3. Neural Networks

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TRAIN AND TEST

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- Introduction
- Neural Networks
- TensorFlow
- AGI (Artificial General Intelligence)
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Introduction

1주차 : 신경망

이번 주에는 신경망에 대해 알아보고 분류 작업에 신경망을 사용하는 방법을 알아봅니다. 텐서플로우 프레임워크를 사용해 몇 줄의 코드만으로 신경망을 구축할 수 있습니다. 그런 다음 Python에서 "처음부터" 자신만의 신경망을 코딩하는 방법을 배우며 더 깊이 파고듭니다. 선택 사항으로 병렬 처리(벡터화)를 사용하여 신경망 계산을 효율적으로 구현하는 방법에 대해 자세히 알아볼 수도 있습니다.

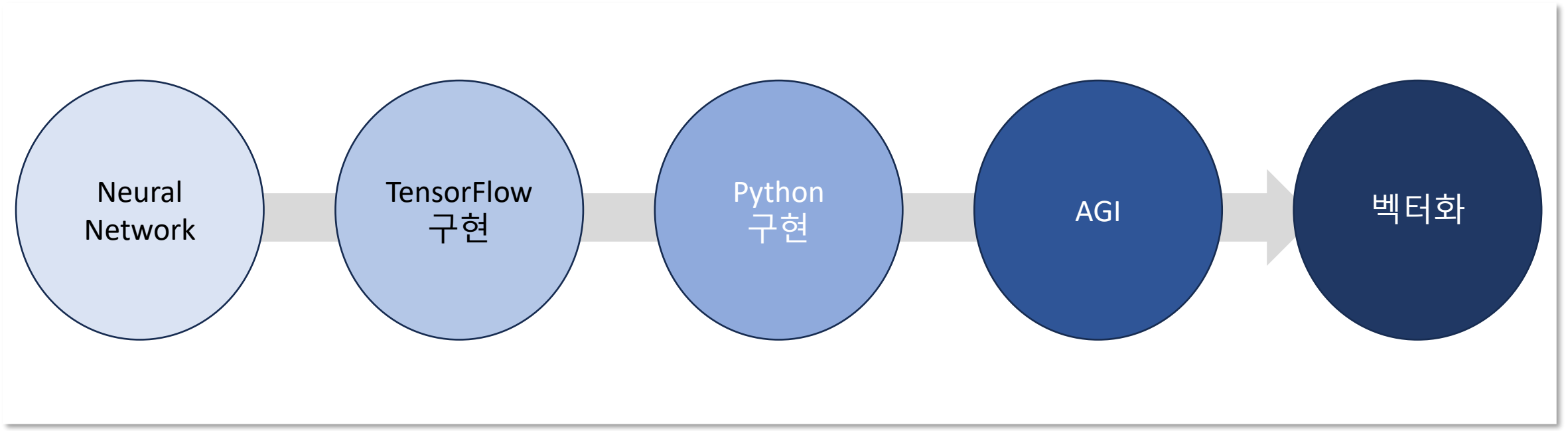
학습 목표

- 신경망의 다이어그램과 구성 요소에 익숙해지기
- 신경망에서 '레이어'의 개념 이해하기
- 신경망이 새로운 기능을 학습하는 방법을 이해합니다.
- 각 레이어에서 활성화가 계산되는 방식을 이해합니다.
- 신경망으로 이미지 분류를 수행하는 방법을 알아보세요.
- 프레임워크인 텐서플로우를 사용하여 이미지 분류를 위한 신경망을 구축합니다.
- TensorFlow의 신경망 레이어에서 데이터가 어떻게 들어오고 나가는지 알아보세요
- 일반 Python 코드로 신경망을 구축하여(처음부터) 예측을 수행합니다.
- (선택 사항): 신경망이 병렬 처리(벡터화)를 사용하여 계산을 더 빠르게 하는 방법을 알아보세요.

