소셜네트워크과학과
공개 세미나

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학과 소개

소셜네트워크과학과 소개

스터디 소개

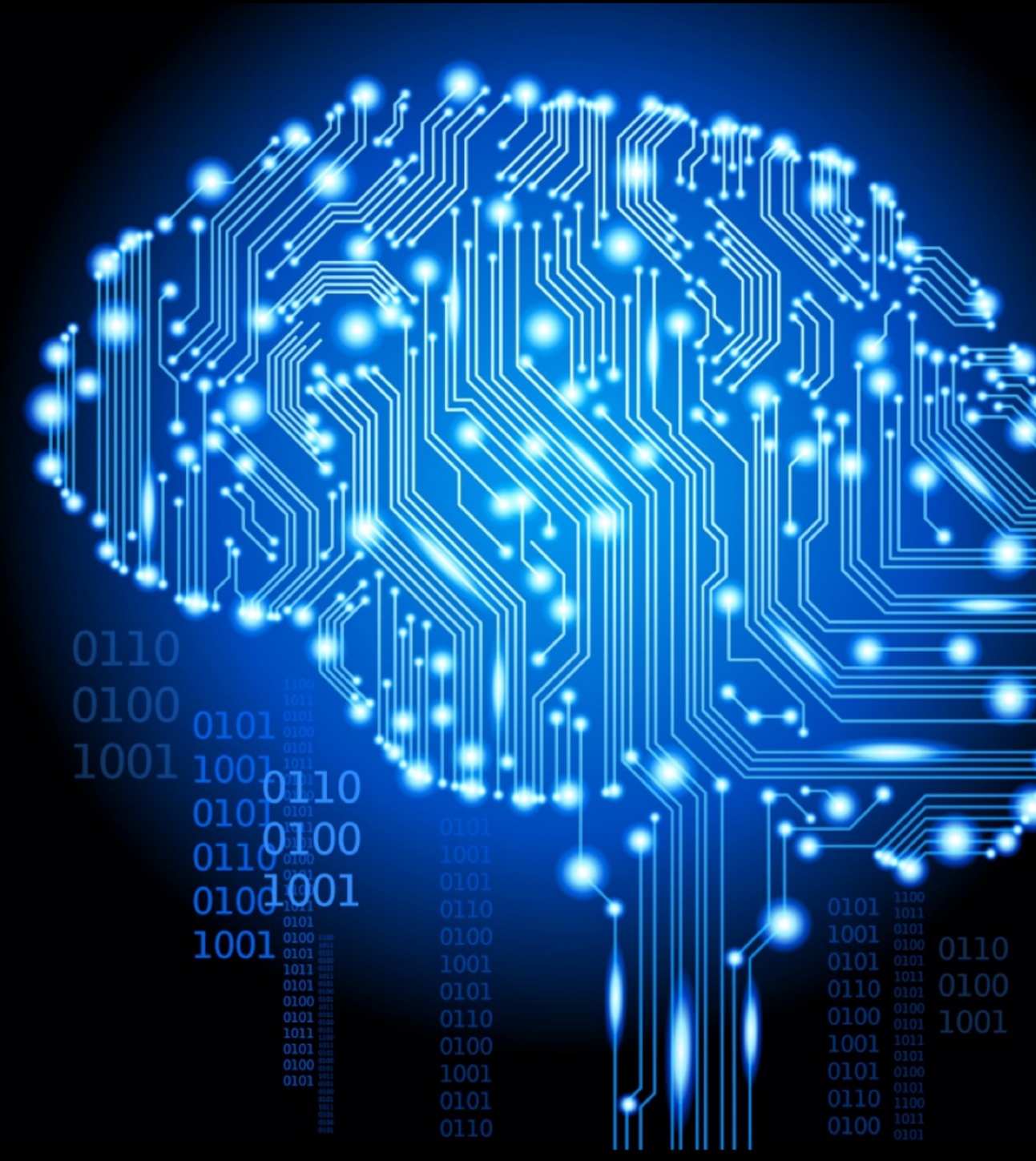
AN INTRODUCTION TO STATISTICS WITH R

— 박진홍

AN INTRODUCTION TO DEEP LEARNING

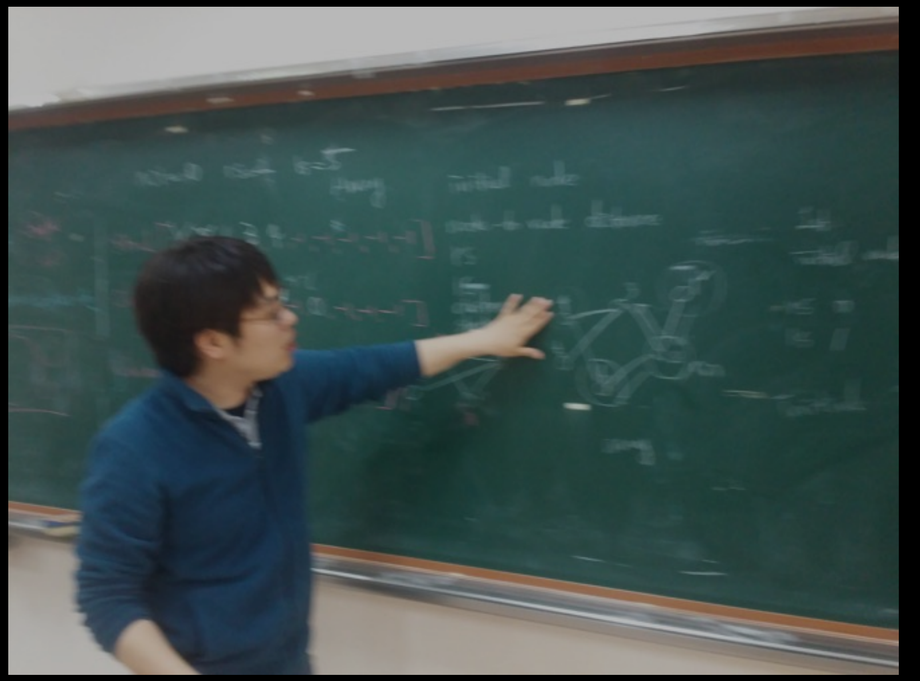
— 김진호

An Introduction to **DEEP LEARNING**



2007-2013 B. Sc. M. Sc. Kyung-Hee University (Physics)
2013-2016.9 Researcher of Research Institute for Basic Science, KHU
2015- Ph. D. Candidate Kyung-Hee University (Social network science)
2016- Researcher of Serendipity Science Lab, KHU
2016- Researcher of Data Analysis and Intelligence Team, Benple

Artificial Intelligence, Complex networks, Econophysics, Game theory



Publication Lists

- **Kim, J**., Chae, H., Yook, S.-H., & Kim, Y. (2016). Reciprocity in spatial evolutionary public goods game on double-layered network. (In press, Scientific Reports)
- **Kim, J**., Chae, H., Yook, S.-H., & Kim, Y. (2015). Spatial evolutionary public goods game on complete graph and dense complex networks. Scientific Reports, 5, 9381.
- Kim, Y., **Kim, J.,** & Yook, S.-H. (2015). Information transfer network of global market indices. Physica A: Statistical Mechanics and Its Applications, 430, 39–45.
- Yook, S. H., Chae, H., **Kim, J.,** & Kim, Y. (2016). Finding modules and hierarchy in weighted financial network using transfer entropy. Physica A: Statistical Mechanics and Its Applications, 447, 493–501.

Lecture

- Reinforcement Learning with Python, ICEC, Hands-on Lecture.

