learning

- ✓ 반지도 학습
- ✓ 일부 데이터에만 레이블이 있는 경우, 이를 활용해 학습하는 방법
- ✓ 예시 : 대량의 데이터에서 일부만 레이블이 있는 상황

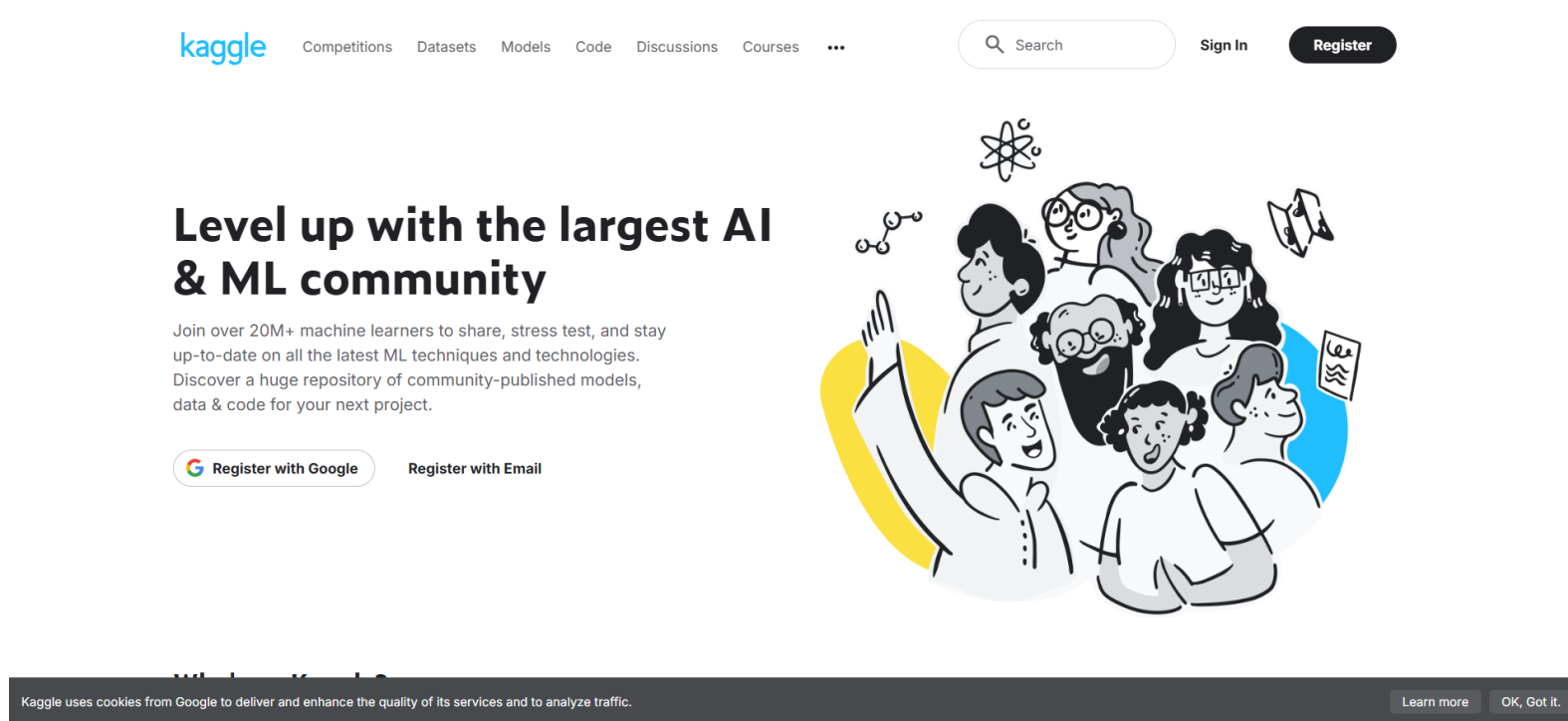
➤ Transfer Learning

- ✓ 전이 학습
- ✓ 기존에 학습한 모델을 다른 비슷한 문제에 적용하는 방법
- ✓ 예시: 이미지 분류 모델을 다른 이미지 데이터셋에 적용

Dataset

■ Kaggle

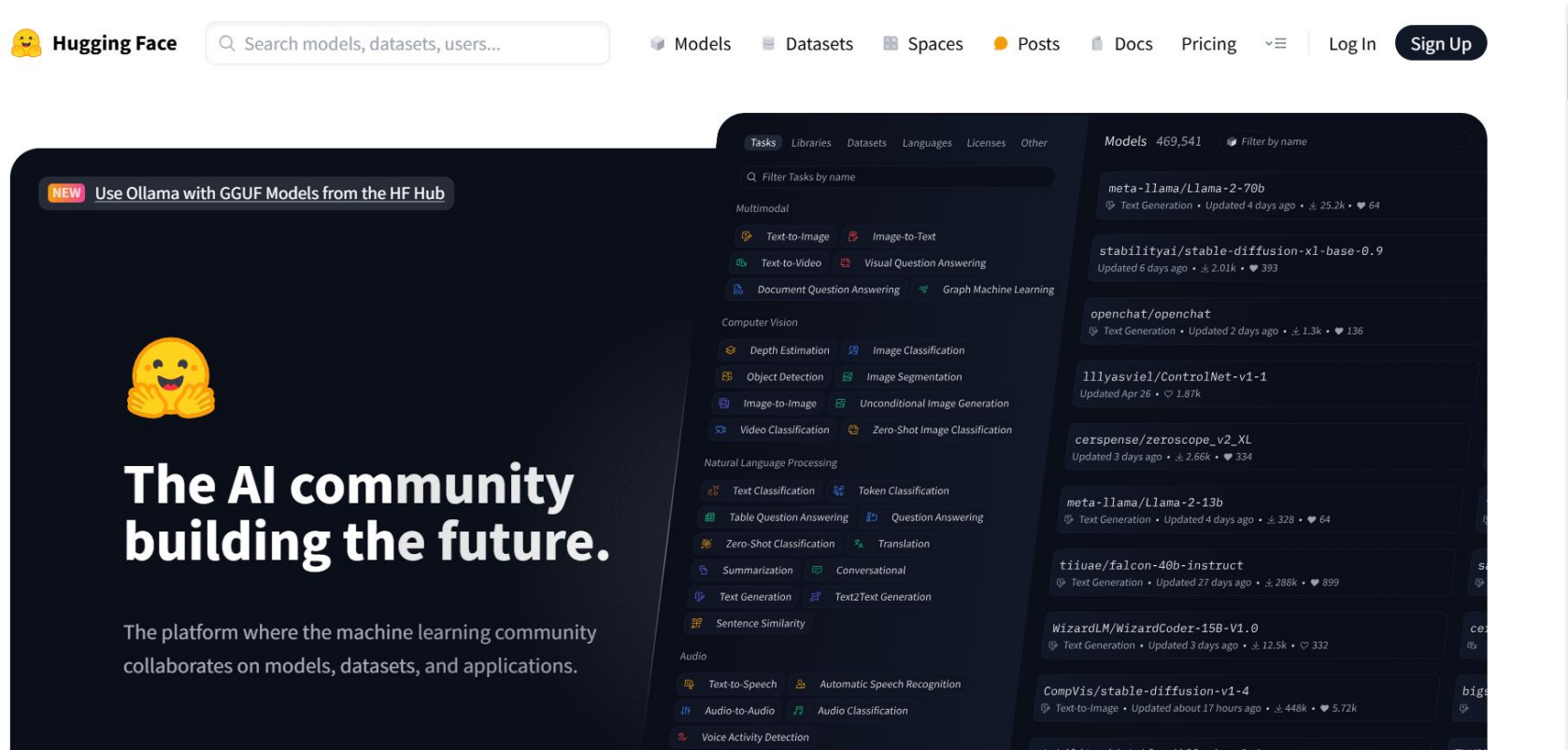
- 데이터셋, 코드, 모델을 공유하고 경연 대회에 참여할 수 있는 플랫폼
- <https://www.kaggle.com/>



Dataset

■ Huggingface

- 다양한 사전 학습된 모델과 데이터셋을 제공하여 AI 개발을 돕는 플랫폼
- <https://huggingface.co/>



Dataset

■ Papers with Code

- 최신 AI 논문과 구현 코드, 성능 지표를 한곳에 모아 연구와 실험을 지원하는 데이터베이스
- <https://paperswithcode.com/>

