Computer vision Seminar

수원대학교

Data Network Analysis 

데이터과학부

정인호

2023.01.19

Self introduce

- **2017.03 – 수원대학교 17학번 응용 통계학과 입학**
- **2019.10 ~ 2021.08 – 군 복무**
  개인 블로그
  깃허브
  가짜 연구소 1, 2기에서 cs231n과 pytorch를 공부
  ICT 이노베이션 시각 인공지능 심화 과정 수료
- **2021.09 ~ now**
  학부 연구생 (prof. 안홍렬)
  데이터 청년 캠프 고려대 과정

Publication & Prize

- 정인호, 김동현, 조성민, 안홍렬. (2022). 의료영상 종류에 따른 병변 영역 분할딥 러닝 모델 별 성능 비교. *한국정보과학회 학술발표논문집*
- 정인호, 김민주, 이하늘, 안홍렬. (2022). 통합 종목 주가 예측을 위한 시계열 스케일러 비교. *한국정보과학회 학술발표논문집, 1961-1963.*
- **The 1st KRX 금융 빅데이터 아이디어 콘테스트** – 김은수, 안홍렬, 정인호 (수원 AI) 72팀 中 우수상 수상 상금 3,000,000 원

Week1) Neural Network

1. 머신러닝과 딥러닝
2. 인공 신경망
3. CNN
4. 기울기 소실과 과적합 문제

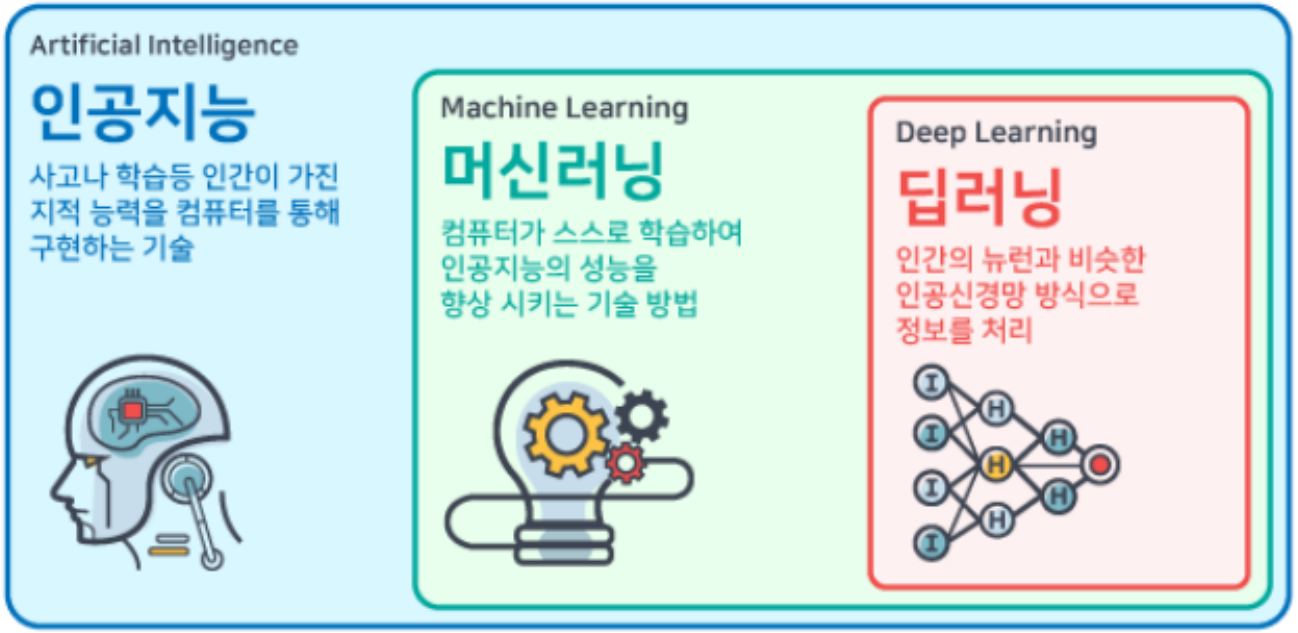
수원대학교
Data Network Analysis

Week1) Neural Network

1. 머신러닝과 딥러닝

수원대학교
Data Network Analysis

1. 머신러닝과 딥러닝



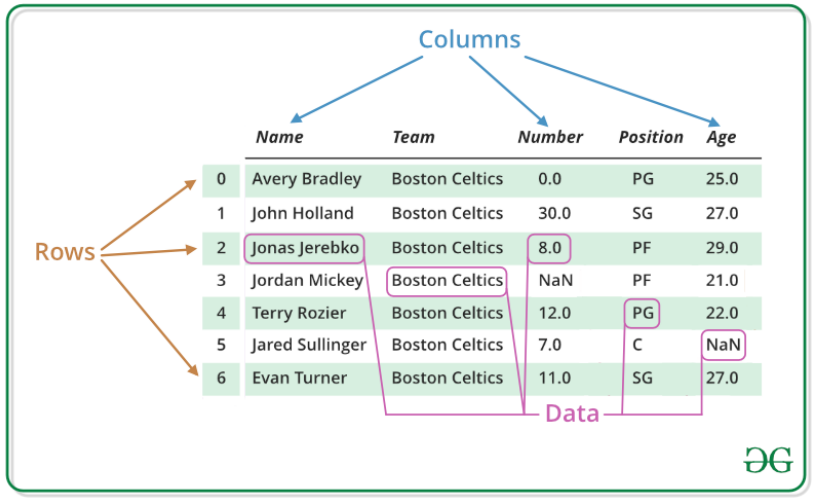
무조건 딥러닝을 쓰는 것이 좋은게 아닌가요?

언제 머신러닝을 쓰고 언제 딥러닝을 쓰죠?