Programming Skills

- C, Python, Perl with MPI

Statistic

Machine Learning

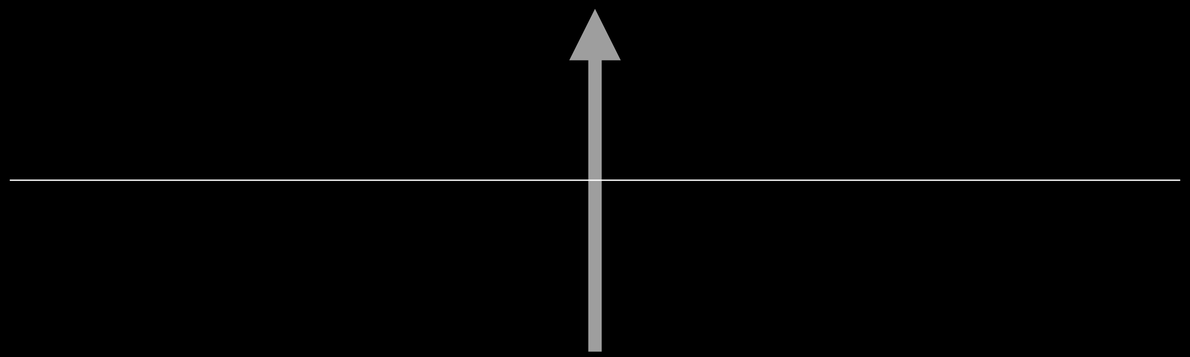
Deep Learning

Statistic | 수량적 비교를 기초로 하여,
많은 사실을 통계적으로 관찰하고 처리하는 방법

Machine Learning | 기계의 학습을 기초로 하여,
많은 데이터를 분류하고 처리하는 알고리즘

Deep Learning | 여러 비선형 변환기법의 조합을 통해
높은 수준의 추상화를 시도하는 기계학습 알고리즘의 집합

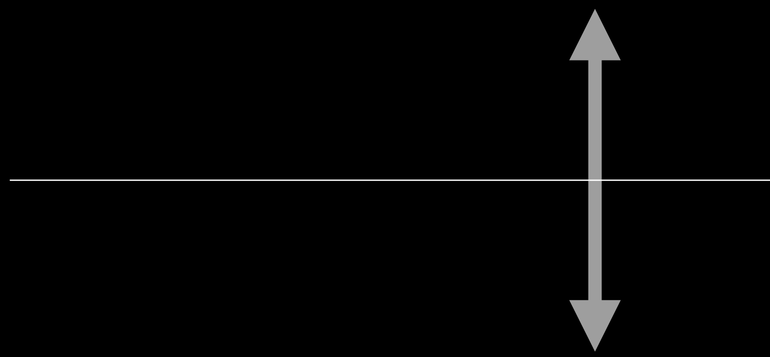
Statistics,
Machine Learning



Common Sense
Architectures

Deep Learning

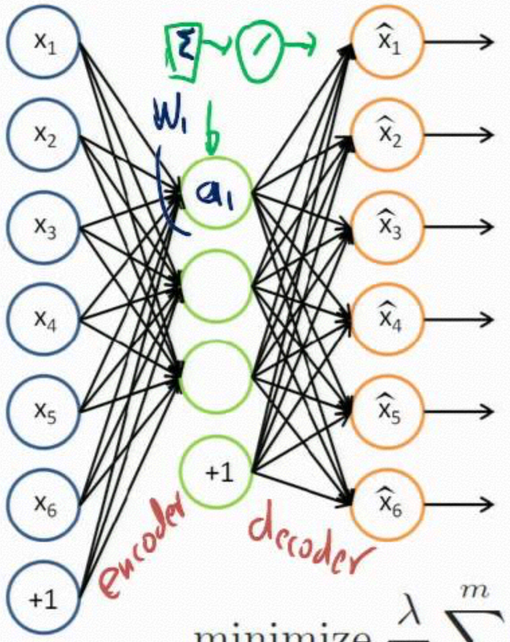
with Architectures

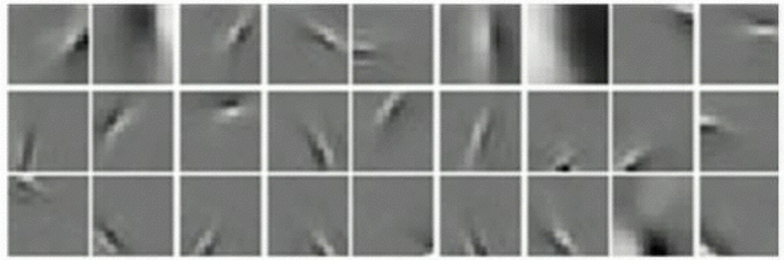


Common Sense

잠깐 영어를 배울 때를 생각해보자.

- Let’s call it a day / Let’s stop working.
- We will wrap this up now/ We will finish this now.





$$a_1 = W_1 x^{(i)} \qquad a W_1^T = \hat{x}$$

$$W_1 \in \mathbb{R}^{1\times 7} \qquad x^{(i)} \in \mathbb{R}^{7\times 1}$$

$$\underset{W}{\text{minimize}} \frac{\lambda}{m}\sum_{i=1}^{m}\|W^T\underbrace{[Wx^{(i)}]}_{a^{(i)}} - x^{(i)}\|_2^2 + \sum_{i=1}^{m}\sum_{j=1}^{k} g(W_j x^{(i)})$$

$$\underset{W,b,c}{\text{minimize}} \frac{\lambda}{m}\sum_{i=1}^{m}\|\underbrace{\sigma(W^T\sigma(Wx^{(i)}+b)+c)}_{\hat{x}^{(i)}} - x^{(i)}\|_2^2 + \sum_{i=1}^{m}\sum_{j=1}^{k} g(W_j x^{(i)})$$

regularizer

e.g., smooth L_1 penalty: $g(.) := \log(\cosh(.))$

Computer Science

CPSC 540
Nando De Freitas

Mar 12 2013
13:21

?

An Introduction to Deep Learning

대상	• **딥러닝** 개념을 입문하고 싶은 학생 • **프로그래밍을 통해 딥러닝**을 구현하고 싶은 학생 • 뉴스에서 봤던 딥러닝, 저게 뭔가 싶었던 학생
준비물	개인 노트북
난이도	★★★★★+★?
특징	• 딥러닝의 개념부터 실제 코드작성까지 • 딥러닝 기술을 쉽게 풀어서 떠먹여 드립니다. • 많은 딥러닝 이슈에 대한 기술적인 해석 • 다른 프로그램을 쓰지않고, 백지에서부터 직접 만드는 딥러닝

1. **시작** 딥러닝, 과연 새로운 개념인가?
   풀리지 않았던 XOR
2. **Deep Neural Network** Deep Neural Network, 이게뭐람..
   DNN 이론부터 코드까지
3. **DNN 구현** DNN 코드만들기 : KERAS로 하는 실습
4. **DNN with Python** DNN 한번 만들어보자, 처음부터!
5. **CNN, RNN** 그림을 인식하는 DNN의 끔찍한 혼종 = CNN
   시간을 인식하는 DNN의 끔찍한 혼종 = RNN
6. **Reinforcement Learning** 미로부터 게임까지,
   강화학습의 기초
7. **RL 구현** Python을 통한 미로 찾는 Reinforcement Learning 구현하기
8. **Long Short Term Memory** 시간을 품은 딥러닝 기법,
   딥러닝은 과거를 어떻게 기억하는가?
9. **LSTM 구현** 300줄로 구현하는 LSTM with Python
10. **Deep Learning, 발전하는 기법** 주목받는 딥러닝 기술

AN INTRODUCTION TO MACHINE LEARNING WITH R

— 한재윤

An Introduction to Machine Learning

WELCOME TO

AN INTRODUCTION TO MACHINE LEARNING WITH R

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B.S. Mathematics, Kyung Hee University, 2010 - Feb 2016