TRAIN AND TEST

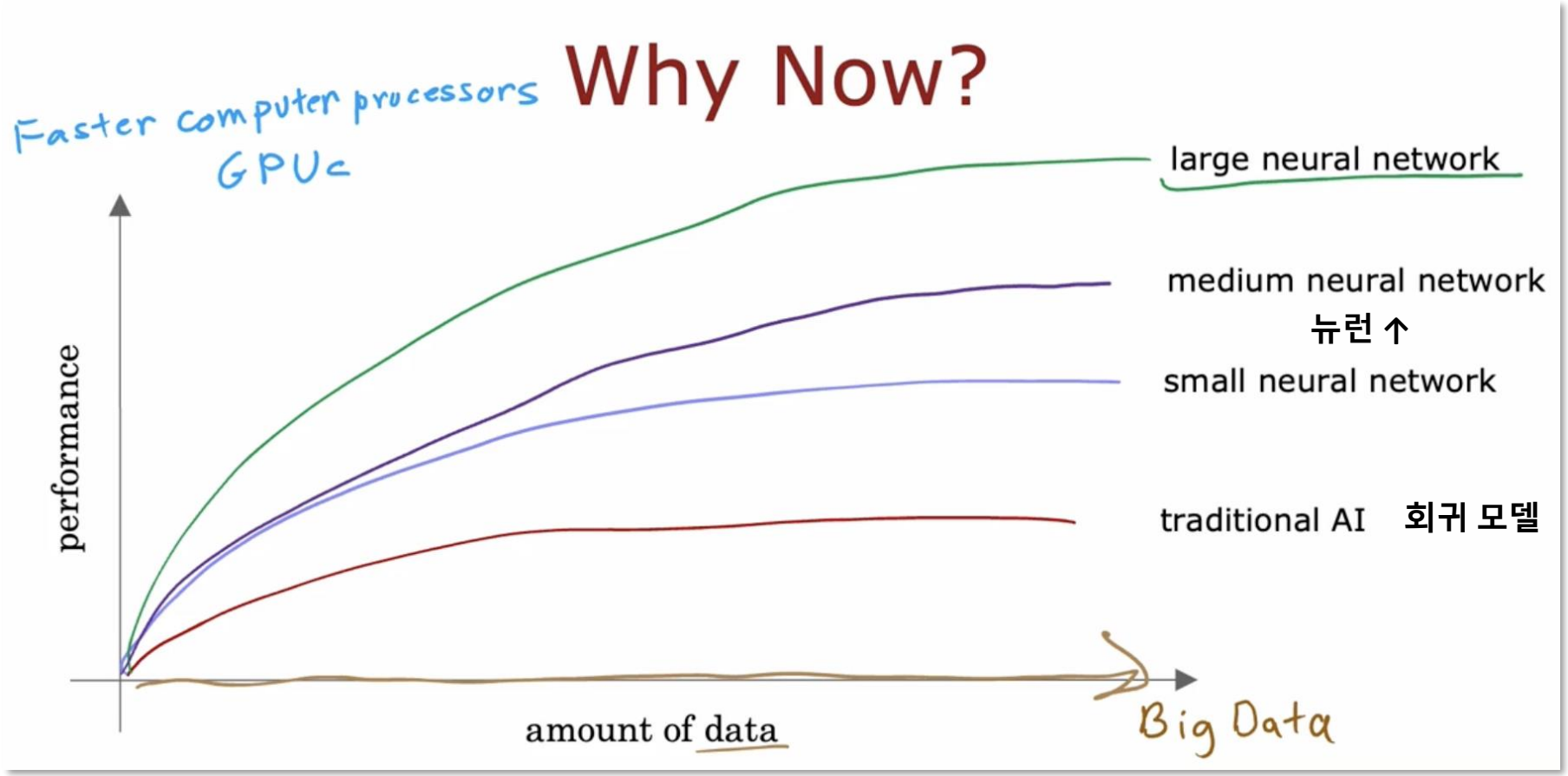
Introduction

1주차 : 신경망



TRAIN AND TEST

Neural Networks



- 컴퓨터 비전
- 음성 인식
- 자연어처리

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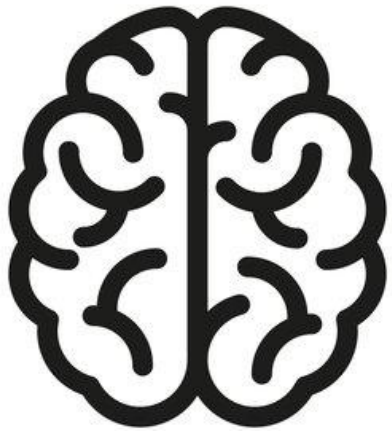
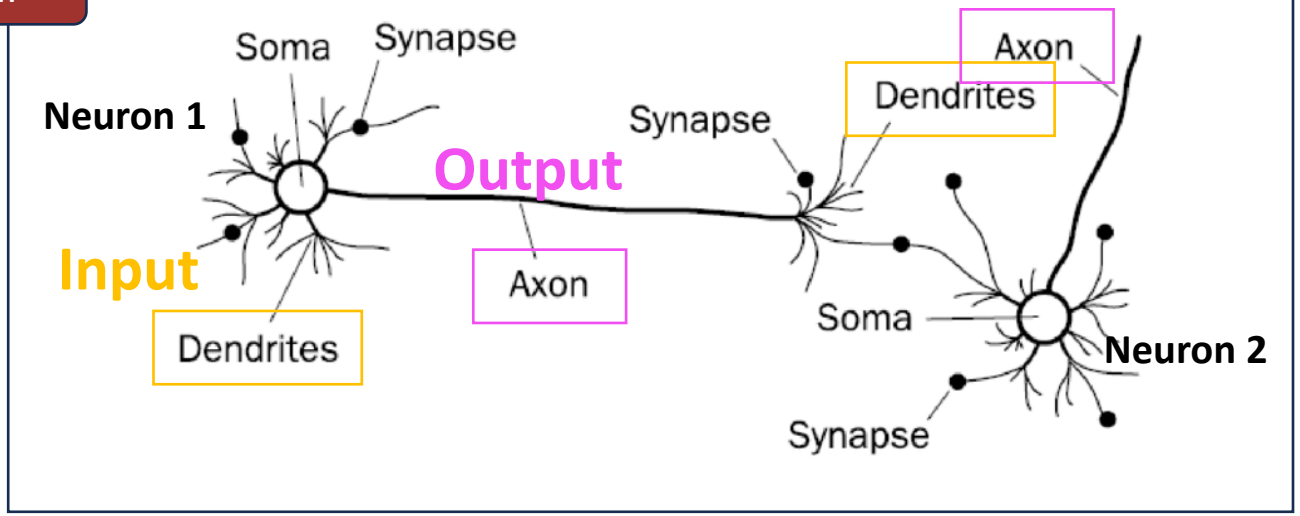
Neural Networks

What is Neural Networks?

Brain

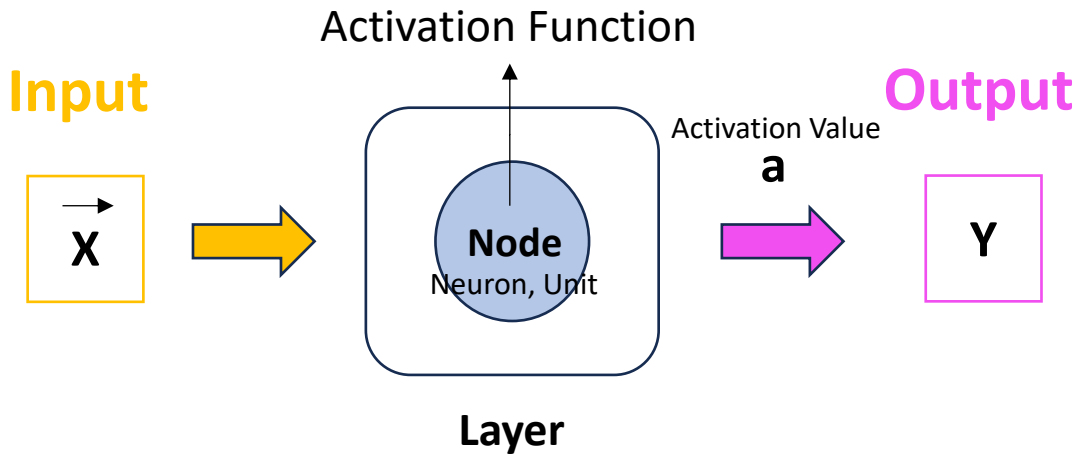


Biological



Mathematical

Perceptron



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Neural Networks

What is Neural Networks?

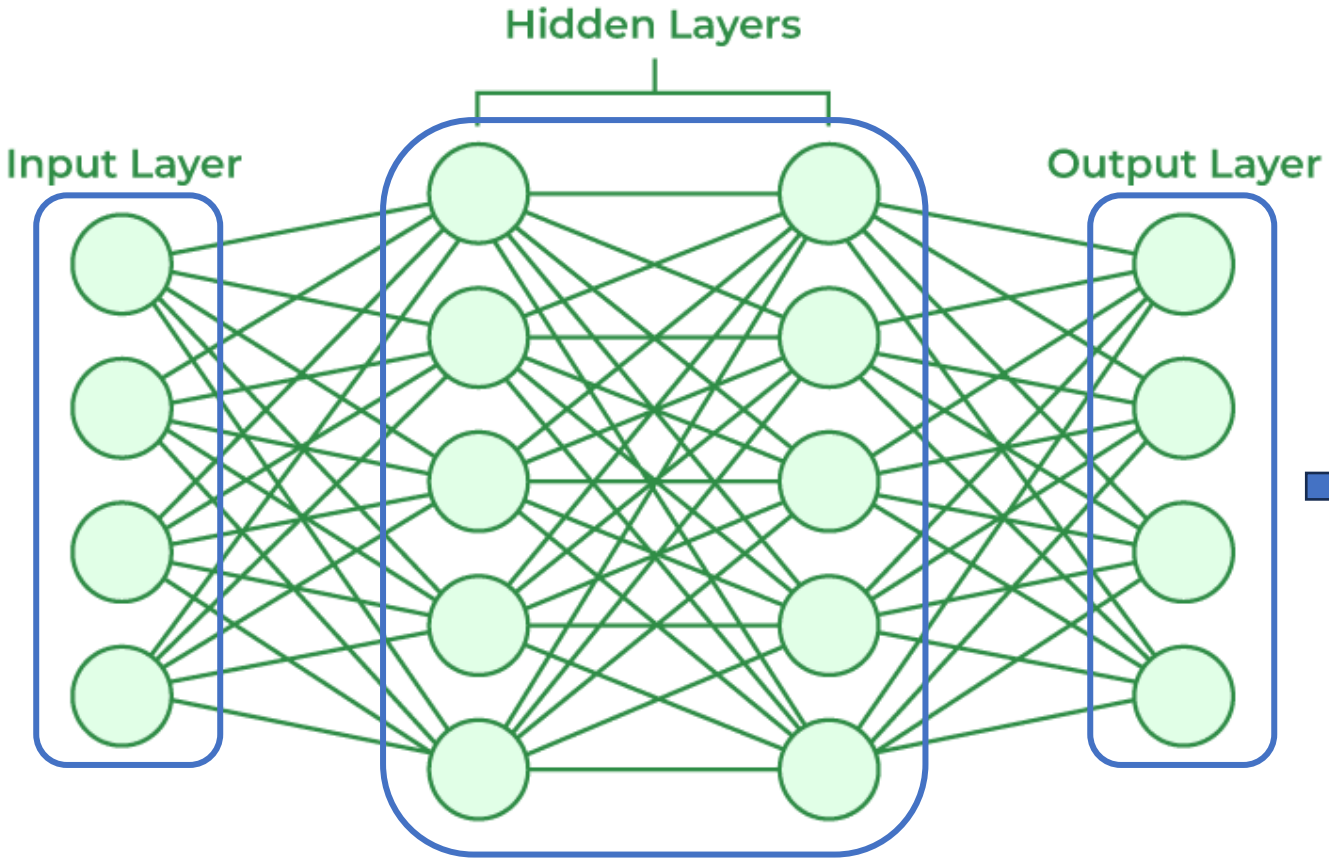
Artificial Neural Network(ANN)

- 적은 Hidden Layer
- Overfitting 문제
- 간단한 비선형 문제 해결

Deep Neural Network(DNN)