1. 머신러닝과 딥러닝

데이터의 종류

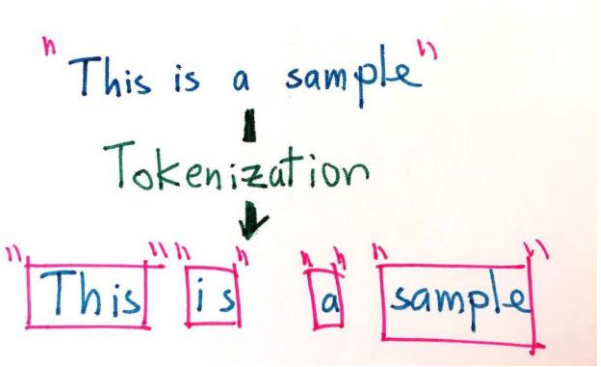
정형 데이터



테이블 데이터

비정형 데이터

이미지 데이터

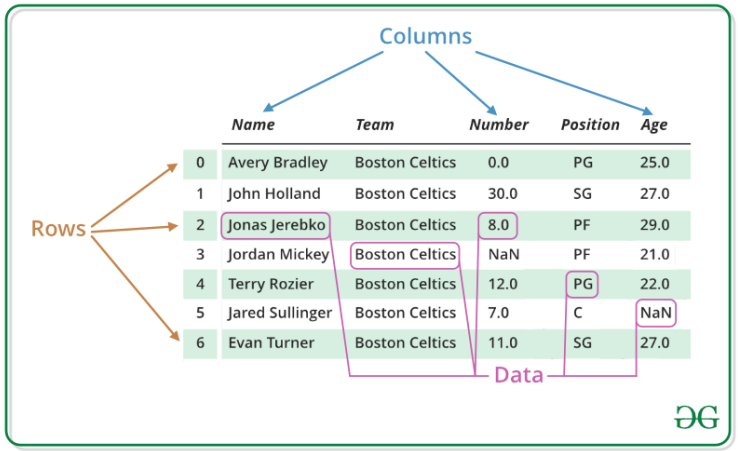


텍스트 데이터

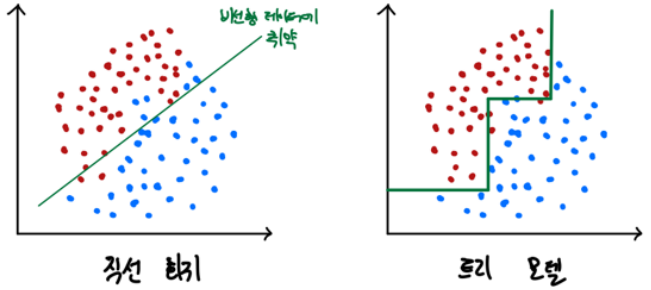
1. 머신러닝과 딥러닝

데이터의 종류

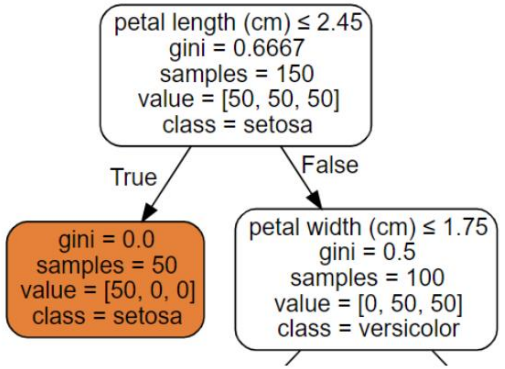
정형 데이터



머신러닝 트리 모델의 특성



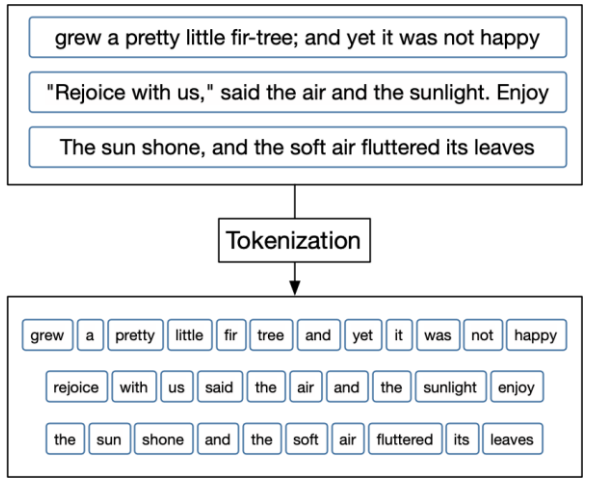
트리 모델의 원리



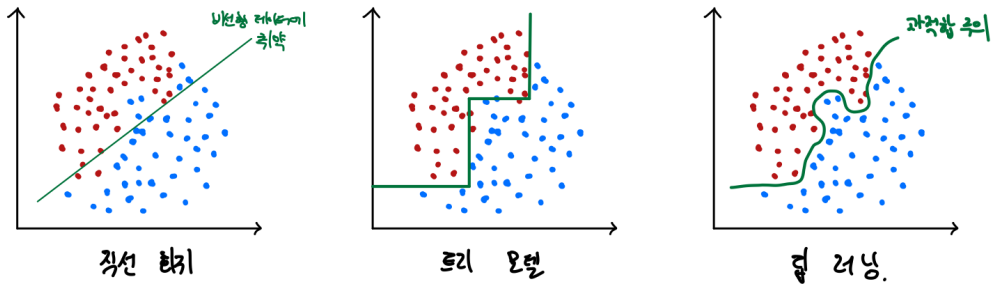
테이블 데이터의 특징

1. 머신러닝과 딥러닝

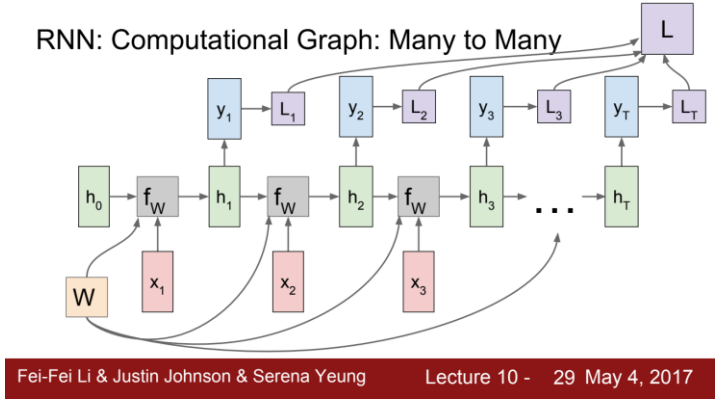
비정형 데이터



딥러닝 트리 모델의 특성



RNN

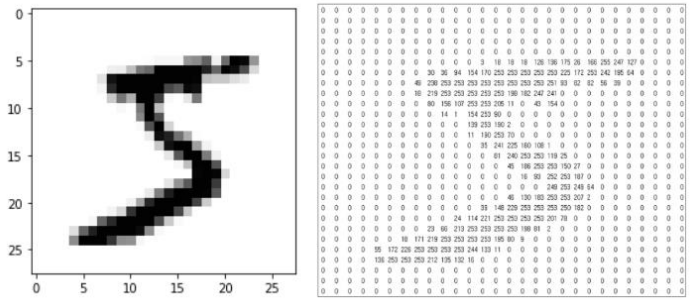


cs231 中

