Sorang-I

Medical Imaging Study
Week 0 : Basic Knowledge

자기 소개

자신을 소개해주세요!
(이름, 나이, 스터디 목표, 학습 경력, 흥미 분야 등등..)

YONSEI UNIVERSITY
COLLEGE OF MEDICINE

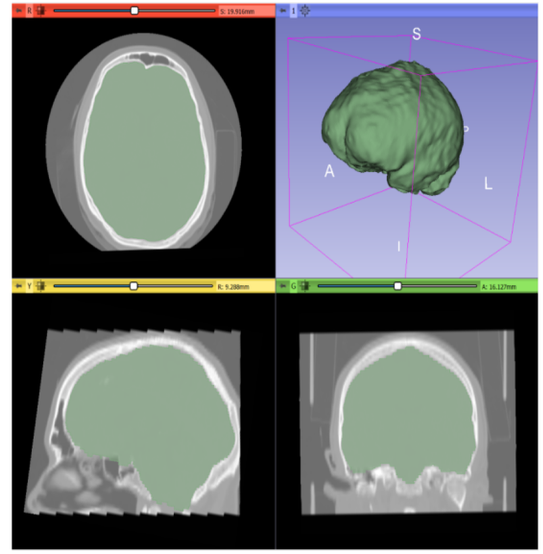
CCIDS 의료영상데이터사이언스센터
Center for Clinical Imaging Data Science

Medical Project

Brain Segmentation

Pathologic Images

Radiologic Images



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RESEARCH INTERESTS

Deep learning & Artificial Intelligence
Medical image analysis & Medical Implements
Pathology & Radiology

EDUCATION

Korea University | Seoul, Republic of Korea Mar 2018 -
Major in Biomedical Engineering

- Interdisciplinary major (2nd major) in Artificial Intelligence
- Relevant Coursework: Medical Imaging, Statistics, Mathematics, Machine Learning, and Programming
- Thesis

RESEARCH EXPERIENCES

Yonsei Severance Hospital. Center for Clinical Imaging Data Science Lab (Advisor: Hwiyoung Kim, PhD) | Seoul, Republic of Korea
Research Intern Jan 2021 -

- Conducted research on radiomics for glioblastoma and metastasis in brain MRI, brain tumor segmentation, and the impact of image intensity normalization on radiomics model performance
- Collaborated with radiologists, medical physicists, and computer scientists. Participated as a co-author in peer-review journal
- Joined the Brain Research Funding Project: Auto-Segmentation Skull CT Image for Craniotomy, Normal CT Image-to-DE CT Image for resolution development

Universitas 21 RISE Competition (Adivisor : Byung Ho Choi, PhD) | Seoul, Republic of Korea
Korea Univ Team Leader Oct 2020 – April 2021

- Conducted research on IBD(Inflammatory Bowel Disease) Blood Test Analysis, 3D MRI Image Analysis
- Made IBD patients care application "BDCare"
-

Korea Univ. Creative Challenge Program (CCP) (Coworking : Kyobo Insurance) | Seoul, Republic of Korea
Data Scientist Apr 2020 – Feb 2021

- Conducted research 'Alzheimer Monitoring Algorithm using by AI speaker'
- Implemented MFCC, Wavelet Transform for analyse patients voice. Made Alzheimer prediction model using by deep learning
- Collaborated with Kyobo Insurance, W Jin Hospital, Daegu geriatric hospital

CDTB Database Competition (Adivisor : Byungwan Ko, PhD) | Seoul, Republic of Korea
Korea Univ Team Leader Oct 2020 – April 2021