- Multi-Layer Perceptron(MLP)
- 여러 개의 Hidden Layers
- 복잡한 비선형 문제 해결

RNN, CNN, LSTM, GRU 등



딥러닝 모델의 Hidden Layer와 Node를 적절히 구성하여 Output값을 잘 예측하는 것

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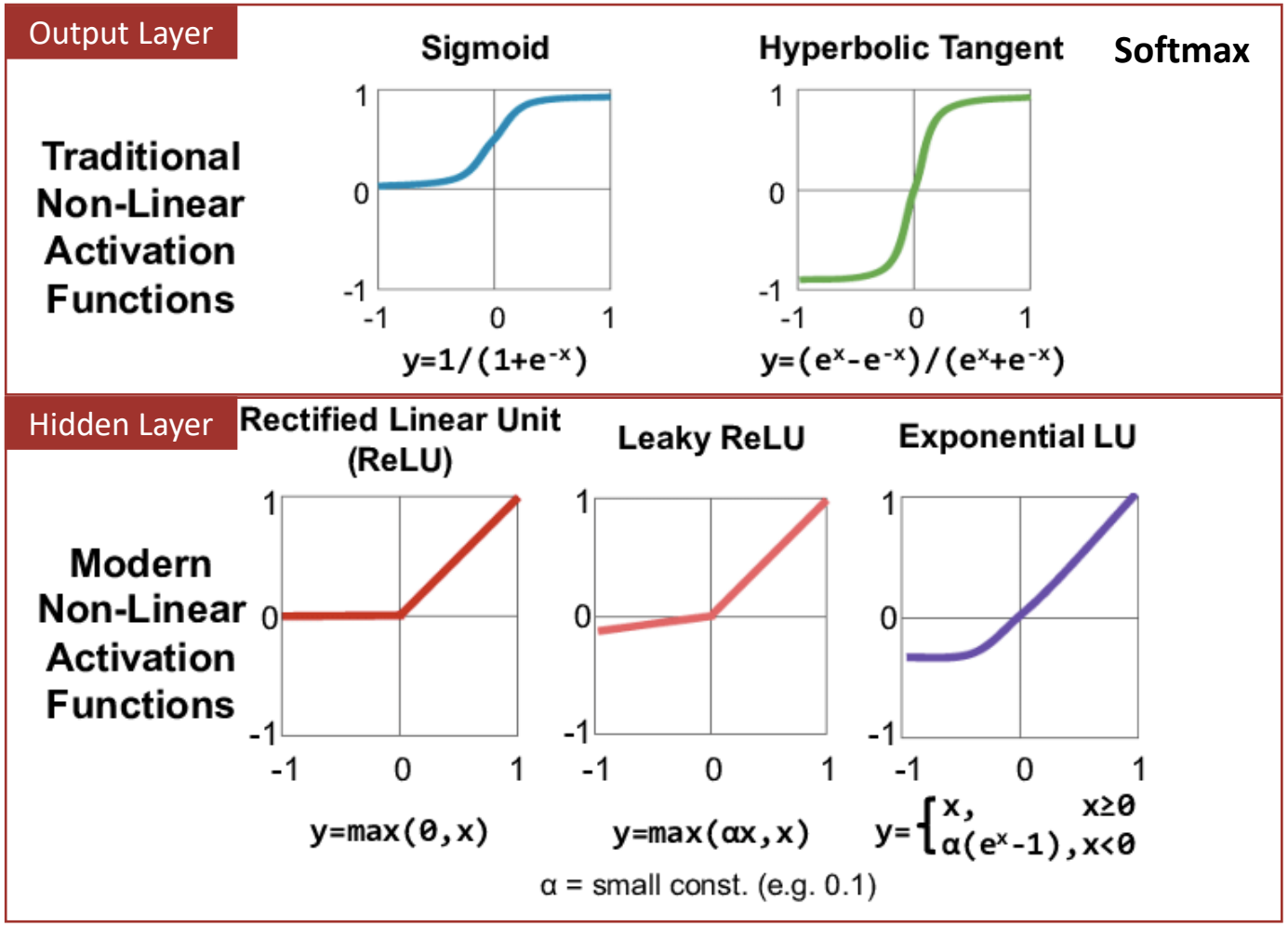
Neural Networks

Activation Function

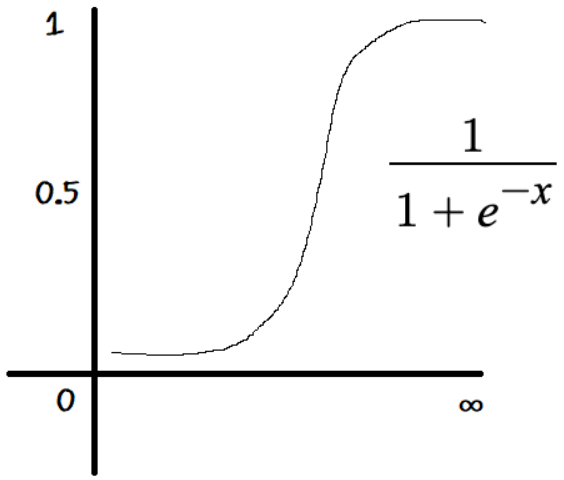
- 입력 신호의 총합을 출력 신호로 변환하는 함수
- 앞 뉴런에서 자극이 들어왔을 때, 다음 뉴런을 활성 할지 여부 판단
- 비선형 함수: **딥러닝** 모델의 레이어 층을 깊게 가져가기 위함



Neural Networks

Activation Function_Output Layer

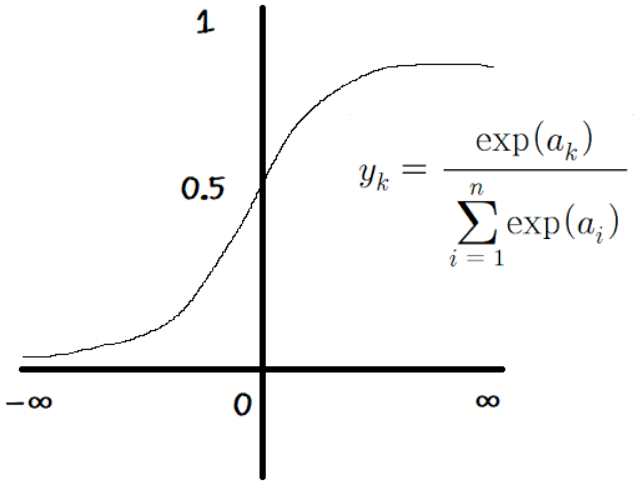
- **Sigmoid (Logistic)**



- 이진분류
- 출력값 범위 : [0,1]
- 손실함수: binary_crossentropy
- Vanishing Gradient Problem 문제

Generalization

- **Softmax**



- 다중분류 (N가지 출력)
- 출력값 범위 : [0,1]
- 단, 출력값 총합이 항상 1
- 손실함수: Categorical_crossentropy

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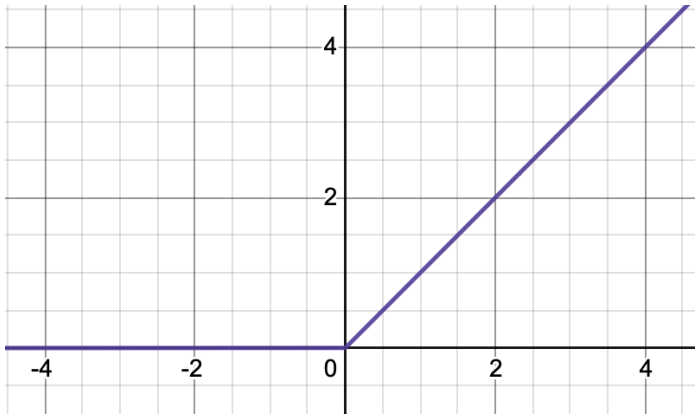
Neural Networks

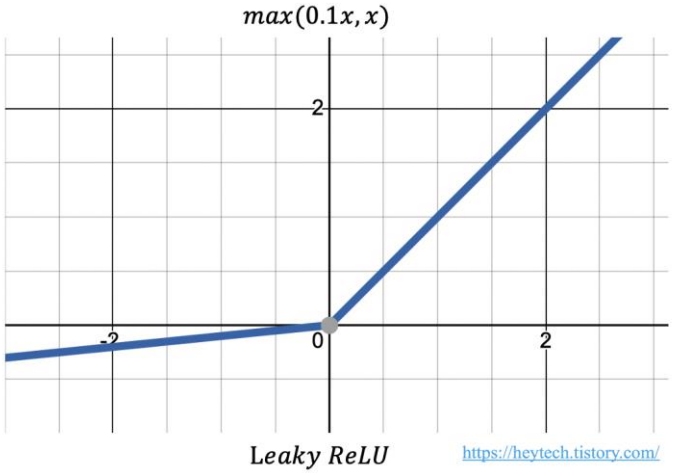
Activation Function_Hidden Layer

- **ReLU**



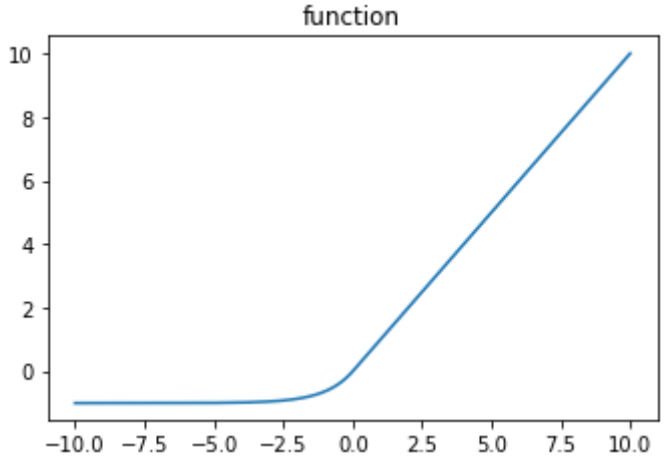
- 딥러닝에서 가장 많이 사용
- Vanashing Gradient 문제 해결
- 연산 속도 빠름
- Dying ReLU 문제
  ReLU사용한 노드가 비활성화되는 현상
  -> 0으로 출력