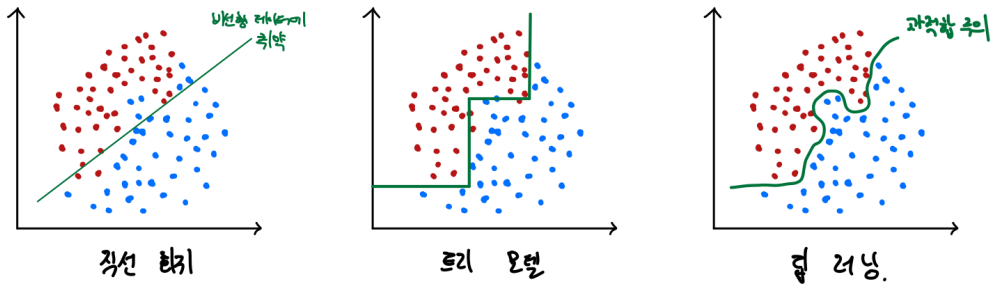
텍스트 데이터의 특징

1. 머신러닝과 딥러닝

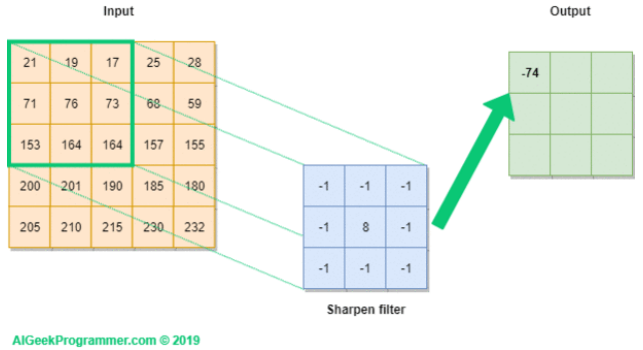
비정형
데이터



딥러닝 트리 모델의 특성



CNN



이미지 데이터의 특징

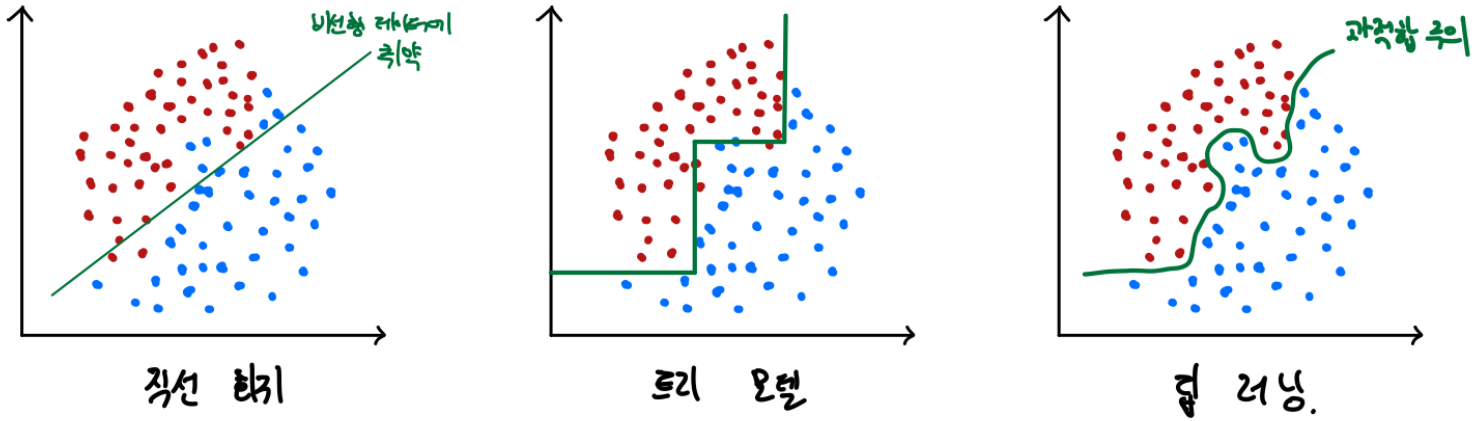
1. 머신러닝과 딥러닝

데이터의 종류

요약

정형 데이터

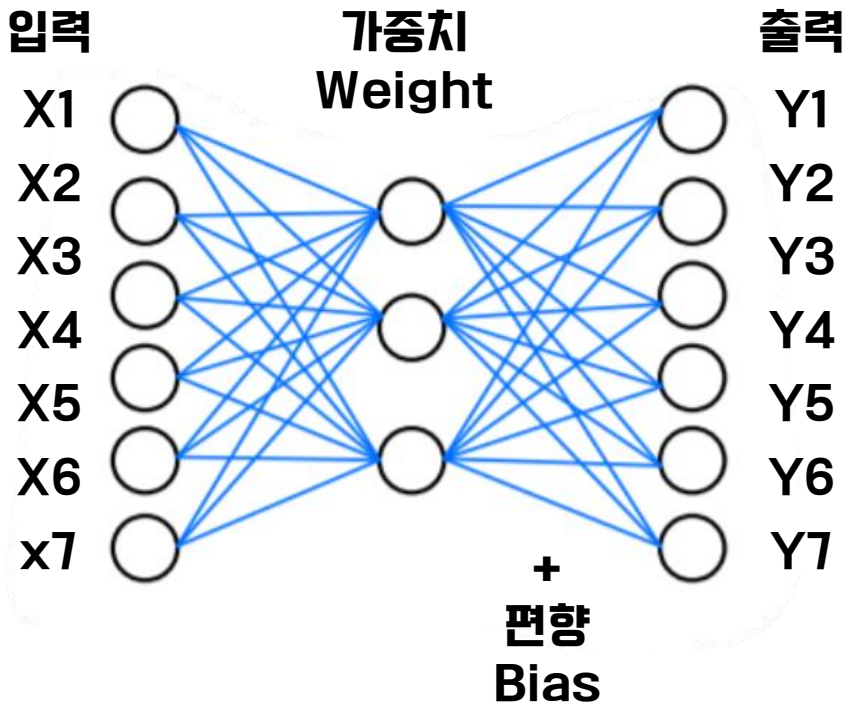
비정형 데이터



Week1) Neural Network

2. 인공신경망

2. 인공신경망



Soft max

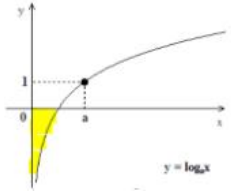
0.1
0.1
0.1
0.025
0.6
0.025
0.05

Cross entropy를 통해 loss를 구한 뒤 Back propagation

1. 이 CE 값으로 부터 label과 미분하여 error를 구함.
2. 차근차근 이전 layer로 각 가중치와 편향치에 대해 편미분 해가면서 weight를 조정해 나간다.