Master's Course, Dept. of SNS, Kyung Hee University, Mar 2016 - Present

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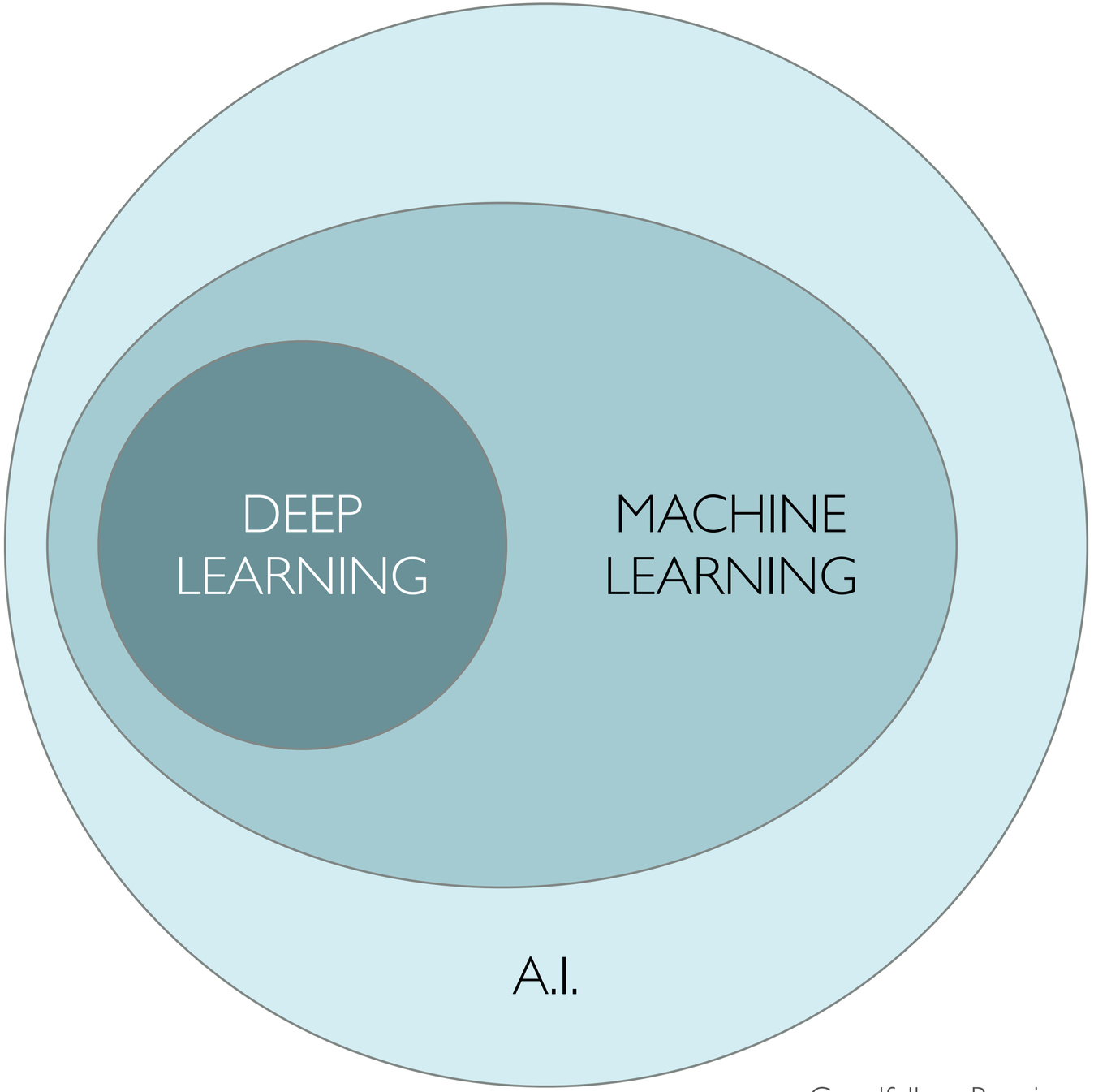
Data Fanatic

Kaggler
Top 6% @ Kobe Shot Selection Competition
Top 17% @ Titanic: Machine Learning from Disaster Competition
Top 30% @ House Price Prediction Competition

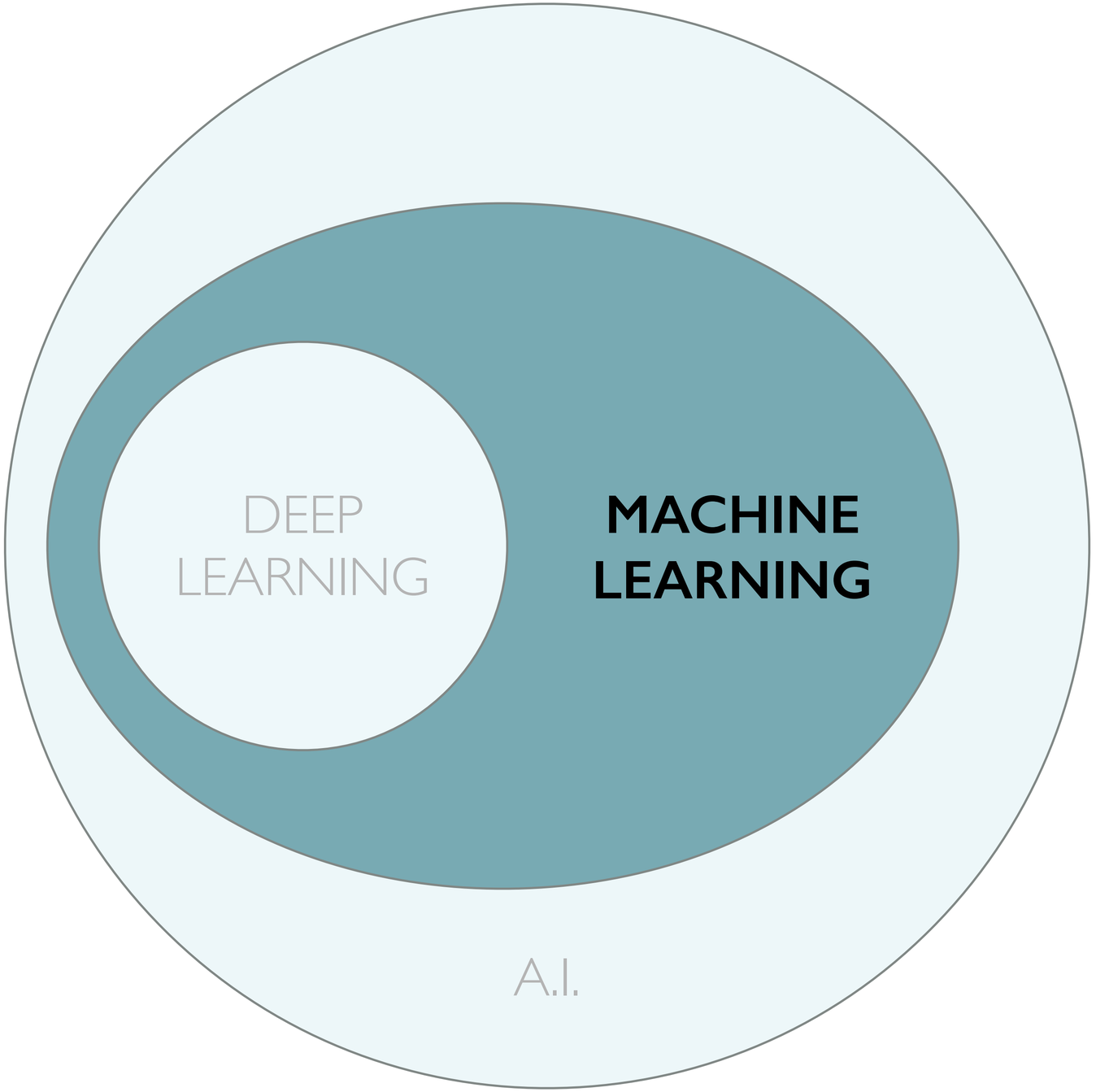
Research Interests
: Statistical Learning, Machine Learning, Deep Learning, Data Visualization

What is Machine Learning

C A N Y O U E X P L A I N ?



Goodfellow, Bengio, and Courville, Deep Learning, 2016, p.9


DEEP
LEARNING
MACHINE
LEARNING
A.I.

MACHINE LEARNING

1 Defining Questions

A scientific field is best defined by the central question it studies. The field of Machine Learning seeks to answer the question

> "How can we build computer systems that automatically improve with experience, and what are the fundamental laws that govern all learning processes?"