- **Leaky ReLU**



- ReLU의 Dying ReLU 문제를 해결하기 위한 시도
- 0으로 출력되던 부분을 아주 작은 음수값으로 출력

- **ELU**



- ReLU의 모든 장점을 포함
- Dying ReLU 문제를 해결

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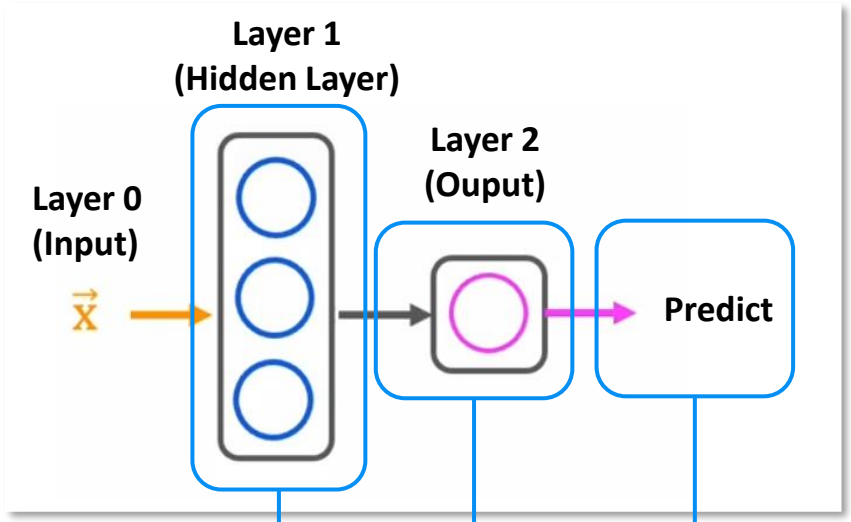
Neural Networks

Neural Network Layer

이진분류 -> Sigmoid 함수

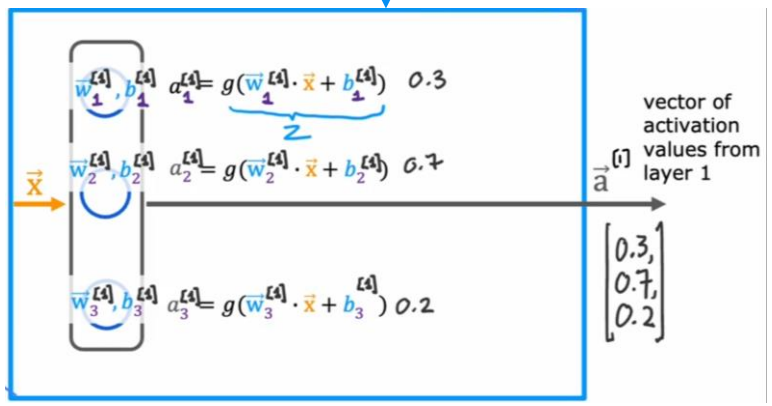
$$g(z) = \frac{1}{1 + e^{-(z)}}$$

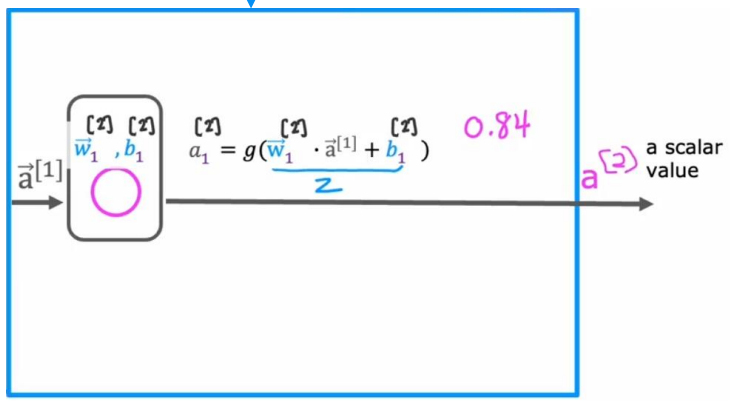


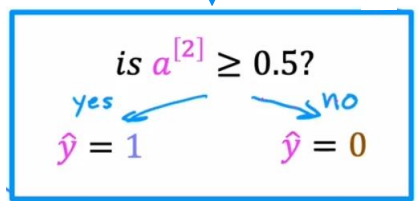
$$a_j^{[l]} = g(\vec{w}_j^{[l]} \cdot \vec{a}^{[l-1]} + b_j^{[l]})$$

- **a**: Activation Value
- **l**: Layer
- **j**: Unit(neuron)
- **w**: weight
- **b**: bias

} parameters







Predict category 1 or 0 (yes/no)

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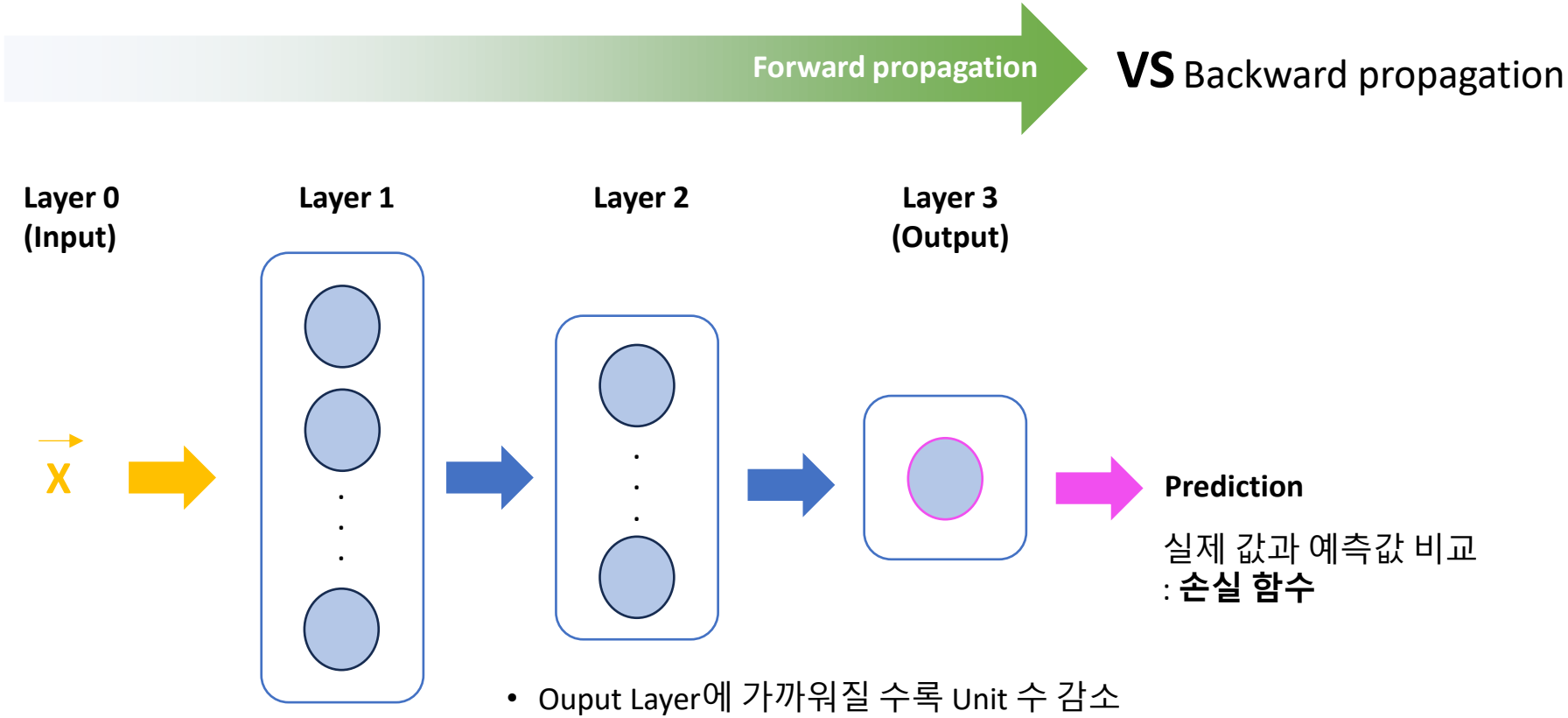
Neural Networks