$$\frac{e^{z_i}}{\sum_{j=1}^{K} e^{z_j}}$$

$$cost(W) = -\sum_{j=1}^{k} y_j \, log(p_j)$$

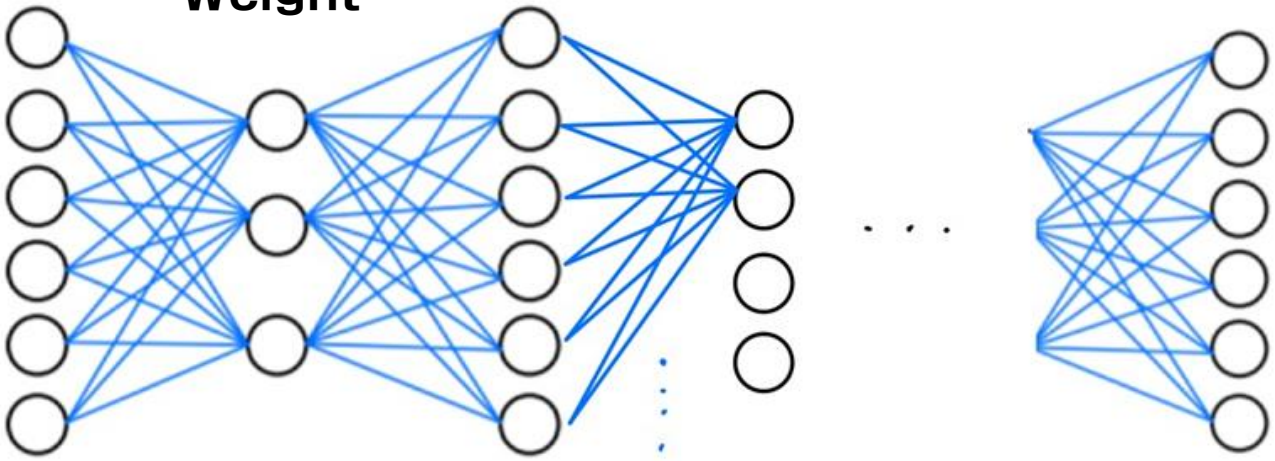


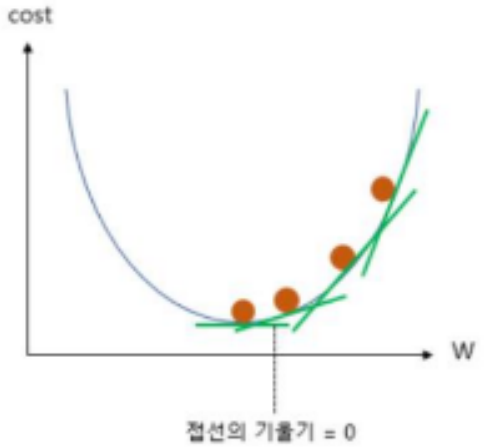
P값이 작을수록 loss는 커짐

2. 인공신경망

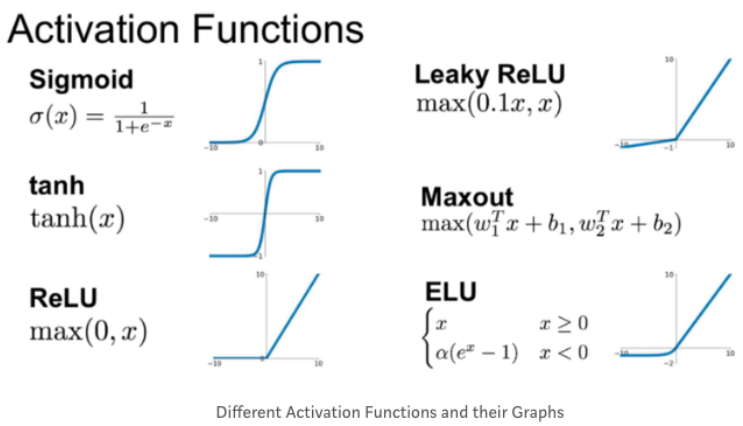
입력
X1
X2
X3
X4
X5
X6
x7

가중치
Weight





활성화 함수
Activation function

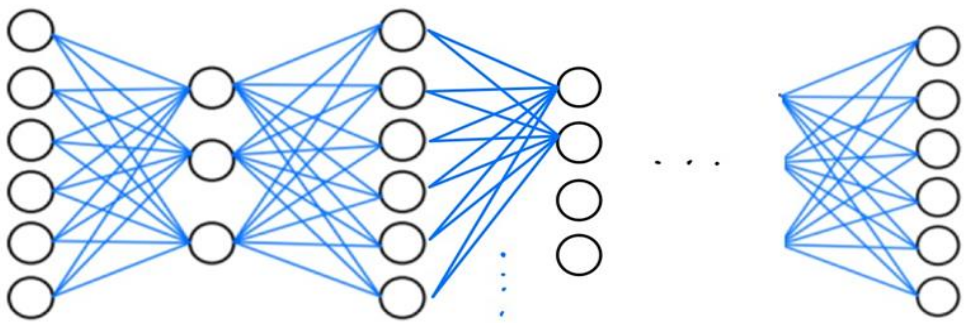


Different Activation Functions and their Graphs

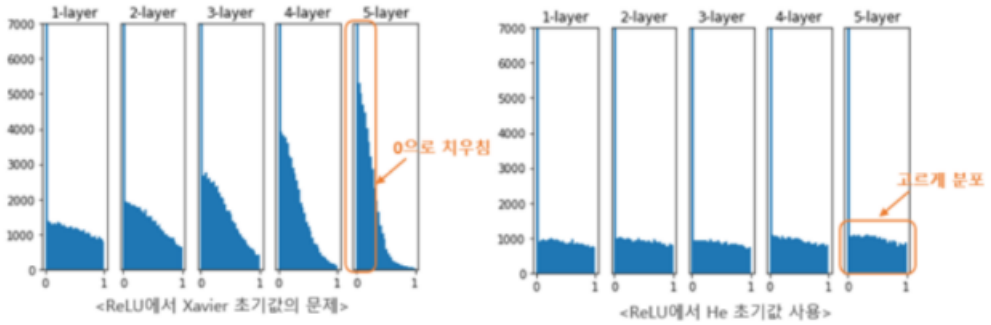
기울기 소실 문제를 방지하기 위해 활성화 함수는 중요하다.

2. 인공신경망

입력
X1
X2
X3
X4
X5
X6
x7



가중치 초기화
Weight intialization