- Conducted research on IBD(Inflammatory Bowel Disease) Blood Test Analysis, 3D MRI Image Analysis
- Made IBD patients care application "BDCare"
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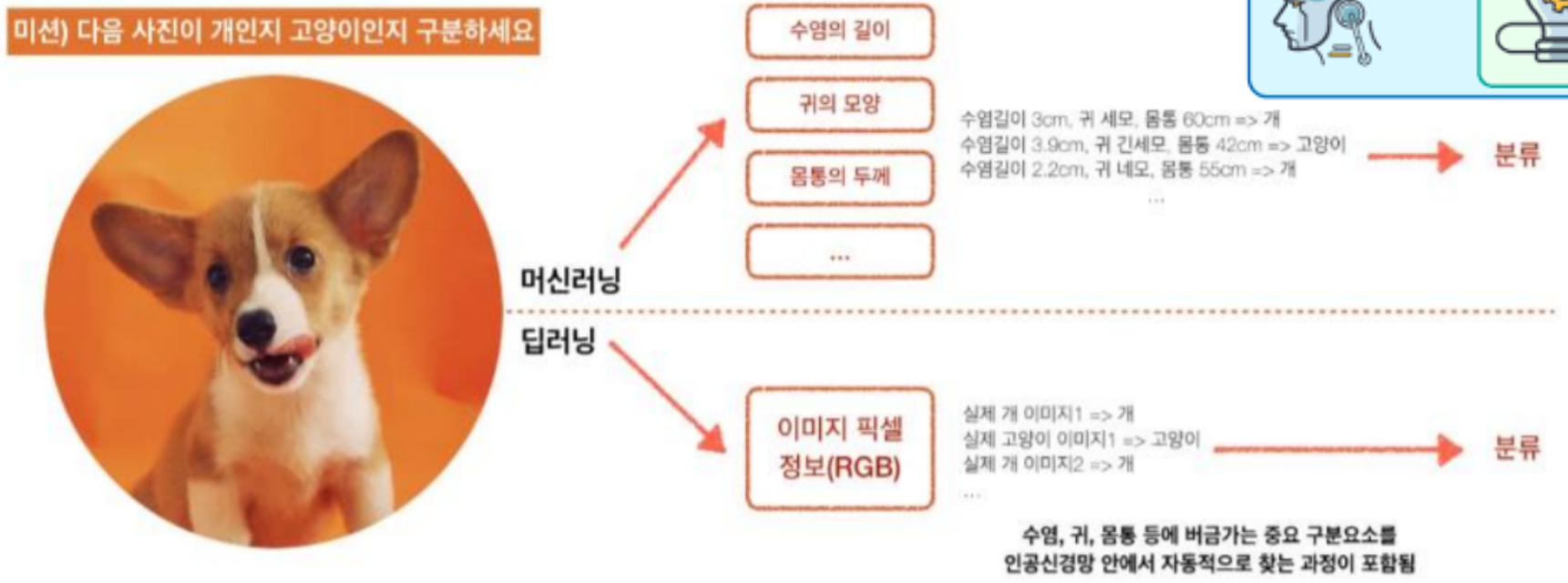
머신러닝 개요

머신러닝? 딥러닝?



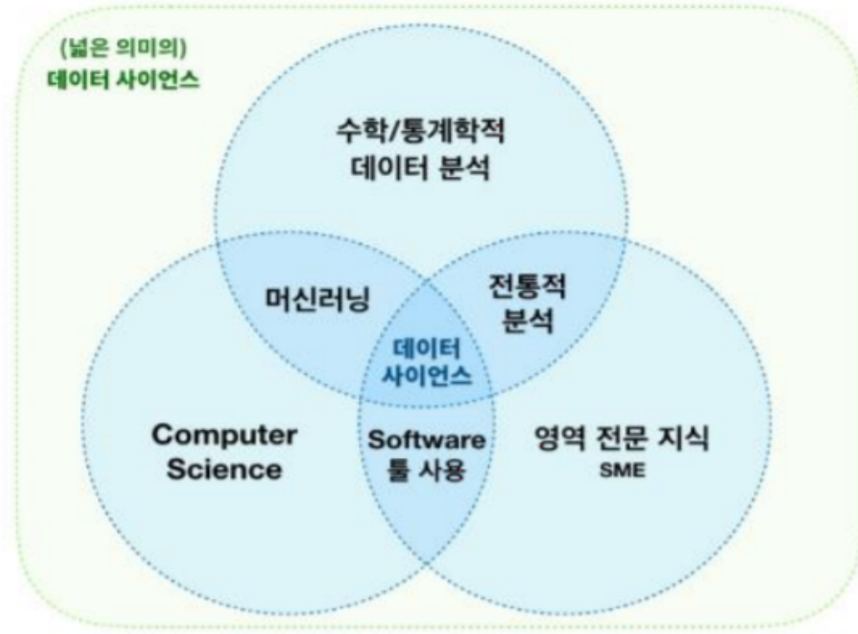
위와 같이 인간이 알 수 있는 특정된 규칙을 통해서 구분하게 되면 머신러닝
그렇지 않고 인공신경망이 자동적으로 구분하여 인간이 구분 요소와 방법을 알 수 없으면 딥러닝이다.