This question covers a broad range of learning tasks, such as how to design autonomous mobile robots that learn to navigate from their own experience, how to data mine historical medical records to learn which future patients will respond best to which treatments, and how to build search engines that automatically customize to their user's interests. To be more precise, we say that a machine *learns* with respect to a particular task T, performance metric P, and type of experience E, if the system reliably improves its performance P at task T, following experience E. Depending on how we specify T, P, and E, the learning task might also be called by names such as data mining, autonomous discovery, database updating, programming by example, etc.

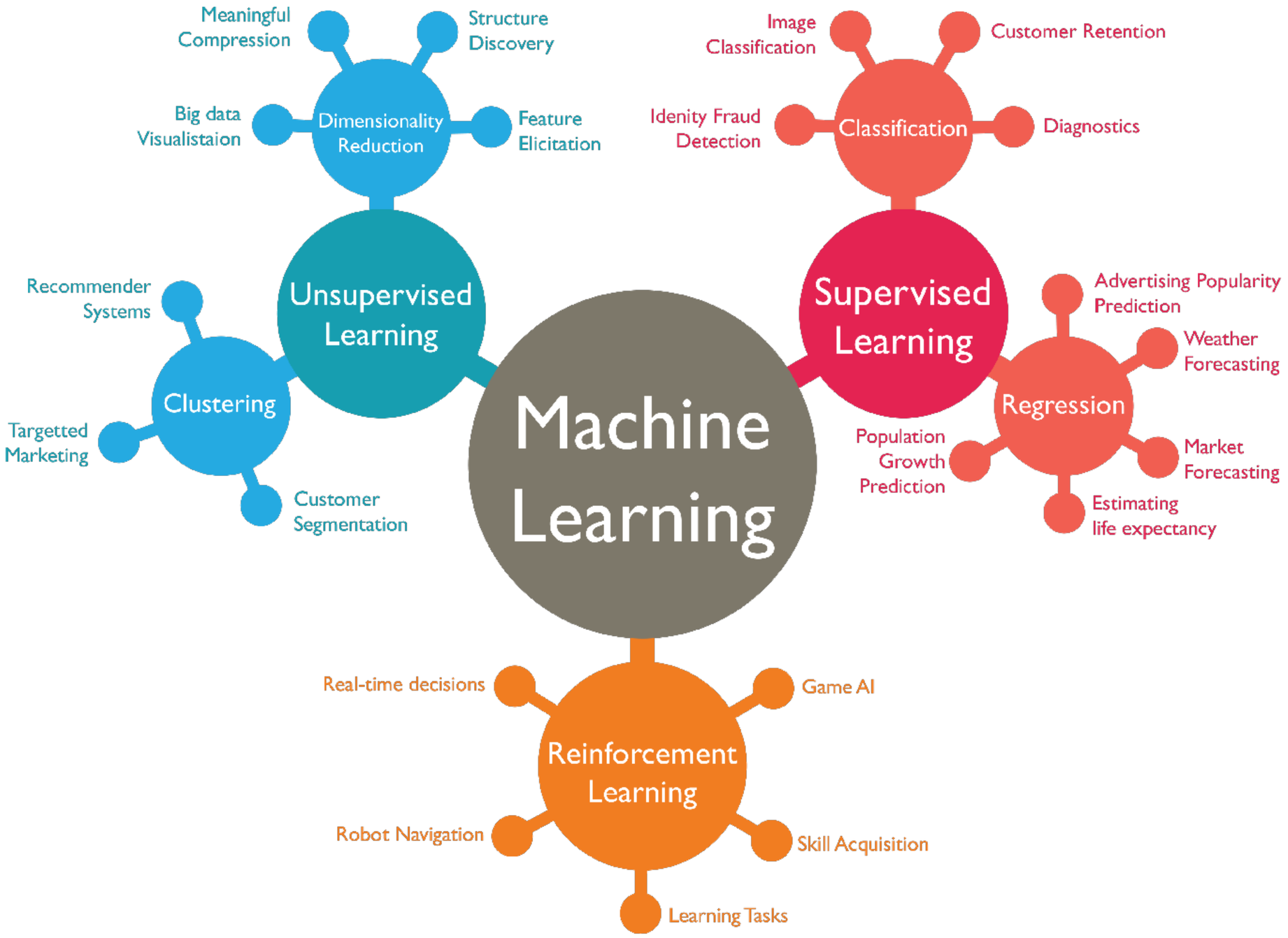
Machine Learning is a natural outgrowth of the intersection of Computer Science and Statistics. We might say the defining question of Computer Science is "How can we build machines that solve problems, and which problems are inherently tractable/intractable?"

Tom Mitchell, The Discipline of Machine Learning, 2006

요약하자면 **머신러닝**이란,

특정 **과제**와 그 과제에 대한 **점수**의 관점에서
경험을 통해 점수를 **향상시키며** 프로그램을 **학습**시키는 것

WITH
COMPUTER SCIENCE AND ***STATISTICS***


Machine Learning
Unsupervised Learning
Supervised Learning
Reinforcement Learning
Dimensionality Reduction
Clustering
Classification
Regression
Meaningful Compression
Structure Discovery
Big data Visualistaion
Feature Elicitation
Recommender Systems
Targetted Marketing
Customer Segmentation
Image Classification
Customer Retention
Idenity Fraud Detection
Diagnostics
Advertising Popularity Prediction
Weather Forecasting
Population Growth Prediction
Market Forecasting
Estimating life expectancy
Real-time decisions
Game AI
Robot Navigation
Skill Acquisition
Learning Tasks

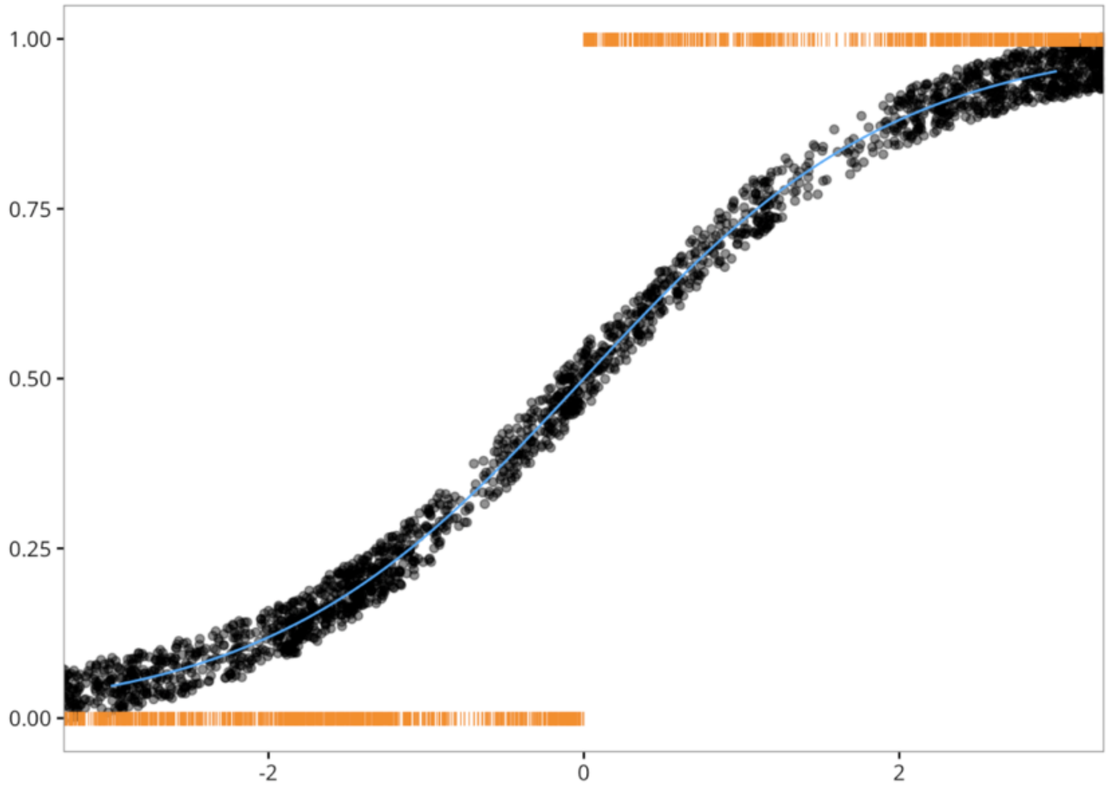
An Introduction to Machine Learning with R