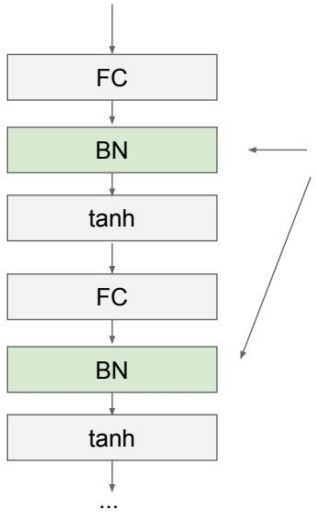


initialization w를 작게하면 collapse가 되고, 너무 크게하면 saturate되기 때문에 가중치 초기화는 중요하다.

2. 인공신경망

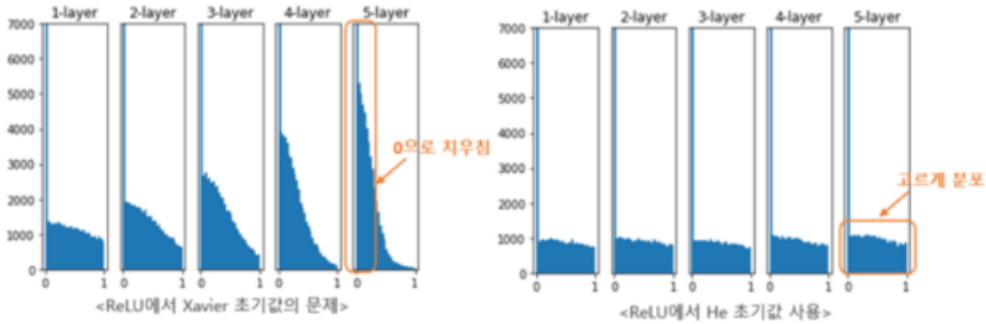
Batch Normalization

[Ioffe and Szegedy, 2015]



Usually inserted after Fully Connected or Convolutional layers, and before nonlinearity.

$$\hat{x}^{(k)} = \frac{x^{(k)} - \mathrm{E}[x^{(k)}]}{\sqrt{\mathrm{Var}[x^{(k)}]}}$$



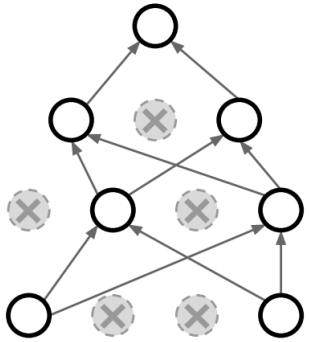
매 layer마다 입력 되는 값의 범위를 제한하여, 기울기 소실을 막는다.

2. 인공신경망

Drop out

Regularization: Dropout

How can this possibly be a good idea?