The screenshot displays the Papers with Code website. At the top, there is a navigation bar with a search bar, links for 'Browse State-of-the-Art', 'Datasets', 'Methods', and 'More'. On the right, there are social media icons and a 'Sign In' button. Below the navigation bar, there are three filter buttons: 'Top', 'New', and 'Greatest'. The main section is titled 'Trending Research' and features a 'Subscribe' button. Two research entries are shown:

- Hunyuan-Large: An Open-Source MoE Model with 52 Billion Activated Parameters by Tencent**
 - Thumbnail: A document page with text and a figure.
 - Metadata: tencent/hunyuan-large • PyTorch • 4 Nov 2024
 - Description: In this paper, we introduce Hunyuan-Large, which is currently the largest open-source Transformer-based mixture of experts model, with a total of 389 billion parameters and 52 billion activation parameters, capable of handling up to 256K tokens.
 - Tags: Logical Reasoning, Mathematical Problem-Solving
 - Star Count: ★ 692
 - Stars per hour: 13.23 stars / hour
 - Buttons: Paper, Code
- Docling Technical Report**
 - Thumbnail: A diagram showing a flow from a PDF document to a processed document with various icons.
 - Metadata: DS4SD/docling • PyTorch • 19 Aug 2024
 - Description: This technical report introduces Docling, an easy to use, self-contained, MIT-licensed open-source package for PDF document conversion.
 - Star Count: ★ 5,728
 - Stars per hour: 6.28 stars / hour
 - Buttons: Paper

Dataset

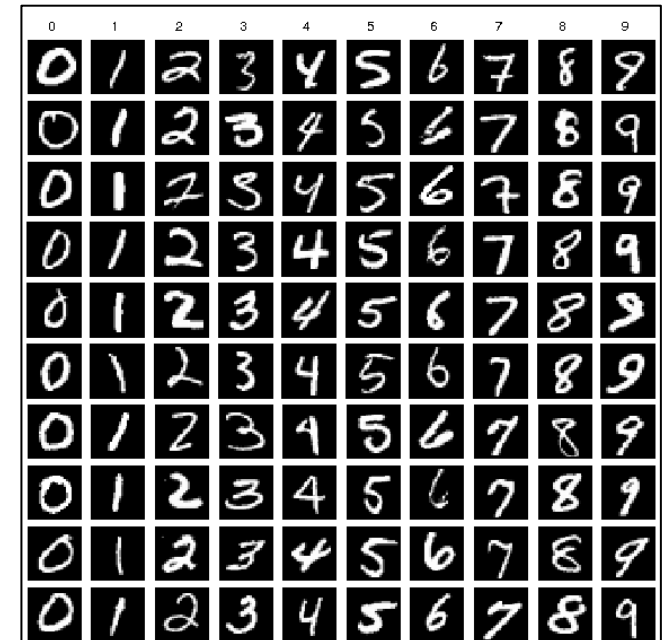
Titanic Dataset

Variable	Definition	Key
survival	Survival	0 = No, 1 = Yes
pclass	Ticket class	1 = 1st, 2 = 2nd, 3 = 3rd
sex	Sex	
Age	Age in years	
sibsp	# of siblings / spouses aboard the Titanic	
parch	# of parents / children aboard the Titanic	
ticket	Ticket number	
fare	Passenger fare	
cabin	Cabin number	
embarked	Port of Embarkation	C = Cherbourg, Q = Queenstown, S = Southampton