대상	• 평소 **기계학습**에 관심이 있는 학생 • **R**을 배우고 다음 과정이 필요한 학생 • **데이터 분석**에 관심이 있는 학생
준비물	개인 노트북
난이도	★★★☆☆
특징	• 기계학습 알고리즘의 **수학적 이해**를 돕고 학습한 알고리즘을 **R**로 구현 • 데이터 분석을 위한 데이터 **전처리 및 시각화** 과정을 함께 학습 • 학습한 알고리즘을 활용하여 **데이터 분석 컴피티션**에 참여

1. **R 입문** 기본 문법 및 데이터 구조 프로그래밍 제어문
2. **데이터 전처리** 데이터를 원하는 형태로 주무르기 결측값 다루기
3. **데이터 시각화 / 기계학습이란?** 데이터를 한 눈에 살펴 보기 기계학습이란?
4. **선형회귀법** 주어진 데이터로 수치형 데이터를 예측해보자
5. **로지스틱 회귀분석** 어떤 사건이 일어날 확률을 예측해보자
6. **고급 회귀분석** 선형회귀법 뛰어넘기
7. **k-최근접 이웃 분류 / 클러스터링** 나와 비슷한 특성을 가진건 누구?
8. **의사결정나무 / 앙상블 기법** 규칙을 통해 의사결정을 내려보자
9. **서포트 벡터 머신** 복잡한 데이터도 한 번에 처리해보자
10. **프로젝트 (데이터 분석 컴피티션)** 배운 알고리즘을 실제로 활용해보자

이 강의를 들으면 정말 **실력**이 **좋아지나요?**

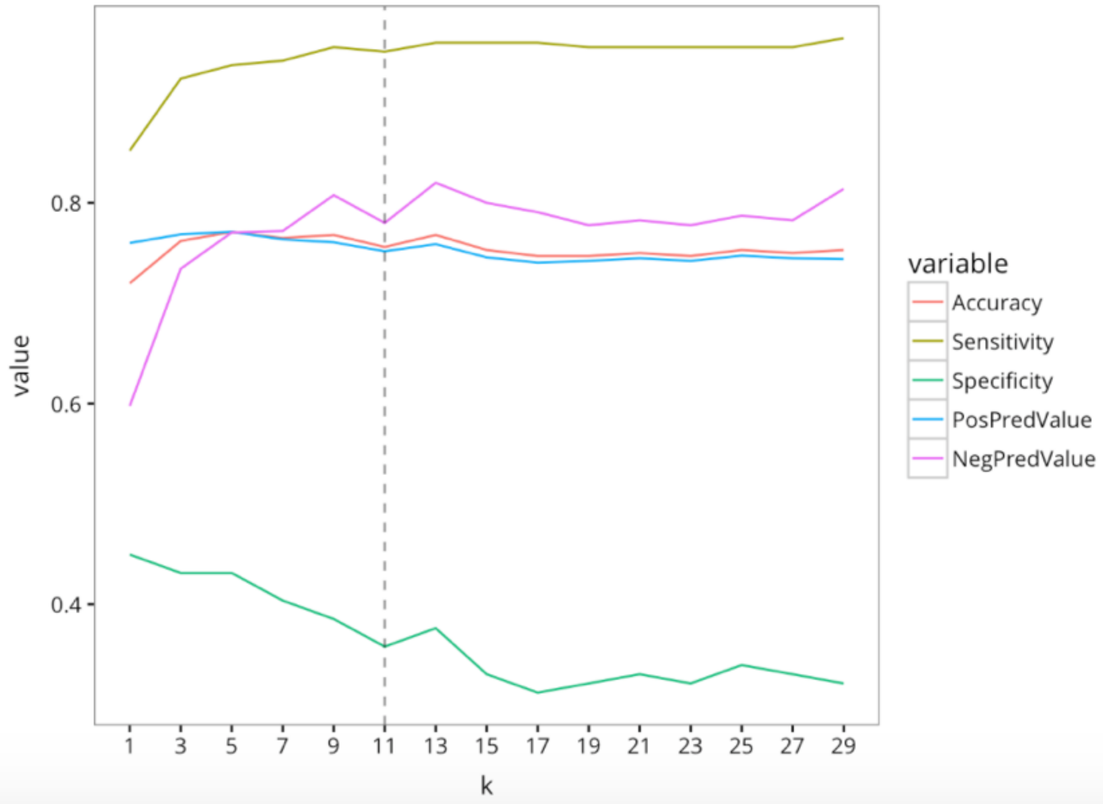
저 번 코 스 에 서 학 생 들 의 결 과 물 을 볼 까 요 ?




```
############바닐라 값###################

cleanedtrain <- train[-c(3831,3832,3833,3834,6921,7214,1146,1147,1126,1150,1454),]
############아웃라이어 제거############
new_logit_Occ <- glm(Occupancy ~ Light , data = cleanedtrain, family = "binomial")
########## Light칼럼 빼고 다 제거#######
x <- predict(new_logit_Occ, test)
new_predict_Occ <- predict(new_logit_Occ, test, type = "response")
new_binary_Occ <- ifelse(new_predict_Occ > 0.5, 1, 0)

accuracy(testOccupancy, new_binary_Occ)
```

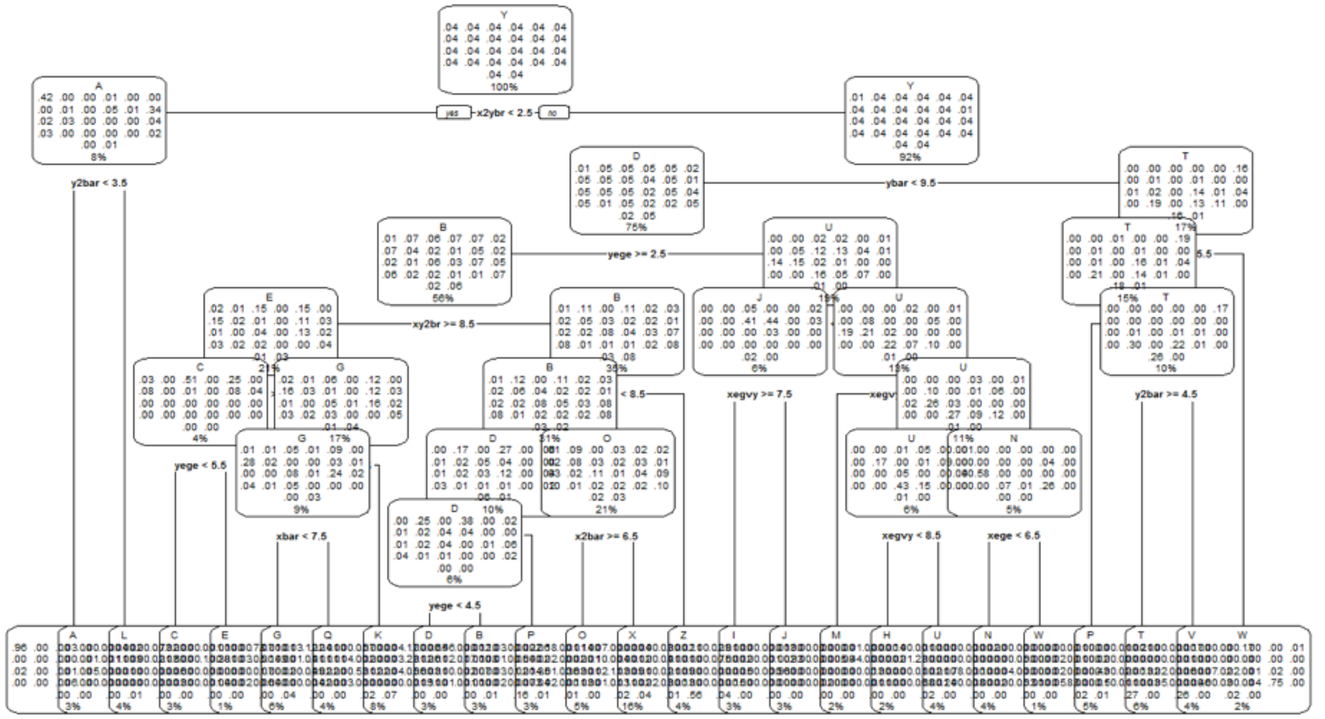
```
## [1] 0.9931296
```

```r
Result <- data.frame(k = NULL, Accuracy = NULL, Sensitivity = NULL, Specificity = NULL, PosPredValue = NULL, NegPr
edValue = NULL)
sequence <- seq(1, 30, by = 2)
for(i in sequence){
    pred <- knn(train = Pima_n_train, test = Pima_n_test, cl = train_labels, k = i)
    confMat <- confusionMatrix(pred, test_labels)
    currentResult <- data.frame(k = i, Accuracy = confMat$overall[1], Sensitivity = confMat$byClass[1],
                                Specificity = confMat$byClass[2], PosPredValue = confMat$byClass[3], NegPredValue
= confMat$byClass[4])
    Result <- bind_rows(Result, currentResult)
}

library(reshape2)
moltenResult <- melt(Result, id.vars = "k")

ggplot(data = moltenResult, aes(x = k, y = value, color = variable)) +
    geom_line() +
    scale_x_continuous(breaks = sequence) +
    geom_vline(mapping = aes(xintercept = 11), linetype = "dashed", alpha = .5)
```