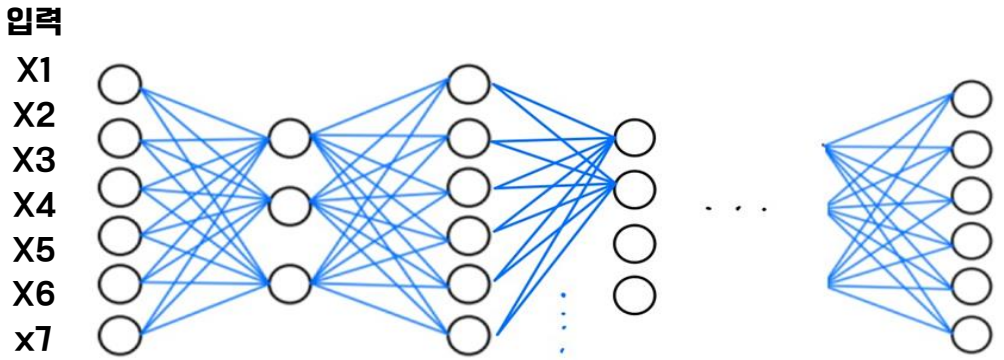


Another interpretation:

Dropout is training a large **ensemble** of models (that share parameters).

Each binary mask is one model

An FC layer with 4096 units has
$2^{4096} \sim 10^{1233}$ possible masks!
Only $\sim 10^{82}$ atoms in the universe...



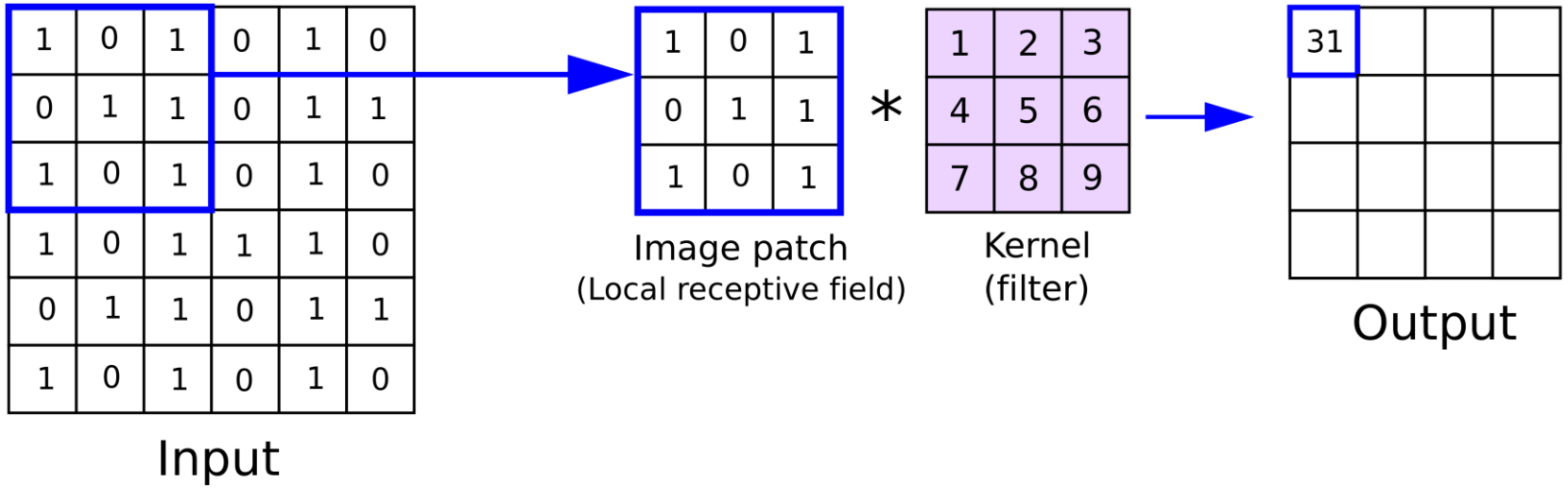
과적합을 막기위해, 일부노드를 지워
앙상블의 효과를 얻는다.