Forward Propagation



- Ouput Layer에 가까워질 수록 Unit 수 감소

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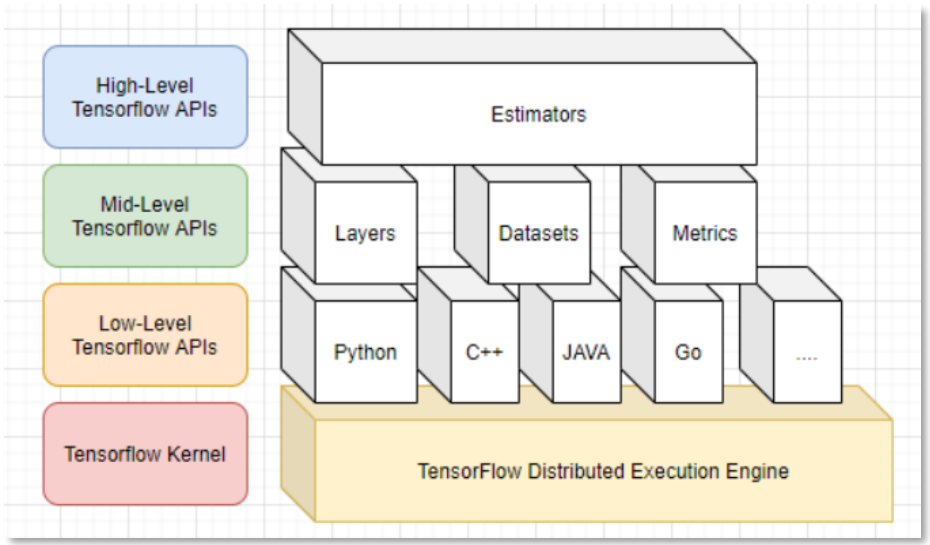
TensorFlow

TensorFlow

- Google에서 개발한 딥러닝 라이브러리
- 사실상 거의 모든 딥러닝 프로젝트에서 범용적으로 활용



출처: 텐서플로우 홈페이지

프레임워크	동작	지원 단체	라이선스 종류	속도	범용성	개발/학습 난이도	참여자 규모
텐서플로우	파이썬, C++ 자바, etc	구글	아파치 2.0	++	++	++	+++
케라스	파이썬, R, MNNet, DL4J	MIT	MIT 라이선스	+++	+++	+	+++
파이토치	파이썬, C++	페이스북	BSD	+++	+	+	++
DL4J	자바, 스칼라, 클로저, 파이썬, 코틀린	스카이마인드 DL4J 커뮤니티	아파치 2.0	++	+++	+++	+
카페	C++, 파이썬, 매트랩	버클리 대학 연구팀	BSD	+	+	+++	+
MXNext	C++, 파이썬, 줄리아, 매트랩, 자바스크립트, 고, R, 스칼라, 펄	아파치 재단, AWS	아파치 2.0	++	+++	++	++

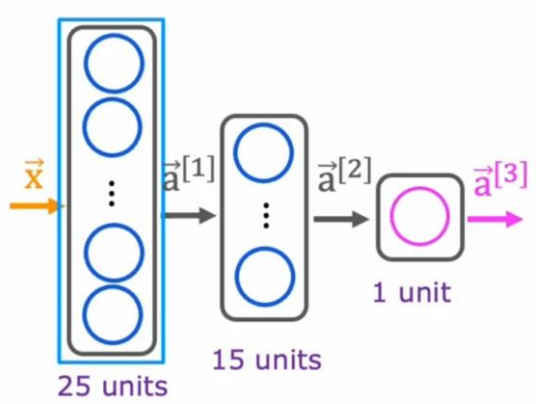
출처: 테크월드뉴스

참고 페이지: https://www.tensorflow.org/

TensorFlow

TensorFlow 딥러닝 모델 구성

- **Keras** 패키지를 활용하여 직접 모델링




```
x = np.array([[0.0,...245,...240...0]])
layer_1 = Dense(units=25, activation='sigmoid')
a1 = layer_1(x)

layer_2 = Dense(units=15, activation='sigmoid')
a2 = layer_2(a1)

layer_3 = Dense(units=1, activation='sigmoid')
a3 = layer_3(a2)
```

- 모델 클래스 객체 생성

```
tf.keras.models.Sequential()
```

- 모델의 각 Layer 구성

```
tf.keras.layers.Dense(units, activation)
```

- 모델 구축 예시

```
model = tf.keras.models.Sequential([
tf.keras.layers.Dense(10, input_dim=2, activation='sigmoid'),
# 2개의 입력 변수, 10개의 노드
tf.keras.layers.Dense(10, activation='sigmoid'), # 10개의 노드
tf.keras.layers.Dense(1, activation='sigmoid'), # 1개의 노드,
마지막 층에 노드 하나로 결과값 나옴. #(입력이 두 개, 출력이 하나, 히든 층
2개) ])
```

- 모델 학습

```
model.compile(loss='mean_squared_error', optimizier='SGD')

#dataset에 저장된 데이터를 입력하고, epochs를 100으로 설정하고 학습
model.fit(dataset, epochs=100)
```

- 예측

```
Model.predict()
```

TRAIN AND TEST

TensorFlow

DNN 모델링 예제

누수 탐지 예측 모델 구현

- staratifiedKFold Cross validation 사용 → 오버피팅 해결
- **배치 정규화**(Batch Normalization) → 오버피팅 해결
- hidden layer 10개
- 95퍼센트 분산을 설명하는 **PCA**로 주성분 74개 선택 (기존 독립변수 532개)
- 활성화함수: ReLU, Softmax
- 손실함수: categorical_crossentropy
- Optimizer : Adam

- 정확도: 0.9676

```
Epoch 100/100
571/571 ━━━━━━━━━━━━━━━━━━━━ 2s 3ms/step - accuracy: 0.9854 - loss: 0.0509
1169
143/143 ━━━━━━━━━━━━━━━━━━━━ 0s 1ms/step - accuracy: 0.9691 - loss: 0.1114
Accuracy: 0.9676
```

```python
acf = 'relu'
Dropout_rate = 0.2


# K-Fold 교차 검증 설정
kfold = KFold(n_splits=10, shuffle=True, random_state=42)
cv_scores = []

# 교차 검증 루프
for train, val in kfold.split(X_train_pca):
    # 모델 구축
    model = Sequential()
    model.add(Dense(1024, input_dim=X_train_pca.shape[1], activation=acf))
    model.add(BatchNormalization())
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(1024, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(512, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(512, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(256, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(256, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(128, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(128, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(64, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(64, activation=acf))
    #model.add(Dropout(Dropout_rate))
    model.add(Dense(y_categorical.shape[1], activation='softmax'))

# 모델 컴파일
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

# 모델 학습
model.fit(X_train_pca, y_train, validation_data=(X_test_pca, y_test), epochs=100, batch_size=3

# 모델 평가
loss, accuracy = model.evaluate(X_test_pca, y_test)
print(f'Accuracy: {accuracy:.4f}')
```