Iris Dataset



MNIST Dataset



Framework

■ MNIST Dataset

➤ 데이터 확인

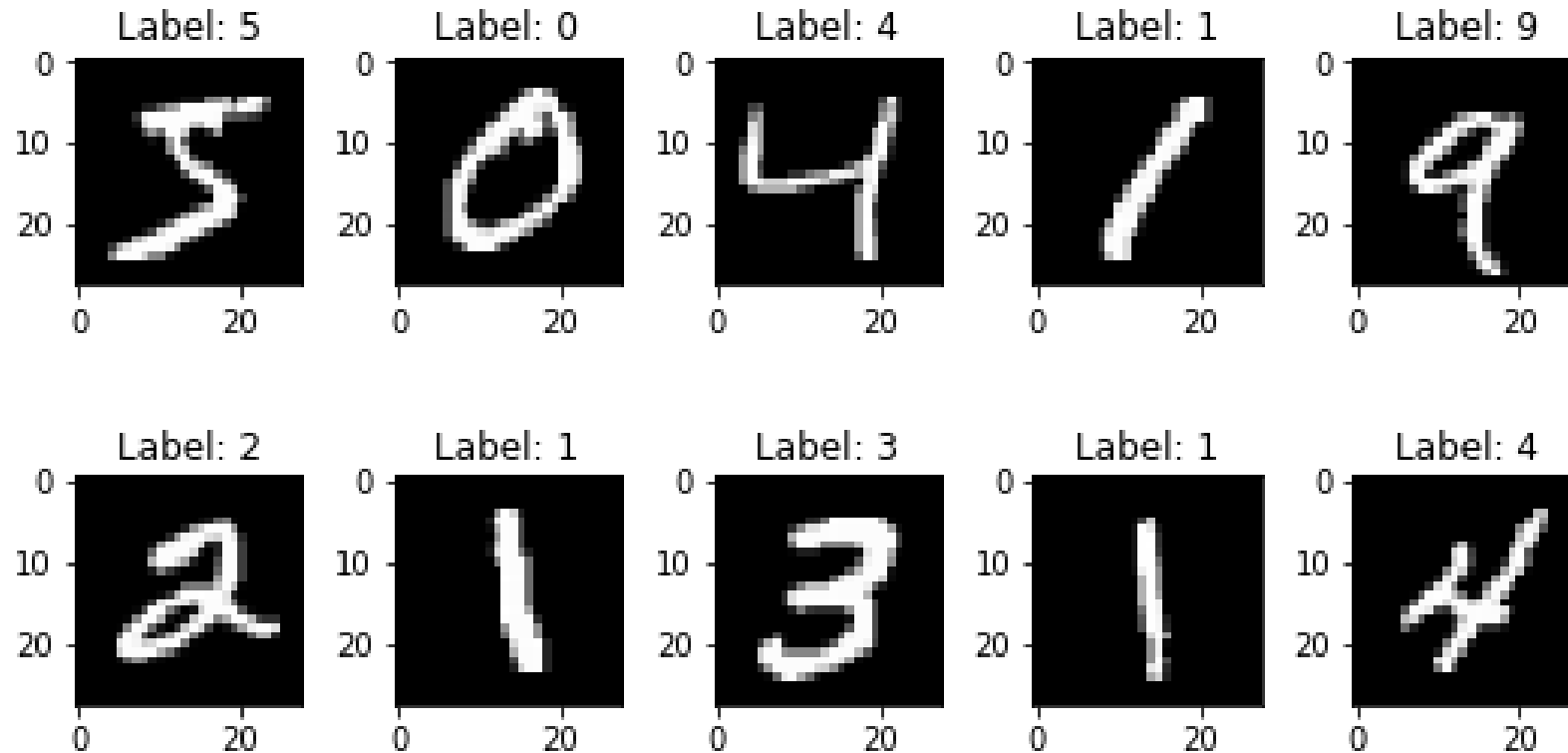
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
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0	1	2	3	4	5	6	7	8	9