Week1) Neural Network

3. CNN

3. CNN

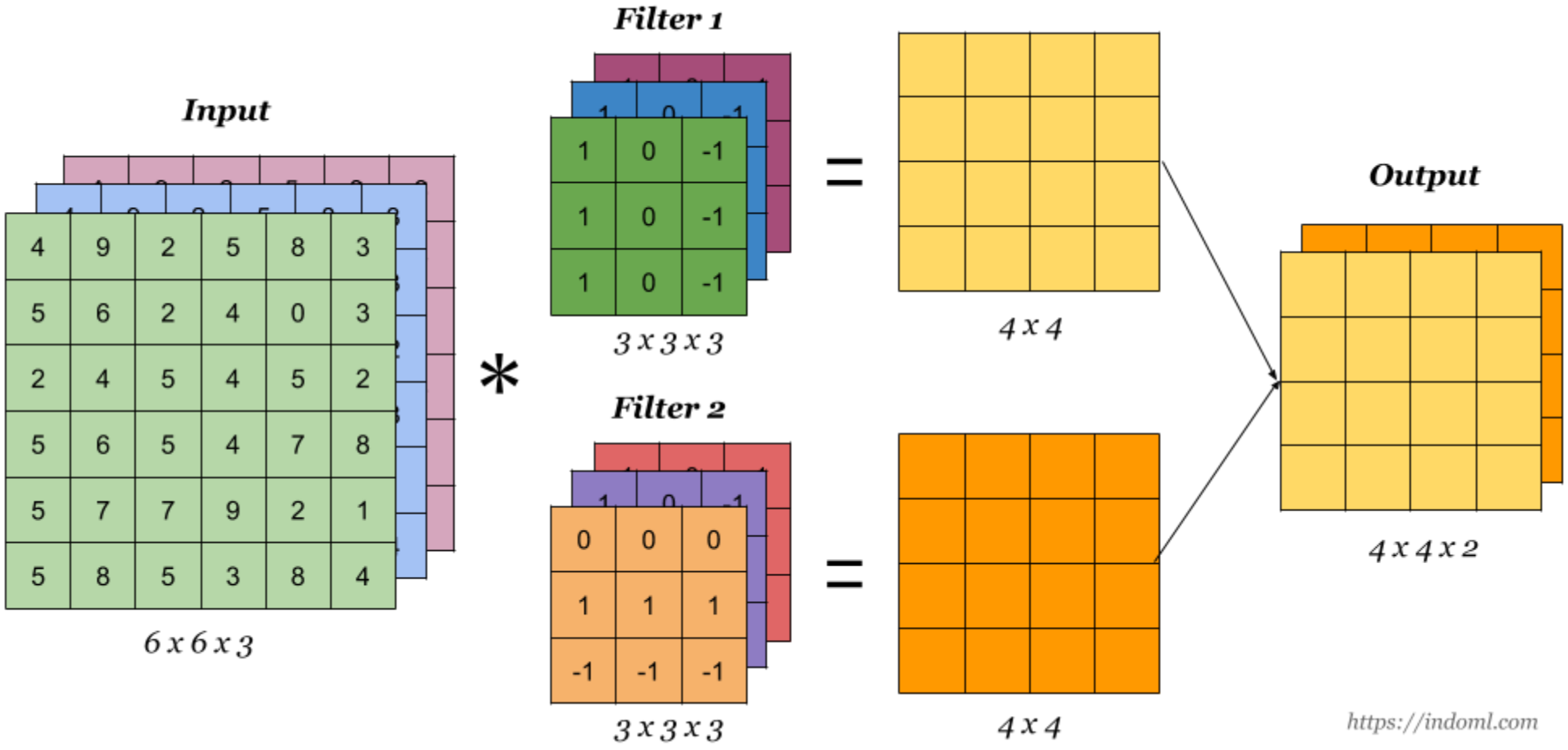
Convolutional filter



이미지 데이터의 특성을 최대한 살린 뉴럴 네트워크

3. CNN

Convolutional filter

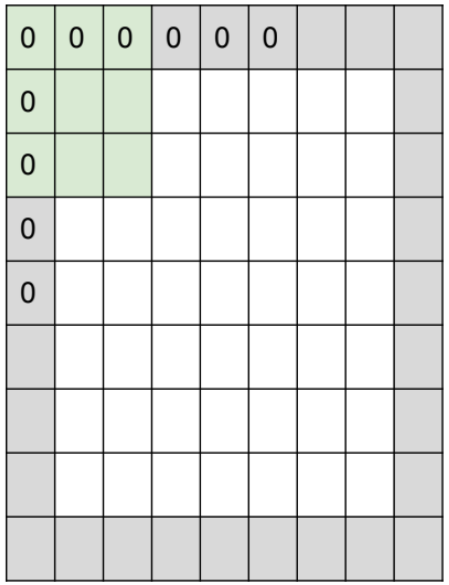



```
model.add(Layers.Conv2D(32,kernel_size=(3,3),activation='relu',padding='same',input_shape=(150,150,3), kernel_initializer='he_normal'))
model.add(Layers.BatchNormalization())
model.add(Layers.Conv2D(32,kernel_size=(3,3),padding='same',activation='relu', kernel_initializer='he_normal'))
model.add(Layers.BatchNormalization())

model.add(Layers.MaxPool2D(3,3))
```

3. CNN

In practice: Common to zero pad the border



e.g. input 7x7
3x3 filter, applied with **stride 1**
pad with 1 pixel border => what is the output?