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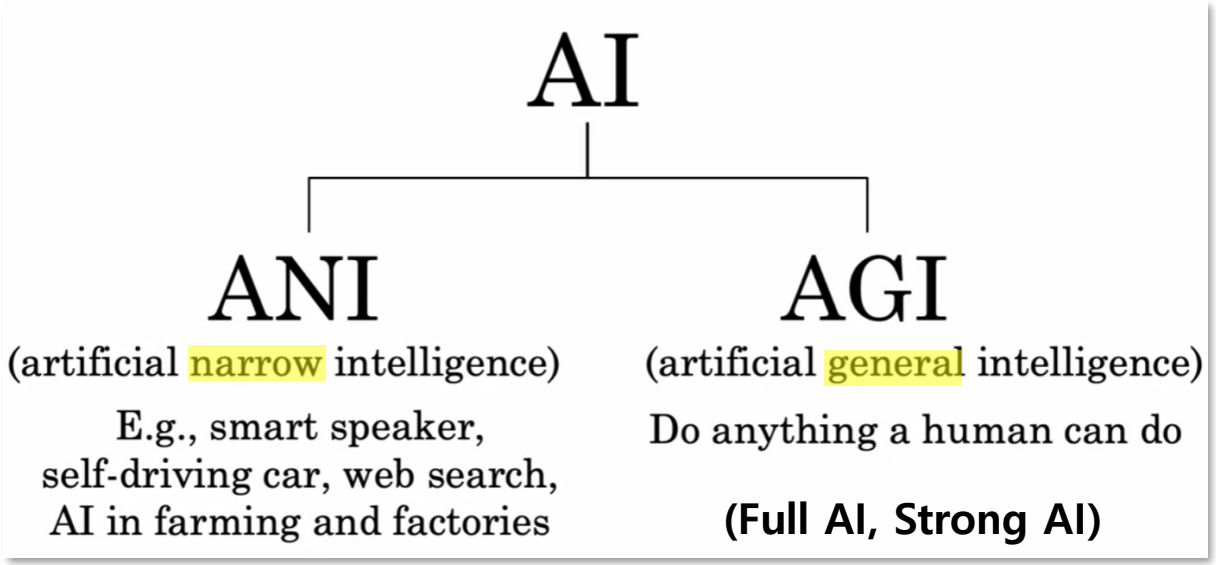
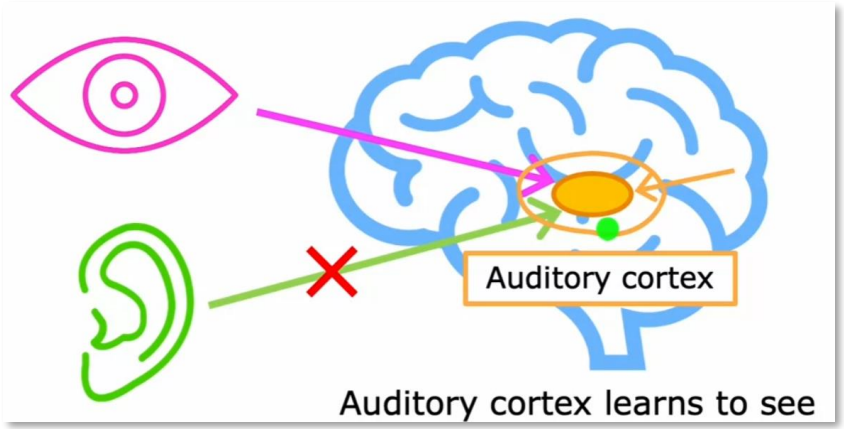
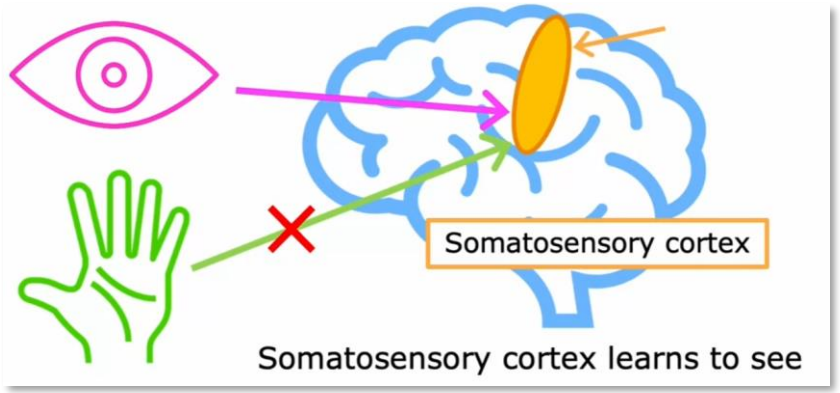
Artificial General Intelligence(AGI)

What is AGI?



인간 수준의 인지적 문제 해결 능력





TRAIN AND TEST

Artificial General Intelligence(AGI)

AGI vs ANI

구분	인공 일반 지능(AGI)	특정 목적 인공지능(Narrow AI)
정의	인간과 유사한 지능 수준을 보이는 인공지능	한정된 작업이나 분야에서 특화된 지능 보이는 인공지능
능력	학습, 이해, 추론, 문제 등 인간 지능의 전반적인 기능을 모방	특정 작업에 최적화된 기능 수행
적용 범위	다양한 분야에 걸쳐 유연하게 적용	매우 한정된 범위의 작업이나 문제에만 적용 가능
자율성	인간과 같은 수준의 자율적 의사 결정 능력	사전에 프로그램된 규칙이나 데이터에 기반한 의사 결정만 수행
학습 능력	제한된 데이터로부터 일반화된 지식을 학습하고 새로운 상황에 적용	대량의 데이터나 특정 작업에 특화된 학습을 통해 최적화
창의성	새로운 문제를 해결하거나 창의적 작업을 수행할 수 있는 잠재력	주어진 문제 해결에 초점을 맞추며 창의적 작업 수행은 제한적
사회 윤리적 영향	인간 사회 전반에 광범위한 영향을 미칠 가능성	특정 분야에서의 영향력은 크지만, AGI만큼 전반적인 영향력은 미미

출처: 삼성 SDS Inside Report

Position: Levels of AGI for Operationalizing Progress on the Path to AGI

Meredith Ringel Morris [1] Jascha Sohl-Dickstein [2] Noah Fiedel [2] Tris Warkentin [2] Allan Dafoe [3]
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Performance (rows) x **Generality** (columns)	**Narrow** *clearly scoped task or set of tasks* 특정 목적	**General** *wide range of non-physical tasks, including metacognitive tasks like learning new skills* 일반적
Level 0: No AI	**Narrow Non-AI** calculator software; compiler	**General Non-AI** human-in-the-loop computing, e.g., Amazon Mechanical Turk
Level 1: Emerging *equal to or somewhat better than an unskilled human*	**Emerging Narrow AI** GOFAI (Boden, 2014); simple rule-based systems, e.g., SHRDLU (Winograd, 1971)	**Emerging AGI** ChatGPT (OpenAI, 2023), Bard (Anil et al., 2023), Llama 2 (Touvron et al., 2023), Gemini (Pichai & Hassabis, 2023)
Level 2: Competent *at least 50th percentile of skilled adults*	**Competent Narrow AI** toxicity detectors such as Jigsaw (Das et al., 2022); Smart Speakers such as Siri (Apple), Alexa (Amazon), or Google Assistant (Google); VQA systems such as PaLI (Chen et al., 2023); Watson (IBM); SOTA LLMs for a subset of tasks (e.g., short essay writing, simple coding)	**Competent AGI** not yet achieved
Level 3: Expert *at least 90th percentile of skilled adults*	**Expert Narrow AI** spelling & grammar checkers such as Grammarly (Grammarly, 2023); generative image models such as Imagen (Saharia et al., 2022) or Dall-E 2 (Ramesh et al., 2022)	**Expert AGI** not yet achieved
Level 4: Virtuoso *at least 99th percentile of skilled adults*	**Virtuoso Narrow AI** Deep Blue (Campbell et al., 2002), AlphaGo (Silver et al., 2016; 2017)	**Virtuoso AGI** not yet achieved
Level 5: Superhuman *outperforms 100% of humans*	**Superhuman Narrow AI** AlphaFold (Jumper et al., 2021; Varadi et al., 2021), AlphaZero (Silver et al., 2018), StockFish (Stockfish, 2023)	**Artificial Superintelligence (ASI)** not yet achieved