Date	Payee	Amount	Address	City	State	Zipcode	Memo	Invoice Number
3/22/21	Verizon Wireless	34.99	125 E. Ridgewood Street	Philadelphia	PA	1911	T3225	60619
3/23/21	ATT	56.76	38 North Princess Ave	South Carolina	SC	29609	Phone bill	60620
3/24/21	Yelp	345.99	755 South Street	South Carolina	SC	29611		60621
3/25/21	Amazon	100.00	47 Wagon Dr	North Dakota	ND	58103		60622
3/26/21	Facebook	66.09	61 Walt Whitman Dr.	Florida	FL	33511		60623
3/27/21	Target	34000	642 Hillside Court	New York	NY	10012	Office supplies	60624
3/28/21	Publix	56.98	18 Bridge St	Connecticut	CT	6010		60625
3/29/21	Walmart	120.45	42 NW. Hamilton Drive	Connecticut	CT	6516	T11522	60626
3/30/21	Nintendo	250.00	7702 Brickyard Drive	Connecticut	CT	6810	T3325	60627
3/31/21	Best Buy	657.55	8326 Bow Ridge Avenue	Philadelphia	PA	15042	T255110	60628
4/1/21	Marshalls	34.56	8282 Linda Rd.	Philadelphia	PA	15045		60629
4/2/21	Otto Izakaya	76.98	8062 Oak Meadow Ave.	Philadelphia	PA	16061		60630
4/3/21	Chilis	122.22	15 Delaware Street	Alabama	AL	35242		60631
4/4/21	Farm Fresh Fast	34.23	874 Harrison Street	Kentucky	KY	40475		60632
4/5/21	Chili House	5667.00	852 Roosevelt Street	Tennessee	TN	37013	T232151	60633
4/6/21	Moe's	664.00	7422 Water Rd	Philadelphia	PA	1911	T2250	60634
4/7/21	Chipotle	12.54	749 Marsh St.	Philadelphia	PA	15044		60635
4/8/21	YMCA	12.27	2 Pennington Road	Philadelphia	PA	15045		60636
4/9/21	CATO	9.99	92 Livingston Dr.	Georgia	GA	30010	T225250	60637
4/10/21	Trader Joes	131.56	601 Hartford St.	Georgia	GA	30008		60638
4/11/21	Boot Barn	21.99	9992 Riverside Drive	Georgia	GA	30022		60639

Framework

■ MNIST Dataset

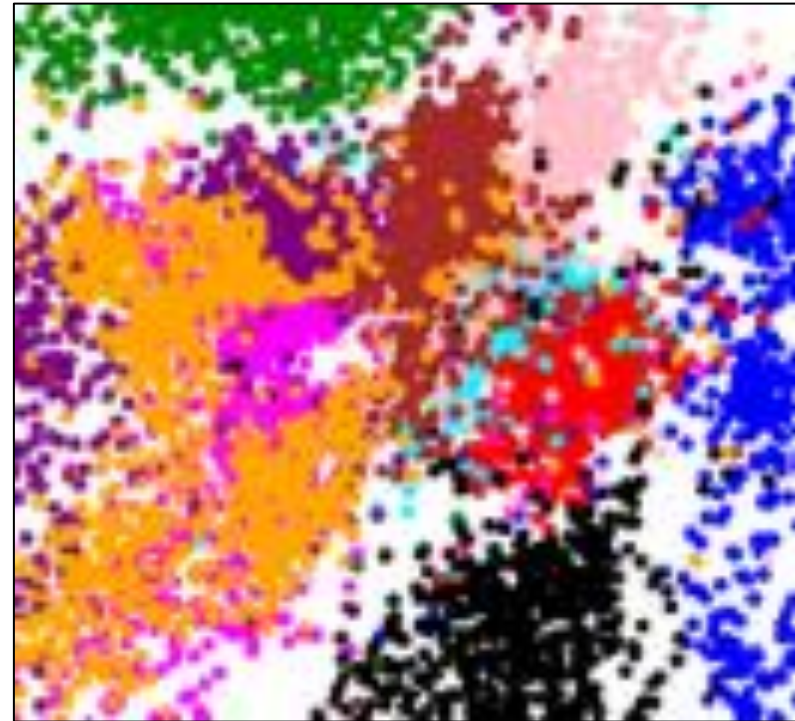
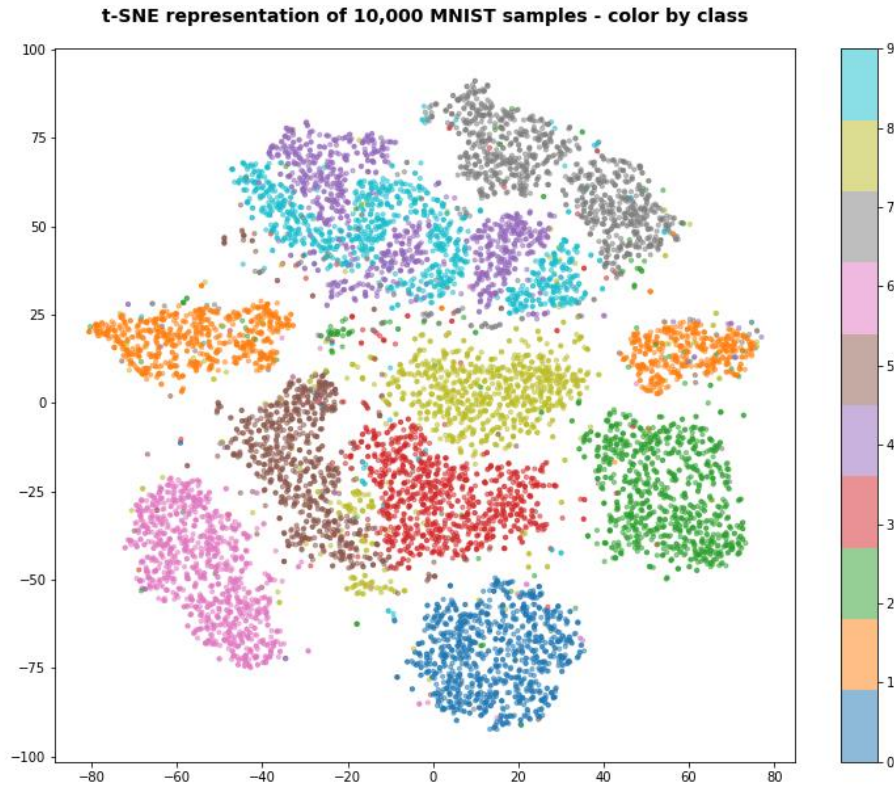
➤ 데이터 전처리 (pre-processing)