7x7 output!
in general, common to see CONV layers with stride 1, filters of size FxF, and zero-padding with (F-1)/2. (will preserve size spatially)
e.g. F = 3 => zero pad with 1
F = 5 => zero pad with 2
F = 7 => zero pad with 3


```
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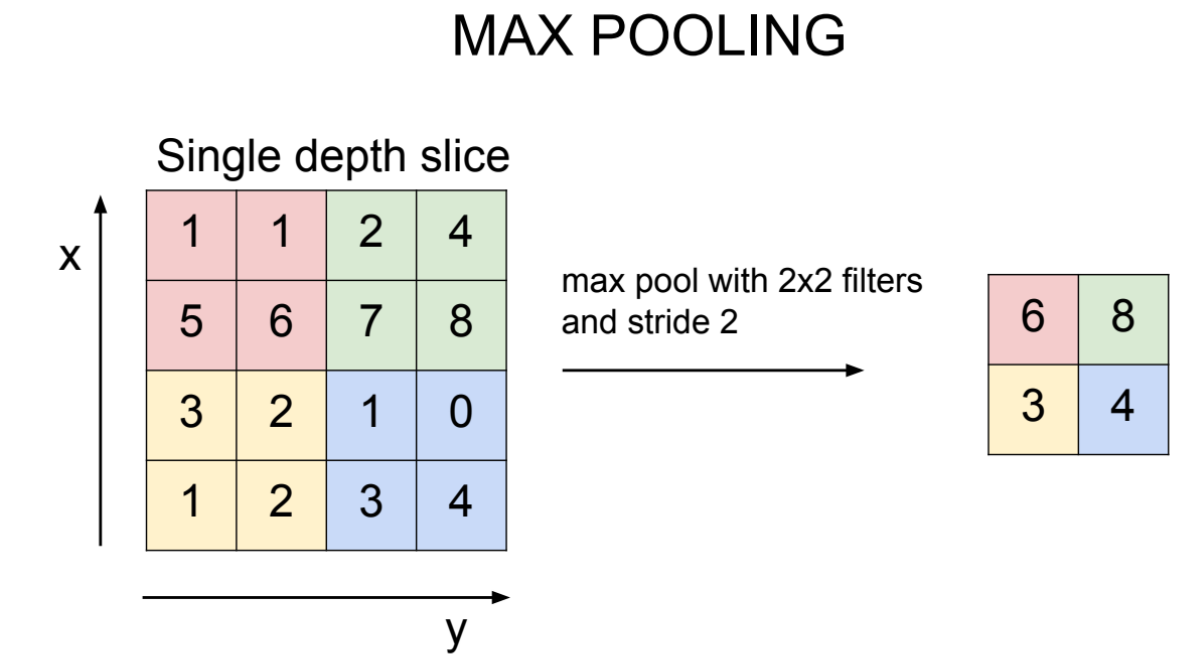
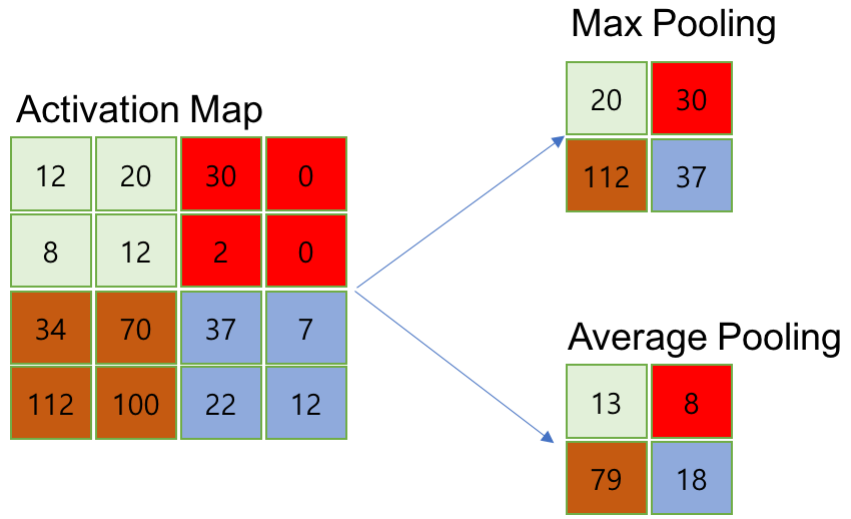
3. CNN



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```
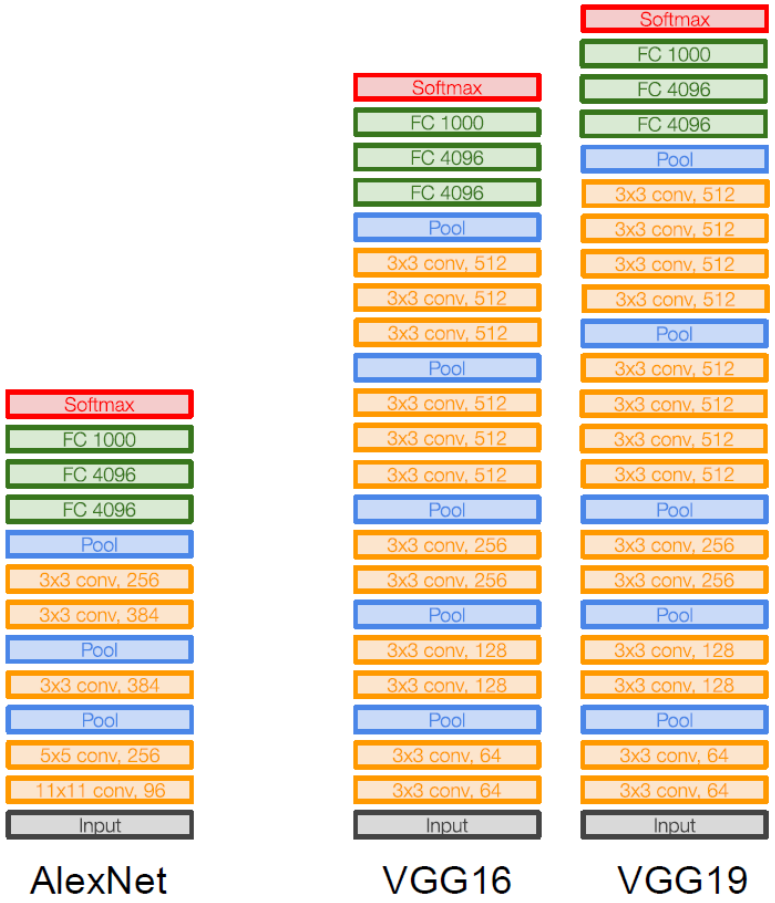
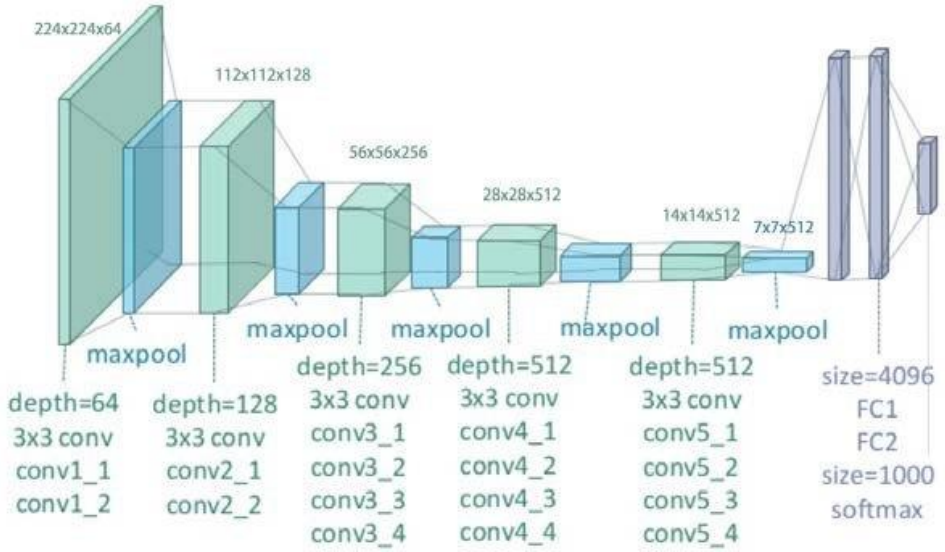

3. CNN

CNN 아키텍쳐





224 * 227 Image 입력

Week1) Neural Network

4.기울기 소실과 과적합 문제

수원대학교
Data Network Analysis

4. 기울기 소실과 과적합 문제

week1
과제 설명

캐글
이미지 분류 모델 수정하기

https://www.kaggle.com/code/uzairrj/beg-tut-intel-image-classification-93-76-accur/notebook