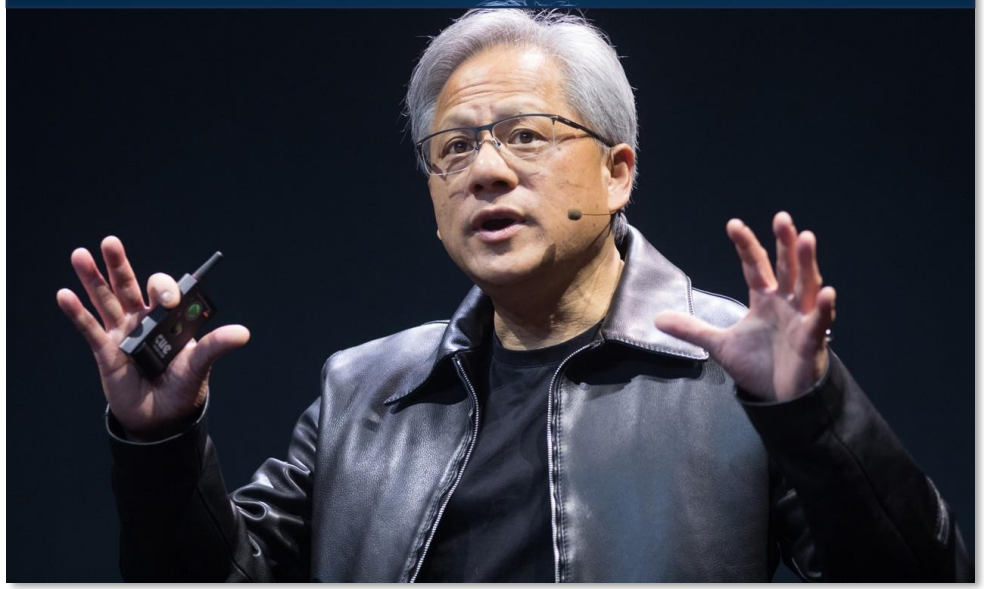
출처: Position: Levels of AGI for Operationalizing Progress on the Path to AGI.2024.07

TRAIN AND TEST

Artificial General Intelligence(AGI)

AGI의 등장

Jensen Huang (NVIDIA CEO)



“AGI 시대 5년 남았다”

(‘GTC 24’. 2024.03)

VS

Andrew Ng (Stanford Proffesor)

“ AGI는 적어도 30~50년 이상 걸린다”

(‘초거대 AI모델 플랫폼 최적화 센터 초청 강연’. 2023.07)

TRAIN AND TEST

Artificial General Intelligence(AGI)

AGI의 영향

실현가능성

- Google, Open AI, Meta, Amazon 등 여러 거대기업이 개발에 참여
- 전문가마다 등장 시기에 대한 의견이 다름
- 산업계에서는 비교적 빠른 기간 내에 실현 가능하다는 의견

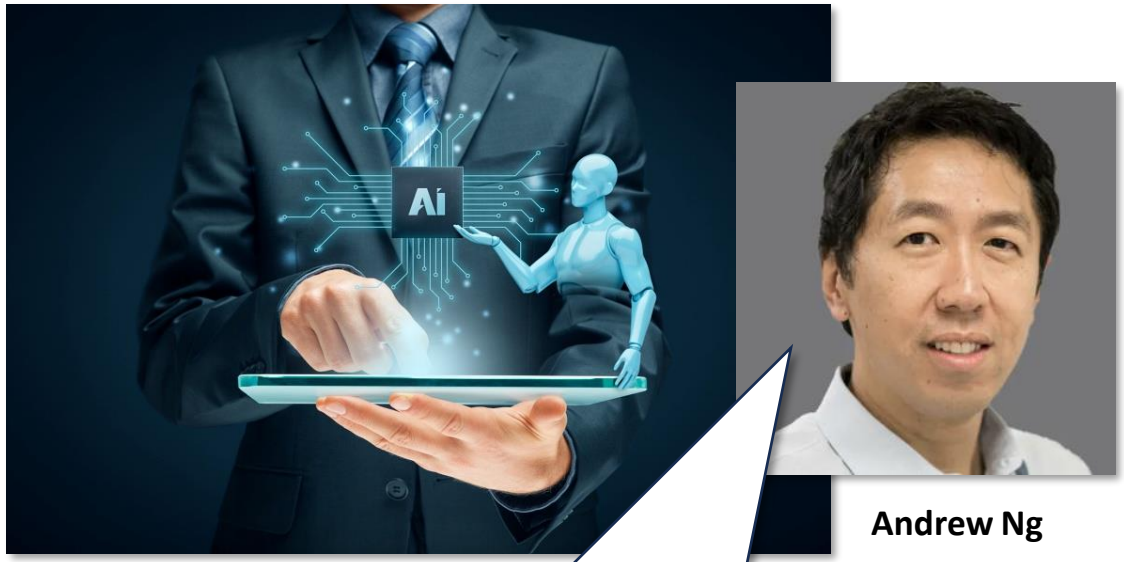
영향

- 인간이 살아가는 전반적인 방식에 영향을 미침
- 국가간 외교 문제
- 시장의 경쟁 양상

➔ 관련 규제가 필요하다는 의견 多

윤리적/사회적 요인에 결정 될 것

인공지능(AGI)의 윤리적 문제 – 'AI 일자리 대체'



Andrew Ng

"AI에 대한 두려움 및 위험성이 과장되어 있음"
"인간은 AI를 통제할 능력이 있음"
"AI가 인간의 일자리를 소멸시키는 것이 아닌,
AI를 활용할 수 있는 사람이 그렇지 못한 사람을 대체할 것"
(2024.04)

TRAIN AND TEST

Vectorization

Vectorization 코드 비교

- **For Loops**

```
x = np.array([200, 17])

W = np.array([[1, -3, 5],
              [-2, 4, -6]])
b = np.array([-1, 1, 2])

def dense(a_in,W,b):
  units = W.shape[1]
  a_out = np.zeros(units)
  for j in range(units):
    w = W[:,j]
    z = np.dot(w, a_in) + b[j]
    a_out[j] = g(z)
  return a_out

[1,0,1]
```

For문

벡터화

- **Vectorization**

```
X = np.array([[200, 17]])          2D array
W = np.array([[1, -3, 5],          same
              [-2, 4, -6]])
B = np.array([[-1, 1, 2]])         1x3 2D array

def dense(A_in,W,B):
  Z = np.matmul(A_in,W) + B        matrix multiplication
  A_out = g(Z)
  return A_out

[[1,0,1]]
```

- Numpy의 **matmul**함수 사용 -> 행렬곱

➡ **효율적인 신경망 구현**

- **행렬 곱셈**

7.2 Matrix Multiplication

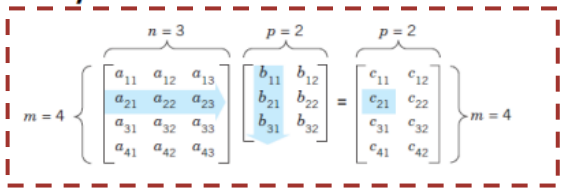
Multiplication of a Matrix by a Matrix

The **product** $\mathbf{C} = \mathbf{AB}$ (in this order) of an $m \times n$ matrix $\mathbf{A} = [a_{jk}]$ times an $r \times p$ matrix $\mathbf{B} = [b_{jk}]$ is defined if and only if $r = n$ and is then the $m \times p$ matrix $\mathbf{C} = [c_{jk}]$ with entries

$$(1) \qquad c_{jk} = \sum_{l=1}^{n} a_{jl}b_{lk} = a_{j1}b_{1k} + a_{j2}b_{2k} + \cdots + a_{jn}b_{nk} \qquad \begin{matrix} j = 1, \cdots, m \\ k = 1, \cdots, p. \end{matrix}$$

$$\begin{matrix} \mathbf{A} & \mathbf{B} & = & \mathbf{C} \\ [m \times n] & [n \times p] & = & [m \times p] \end{matrix}$$

Multiplication of rows into columns



$$c_{21} = a_{21}b_{11} + a_{22}b_{21} + \cdots + a_{2n}b_{n1}$$

Paper Review

Application of Deep Learning

Ahmed, S. F., Alam, M. S. B., Hassan, M., Rozbu, M. R., Ishtiak, T., Rafa, N., ... & Gandomi, A. H. (2023). Deep learning modelling techniques: current progress, applications, advantages, and challenges. *Artificial Intelligence Review*, *56*(11), 13521-13617.