Framework

■ MNIST Dataset

➤ 데이터 분포 확인 (feature space)



Framework

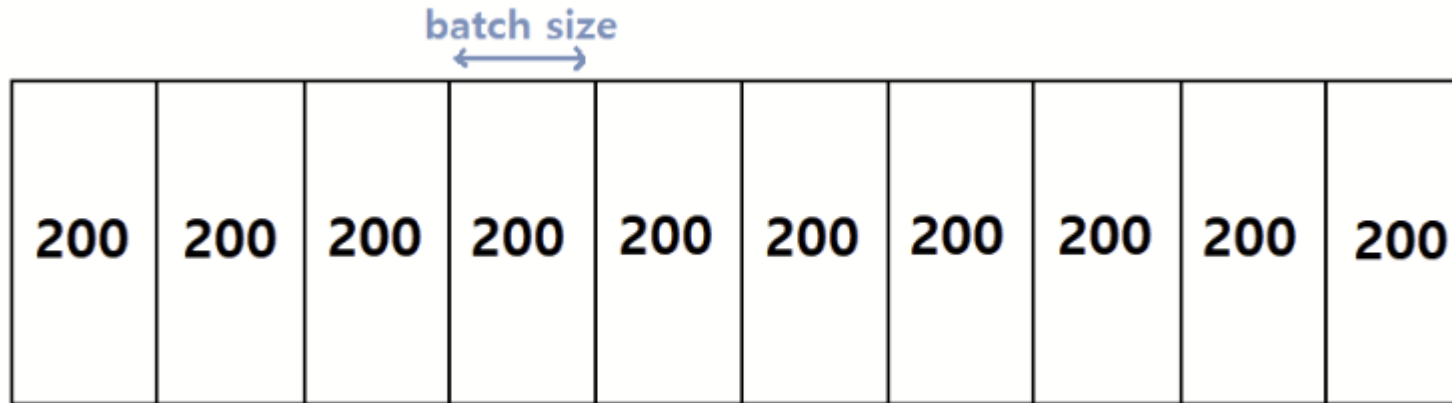
▪ MNIST Dataset

➤ 모델 탐색 및 구축

- ✓ 목적에 따라 선택되는 모델이 달라짐

➤ 데이터 분할

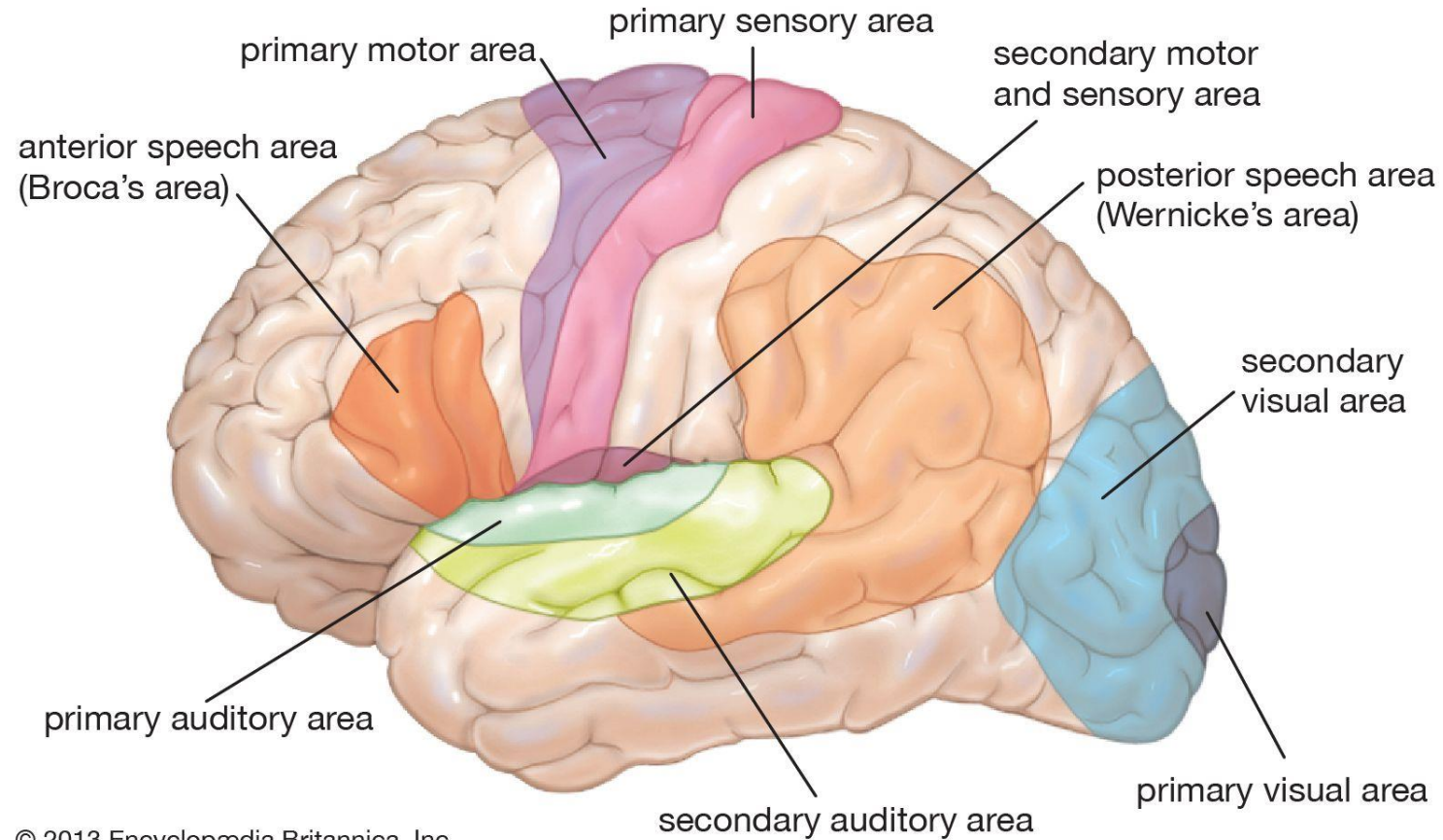