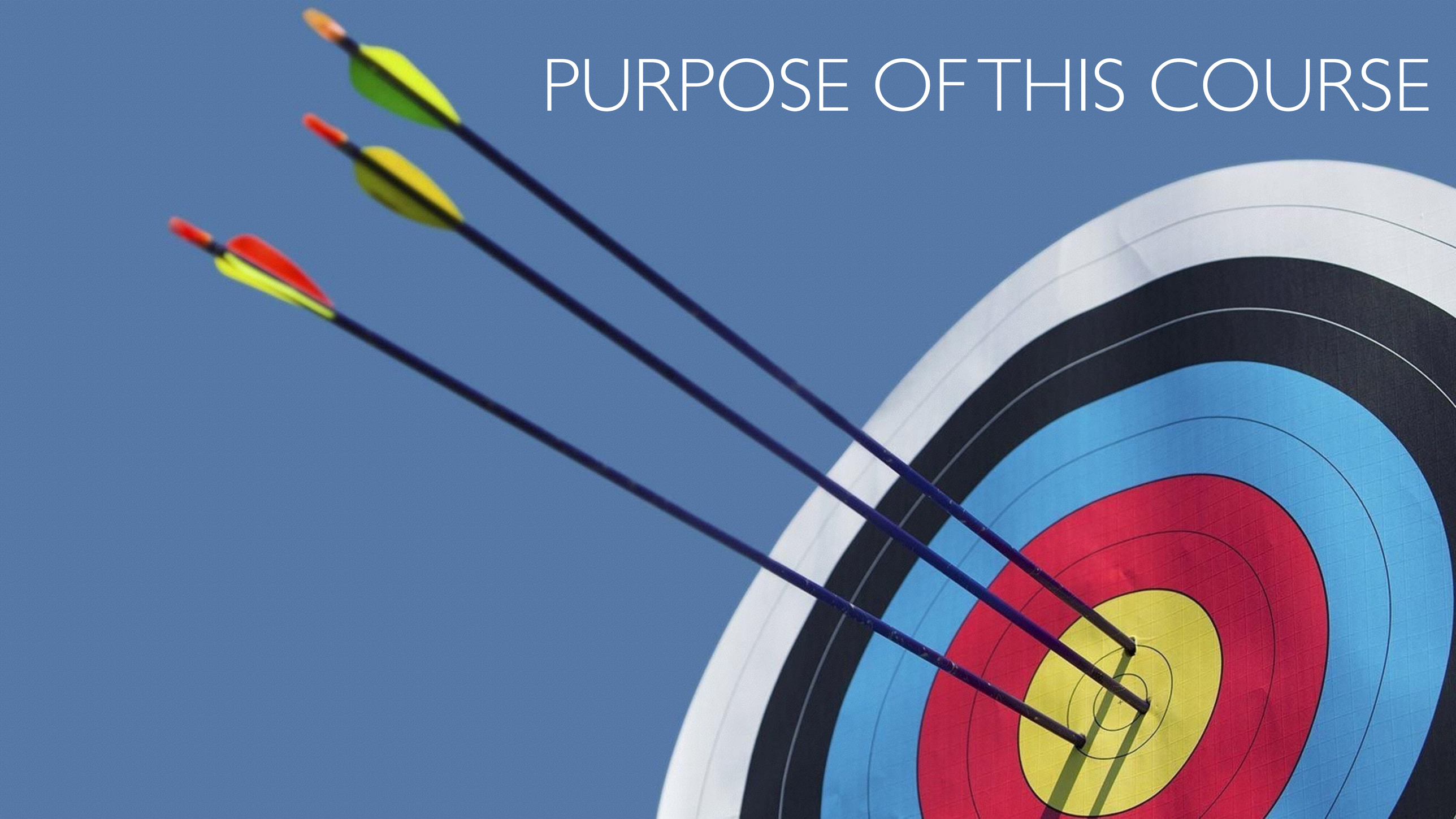


CART Algorithm

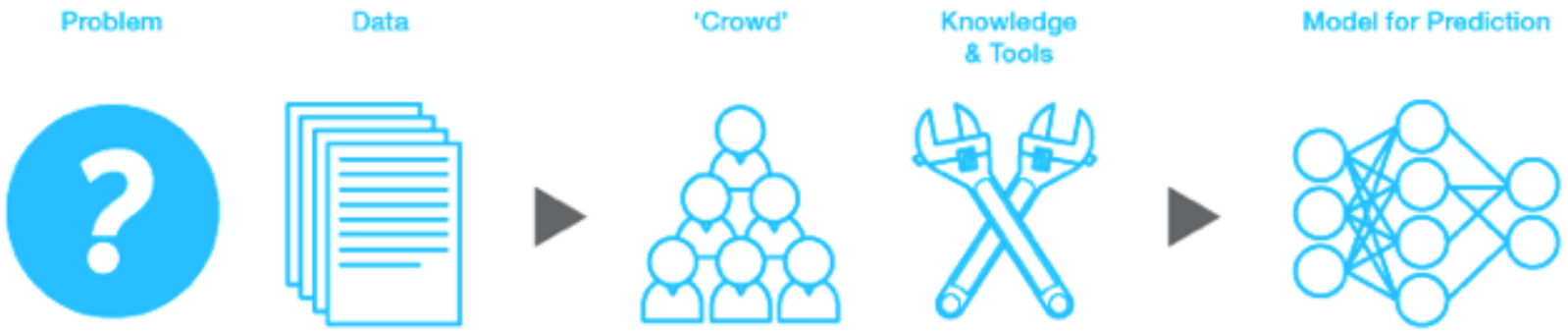
```
library(caret)
library(rpart)
library(rpart.plot)

letterTree <- rpart(letter ~ ., data = letterTrain, method = "class")

# visualization
rpart.plot(letterTree, tweak = 2)
```



PURPOSE OF THIS COURSE



kaggle™



Active Competitions

Bosch Production Line Performance
Reduce manufacturing failures

31 days
979 teams
1026 kernels
$30,000

Outbrain Click Prediction
Can you predict which recommended content each user will click?

3 months
122 teams
287 kernels
$25,000

Allstate Claims Severity
How severe is an insurance claim?