머신러닝 개요

데이터사이언티스트란?
(개발자와 데이터 사이언스, 통계학과 컴퓨터 그 사이에 대해서)

데이터 사이언스란,

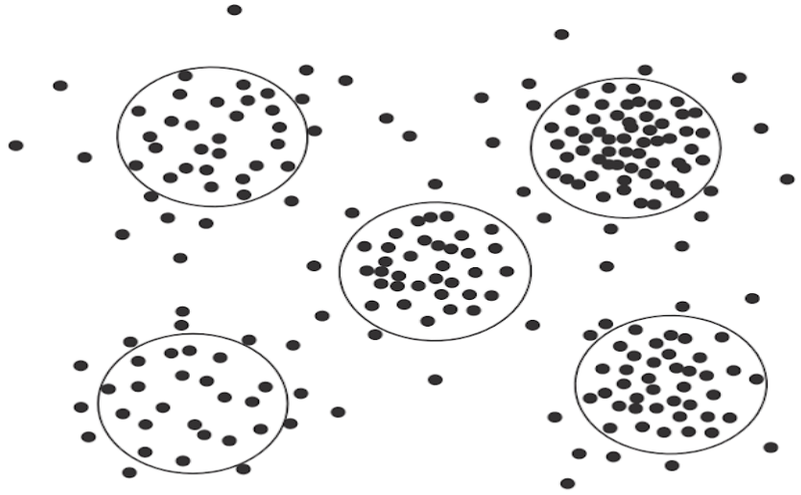
이전에 했던 데이터 마이닝(크롤링)과 유사하게 정형, 비정형 형태를 포함한 다양한 형태의 데이터로부터 지식과 인사이트를 추출하는데 과학적 방법론, 프로세스, 알고리즘, 시스템을 동원하는 융합분야이다.



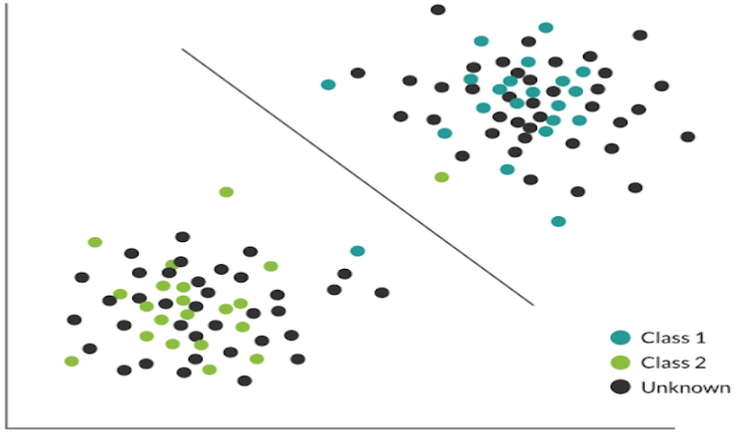
머신러닝 개요

Supervised Learning & Unsupervised Learning
둘의 차이점은? (Self Supervised Learning)

Unsupervised



Supervised



https://www.guru99.com/supervised-vs-unsupervised-learning.html

머신러닝 개요

Types of supervised learning

- Predicting final exam score based on time spent
  - regression
- Pass/non-pass based on time spent
  - binary classification
- Letter grade (A, B, C, E and F) based on time spent
  - multi-label classification

QUIZ

1. 자판기는 머신러닝이라고 부르지 않는다. 이유는 무엇일까?