- ✓ Train, Validation, Test



➤ 모델 평가 & 결과 해석

Brain

▪ Brain Region

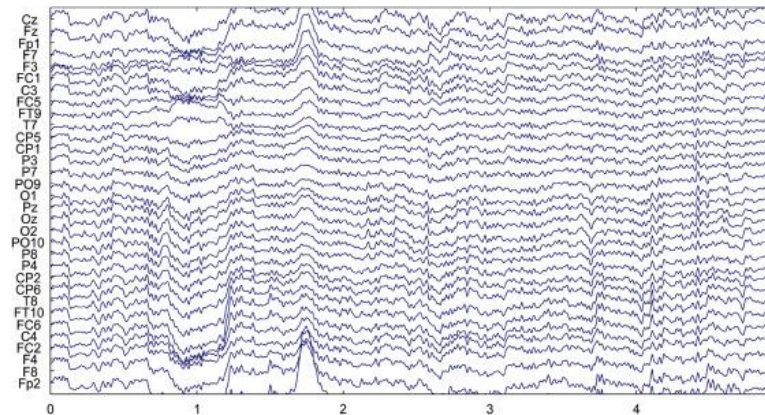


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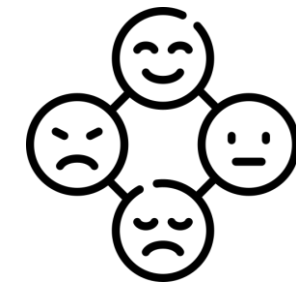
Brain