Artificial Intelligence Review (2023) 56:13521–13617
https://doi.org/10.1007/s10462-023-10466-8

Deep learning modelling techniques: current progress, applications, advantages, and challenges

Shams Forruque Ahmed[1] · Md. Sakib Bin Alam[2] · Maruf Hassan[1] · Mahtabin Rodela Rozbu[3] · Taoseef Ishtiak[4] · Nazifa Rafa[5] · M. Mofijur[6,7] · A. B. M. Shawkat Ali[8,9] · Amir H. Gandomi[10,11]

Published online: 17 April 2023

Abstract
Deep learning (DL) is revolutionizing evidence-based decision-making techniques that can be applied across various sectors. Specifically, it possesses the ability to utilize two or more levels of non-linear feature transformation of the given data via representation learning in order to overcome limitations posed by large datasets. As a multidisciplinary field that is still in its nascent phase, articles that survey DL architectures encompassing the full scope of the field are rather limited. Thus, this paper comprehensively reviews the state-of-art DL modelling techniques and provides insights into their advantages and challenges. It was found that many of the models exhibit a highly domain-specific efficiency and could be trained by two or more methods. However, training DL models can be very time-consuming, expensive, and requires huge samples for better accuracy. Since DL is also susceptible to deception and misclassification and tends to get stuck on local minima, improved optimization of parameters is required to create more robust models. Regardless, DL has already been leading to groundbreaking results in the healthcare, education, security, commercial, industrial, as well as government sectors. Some models, like the convolutional neural network (CNN), generative adversarial networks (GAN), recurrent neural network (RNN), recursive neural networks, and autoencoders, are frequently used, while the potential of other models remains widely unexplored. Pertinently, hybrid conventional DL architectures have the capacity to overcome the challenges experienced by conventional models. Considering that capsule architectures may dominate future DL models, this work aimed to compile information for stakeholders involved in the development and use of DL models in the contemporary world.

Keywords Deep learning · Deep learning architecture · Neural network · Boltzmann machine · Deep belief network · Autoencoders

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Taye, M. M. (2023). Understanding of machine learning with deep learning: architectures, workflow, applications and future directions. *Computers*, *12*(5), 91.

computers

MDPI

Review

Understanding of Machine Learning with Deep Learning: Architectures, Workflow, Applications and Future Directions

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Abstract: In recent years, deep learning (DL) has been the most popular computational approach in the field of machine learning (ML), achieving exceptional results on a variety of complex cognitive tasks, matching or even surpassing human performance. Deep learning technology, which grew out of artificial neural networks (ANN), has become a big deal in computing because it can learn from data. The ability to learn enormous volumes of data is one of the benefits of deep learning. In the past few years, the field of deep learning has grown quickly, and it has been used successfully in a wide range of traditional fields. In numerous disciplines, including cybersecurity, natural language processing, bioinformatics, robotics and control, and medical information processing, deep learning has outperformed well-known machine learning approaches. In order to provide a more ideal starting point from which to create a comprehensive understanding of deep learning, also, this article aims to provide a more detailed overview of the most significant facets of deep learning, including the most current developments in the field. Moreover, this paper discusses the significance of deep learning and the various deep learning techniques and networks. Additionally, it provides an overview of real-world application areas where deep learning techniques can be utilised. We conclude by identifying possible characteristics for future generations of deep learning modelling and providing research suggestions. On the same hand, this article intends to provide a comprehensive overview of deep learning modelling that can serve as a resource for academics and industry people alike. Lastly, we provide additional issues and recommended solutions to assist researchers in comprehending the existing research gaps. Various approaches, deep learning architectures, strategies, and applications are discussed in this work.

Keywords: machine learning (ML); deep learning (DL); recurrent neural network (RNN); convolutional neural networks (CNN) artificial intelligence (AI)

check for updates

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1. Introduction

Machine learning is used to make computers execute activities that humans can perform more effectively [1]. Using computer algorithms, machine learning enables the machine to access data automatically and with enhanced experience as it learns. It has simplified life and become an indispensable instrument in several industries, such as agriculture [2], banking [3], optimisation [4], robotics [5], structural health monitoring [6], and so on. It may be utilised in cameras for object detection, picture, colour, and pattern recognition, data collection, data sorting, and audio-to-text translation [7].

Deep learning [8] is one of the machine learning methods that dominate in various application areas. Machine learning functions similarly to a newborn infant. There are billions of linked neurons in the brain, which are engaged when a message is sent to the brain. When a baby is shown a vehicle, for instance, a specific set of neurons are active. When the infant is shown another automobile of a different model, the same set of neurons plus some extra neurons may be triggered. Thus, humans are trained and educated during childhood, and during this process, their neurons and the pathways linking them are modified.

2023.04

Sharifani, K., & Amini, M. (2023). Machine learning and deep learning: A review of methods and applications. *World Information Technology and Engineering Journal*, *10*(07), 3897-3904.

Machine Learning and Deep Learning: A Review of Methods and Applications

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[3] MahamGostar Research Group, Iran

ABSTRACT
Machine learning and deep learning have rapidly emerged as powerful tools in many fields, including image and speech recognition, natural language processing, and even medicine. In this article, we provide a review of the methods and applications of machine learning and deep learning, including their strengths and weaknesses, as well as their potential future directions. We also discuss the challenges associated with these technologies, including data privacy, ethical considerations, and the need for transparency in the decision-making process. Machine learning and deep learning are two of the most revolutionary technologies in the field of artificial intelligence. They have become increasingly popular in recent years due to their ability to make predictions, analyze large datasets, and provide insights that were previously impossible to obtain. This article will explore the basics of machine learning and deep learning, their differences, applications, and their impact on various industries. Machine learning and deep learning are transforming the way we interact with technology and unlocking new possibilities for innovation. These technologies have already made significant impacts in various industries and have the potential to continue to revolutionize the world. This article provides a comprehensive overview of the basics of machine learning and deep learning, their differences, applications, and their impact on society. With a focus on current literature and research, this article aims to provide a better understanding of the potential of machine learning and deep learning and their implications for the future.

KEYWORDS: Machine Learning, Deep Learning, Artificial Intelligence, Revolutionary Technologies

1.0 INTRODUCTION

The concept of machine learning and deep learning has been around for a long time. However, in recent years, these technologies have been revolutionized with the availability of big data and advancements in computing power. Machine learning and deep learning have become increasingly popular in various industries, including healthcare, finance, retail, and more. The aim of this article is to provide a comprehensive understanding of machine learning and deep learning and how they differ from each other. This article also aims to examine the applications of these technologies in various industries and their impact on society [1-7].

Machine learning and deep learning are two rapidly developing fields that have seen widespread adoption in recent years. Both involve the use of algorithms to learn from data, with the goal of improving the accuracy and efficiency of predictions or decisions. Machine learning typically involves the use of statistical methods to learn from data, while deep learning uses neural networks to learn from large datasets. In this article, we aim to provide an overview of the methods and applications of these technologies, as well as their strengths and limitations [8-16].

The field of artificial intelligence has seen a rapid evolution in recent years with the emergence of machine learning and deep learning. These technologies have become increasingly popular due to their ability to analyze large datasets, make predictions, and provide insights that were previously impossible to obtain. As the amount of data generated continues to grow, and computing power increases, the potential of machine learning and deep learning to revolutionize various industries and transform the world is becoming increasingly apparent. This article aims to provide a comprehensive understanding of these technologies, their applications, and their impact on society. By examining the basics of machine learning and deep learning, exploring their differences, and highlighting their various applications, this article aims to shed light on the potential of these technologies and their

2023.05

Paper Review

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ing architecture · Neural network · Boltzmann
ncoders

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연도: 2023.04

연구목적

딥러닝 모델링 기술에 대한 현황을 포괄적으로 리뷰하고, 다양한 응용 분야에서의 진전, 장점, 도전 과제를 탐구하기 위함. 또한, 현재 딥러닝의 한계와 문제점을 해결할 수 있는 방법을 제안, 미래 딥러닝 모델의 발전 방향을 제시.

연구방법

문헌 분석 방법을 사용하여 데이터베이스에서 186,000개의 논문을 검토하였고, 최종적으로 419개의 논문을 분석 → 최신 알고리즘과 모델링 기술을 중심으로 평가, 분석 수행

요약

- 4장 - 다양한 유형의 딥러닝 모델 구조, 최신 동향 등 설명, 모델별 장점 & 도전과제 테이블 제시
- 6장 - 모델링 기법들이 어떤 연구에 활용될 수 있는지 비교 분석 (RNN = 시계열 예측에 유용)
- 7장 - 딥러닝의 미래:
  - 하드웨어 및 소프트웨어 시스템의 발전
  - 크고 광범위한 데이터세트의 필요성
  - 다양한 도메인에서의 적용 – 모델의 일반화 능력을 증진

TRAIN AND TEST

Paper Review

Machine Learning and Deep Learning: A Review of Methods and Applications

World Information Technology and Engineering Journal Volume 10, Issue 07 – 2023

Machine Learning and Deep Learning: A Review of Methods and Applications

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TRAIN AND TEST

TRAIN AND TEST