2. Supervised 와 unsupervised learning 의 차이는 무엇일까?

3. Classification problem 과 regression problem 의 차이는 무엇일까?

4. 머신러닝의 정의를 한 문장으로 작성하세요 ('학습' 이라는 단어가 들어가게 작성하세요 !)

5. 머신러닝 알고리즘의 종류 3가지 이상을 작성하세요

6. 지도학습, 비지도학습, 강화학습에 대해 간단하게 설명하세요 (한 문장씩도 괜찮습니다, 차이점이 뚜렷하면 좋습니다) (강화학습을 모른다면 생략해도 좋습니다!)

Project Process

Medical Data

일반 데이터와 뭐가 다를까?

Image Data (CT, MRI, PET, etc..)

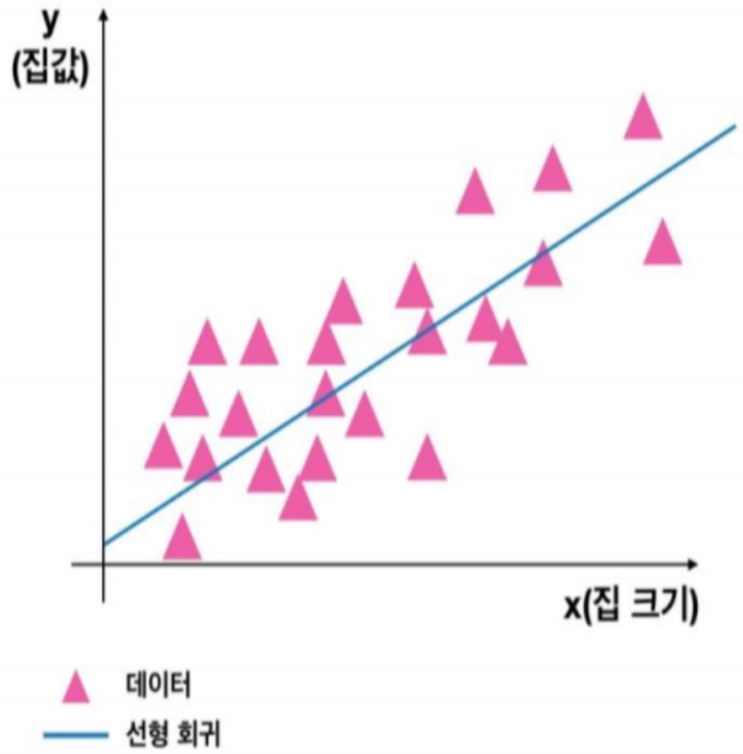
Voice(Wave) Data (Patients Voice, Signal, Frequency)

Tabular Data (Blood Test, Personal Information, Heredity)

Pathology Data (Drug condition, EEG)

Linear Regression

Linear Regression(선형회귀) 종속변수 y와 독립변수 X의 상관관계가 선형으로 설명되는 회귀 분석



집크기에 따른 집 값을 예측하려면?
좌측처럼 간단하게 선 하나로 표현가능!

~~파고들면 더욱 엄격한 정의가 있지만,~~
일단 일차함수 분석으로 이해하세요! (즉 직선)

이해하기 쉬어 모델을 수립하기 좋기 때문에
통계 모델링에서 굉장히 많이 활용됩니다.

그러나 매우 복잡한 상황에서는 정확성이 떨어집니다.

Linear Regression

Hypothesis, Cost (function)

$$H(x) = Wx + b$$

$$H(x) - y$$

Cost

How **fit** the line to our (training) data

$$H(x) - y$$

$$\frac{(H(x_1)-y_1)^2+(H(x_2)-y_2)^2+(H(x_3)-y_3)^2}{3}$$

$$cost(W) = \frac{1}{m}\sum_{i=1}^{m}(Wx_i - y_i)^2$$