▪ BCI

➤ Brain Computer Interface



Speech



Emotion



Motion

Other

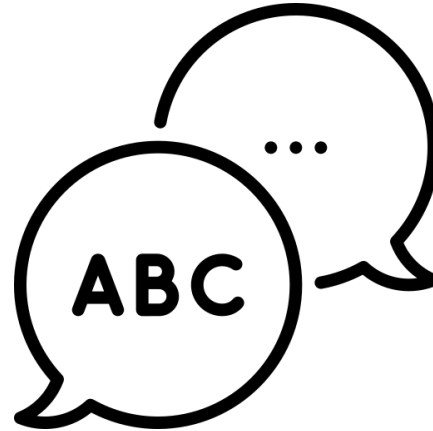
▪ Need to ...



Connect



지원 서류



영어 성적



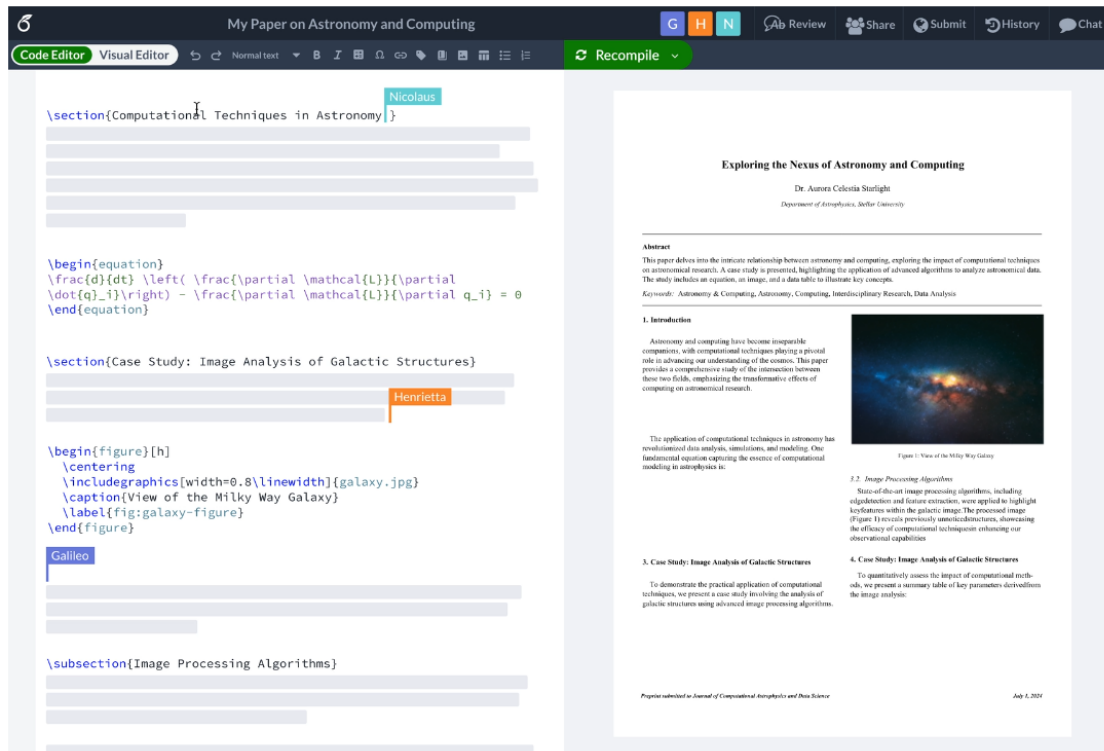
인간관계

Other

■ 논문

➤ Overleaf

- ✓ 논문 작성시 가장 많이 사용하는 사이트
- ✓ LaTeX 사용



Question