2 months
212 teams
140 kernels
Jobs

Melbourne University AES/MathWorks/NIH Seiz...
Predict seizures in long-term human intracranial EEG recordings

41 days
538 teams
455 kernels
$20,000

Painter by Numbers
Does every painter leave a fingerprint?

20 days
35 teams
112 kernels

Jae-YoonHan
View

Is your company hiring?
Are you on the job market?
Visit our jobs board >>

Recent Jobs

Predictive Science - Data Scientist - Creating Algorithms That Are Changing The World (Remote)

HelloFresh - (Senior) Data Scientist (Berlin)

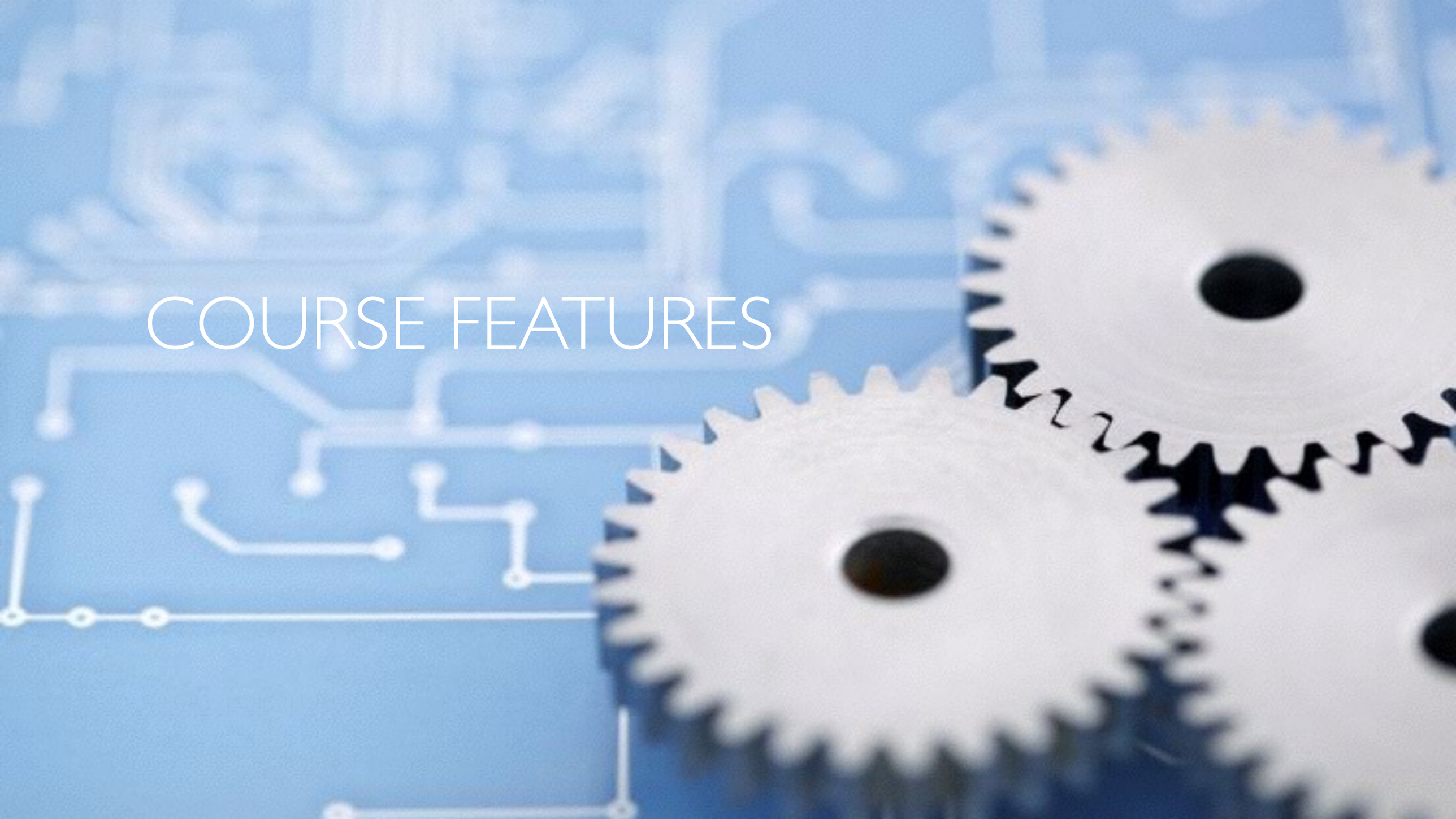
MaxPoint - Senior Data Scientist, Machine Learning (Austin, TX and Morrisville, NC)

Microsoft - Principal Data Scientist (Bellevue, WA)

trivago - Hadoop / Big Data Specialist - Hive / Oozie / Impala (Düsseldorf, Germany)

ACI Worldwide - Data Scientist

COURSE FEATURES

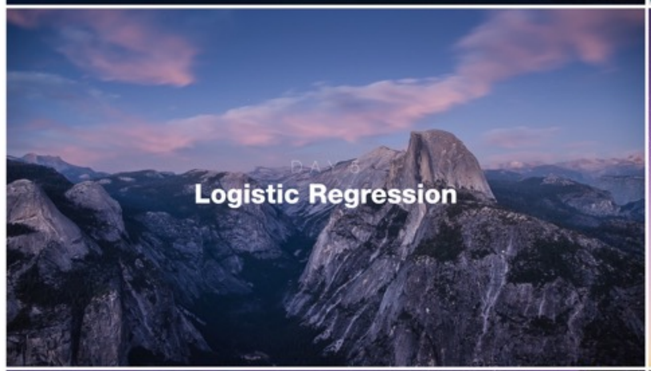


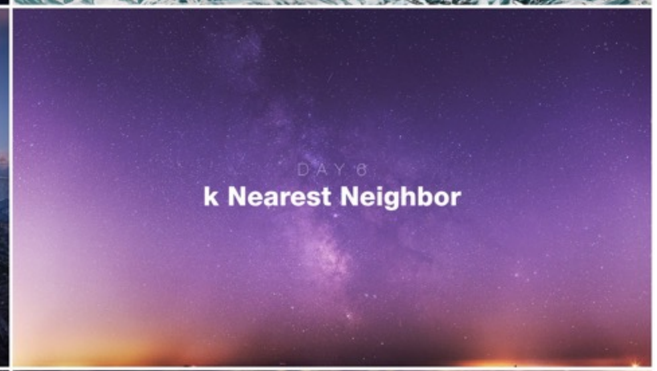

DAY 1
Hello, R!

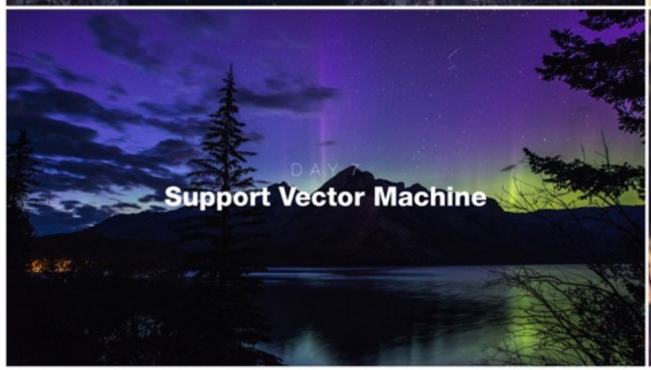
Data Handling

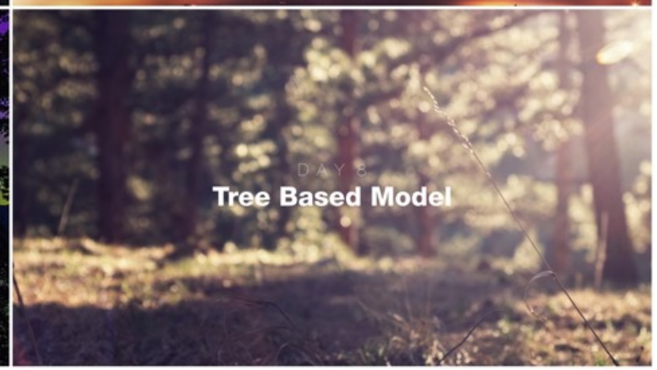

DAY 3
Data Visualization


DAY 4
Linear Regression


Logistic Regression

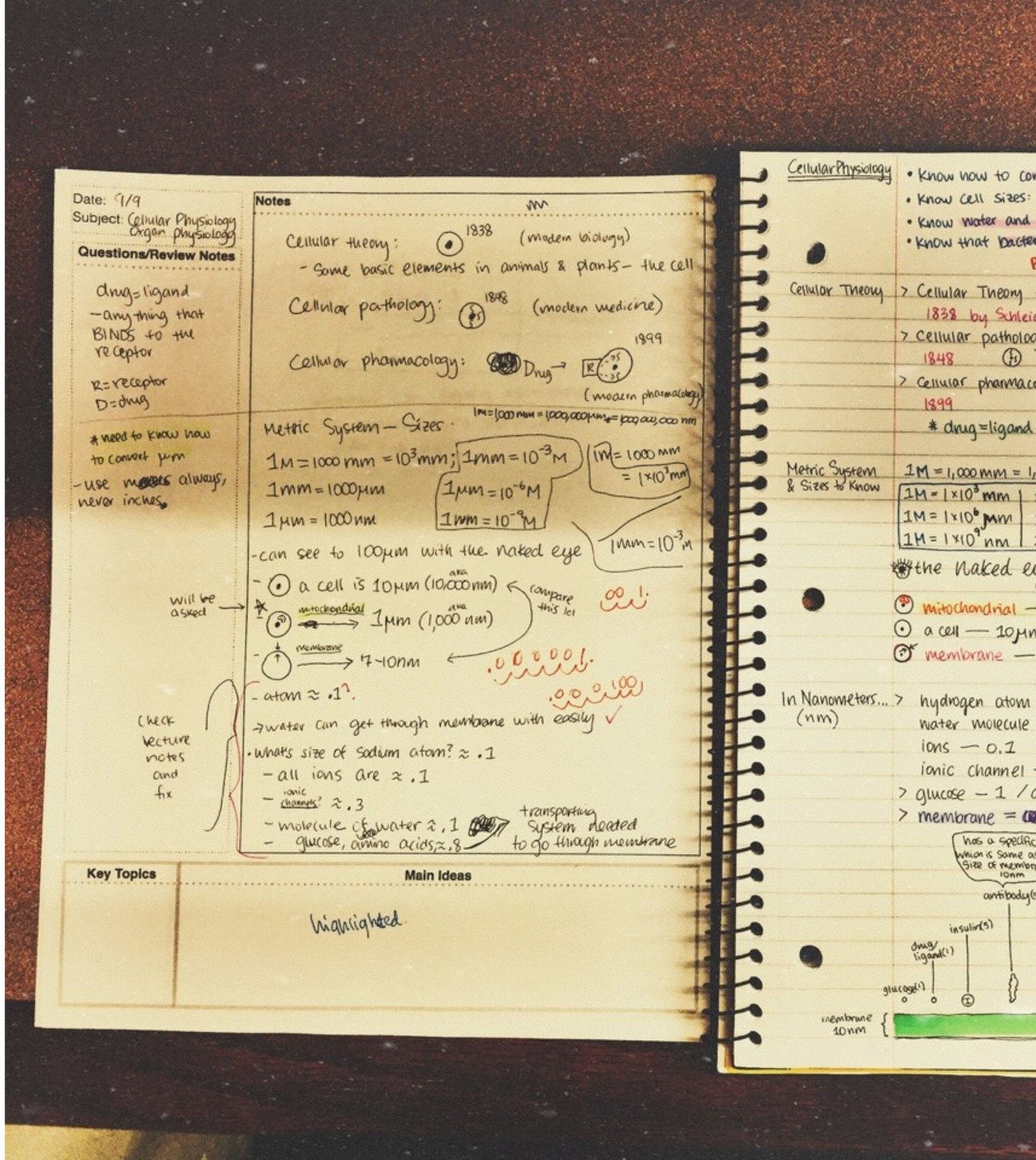

DAY 6
k Nearest Neighbor

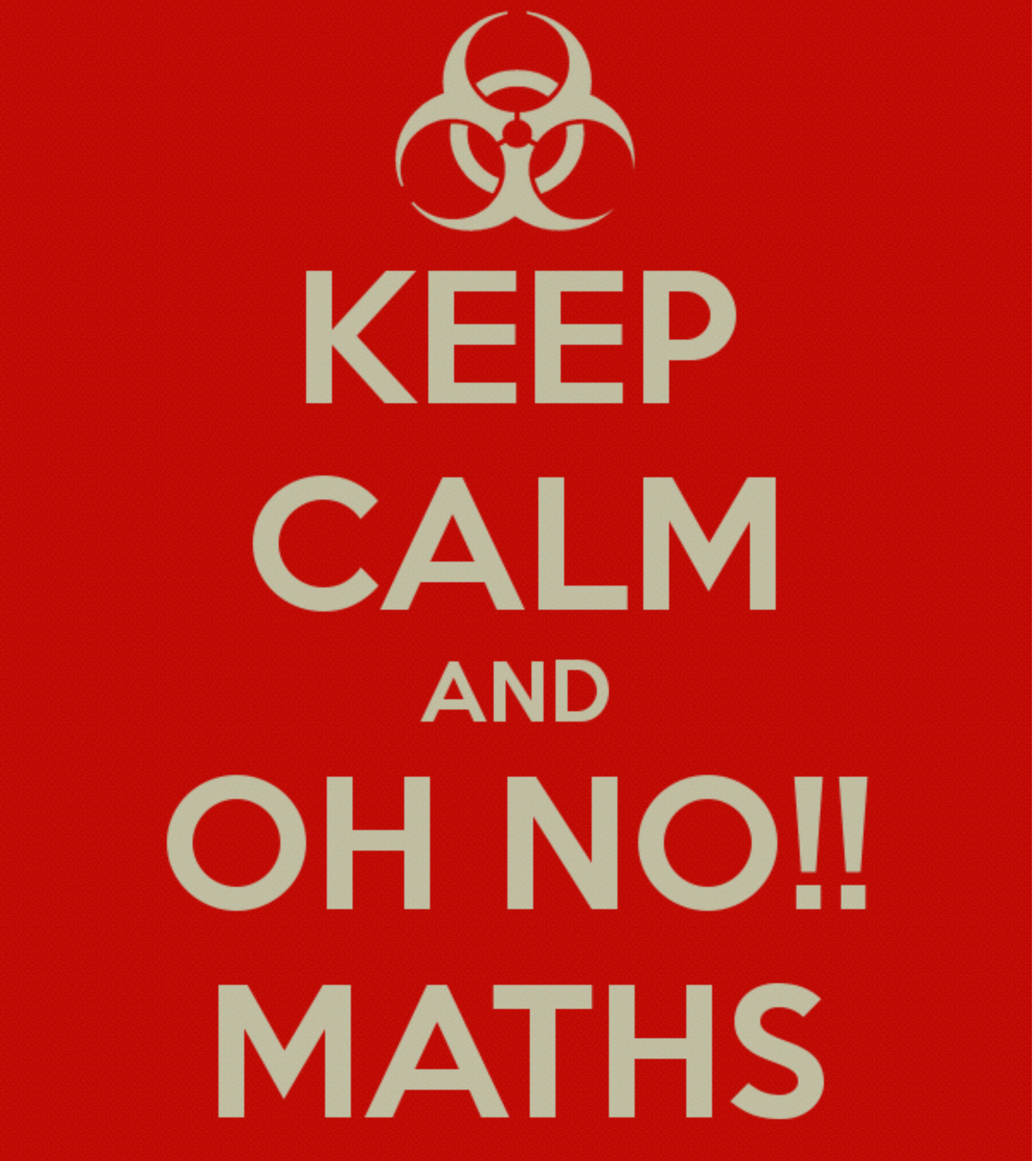

Support Vector Machine


DAY 8
Tree Based Model

KEYNOTES

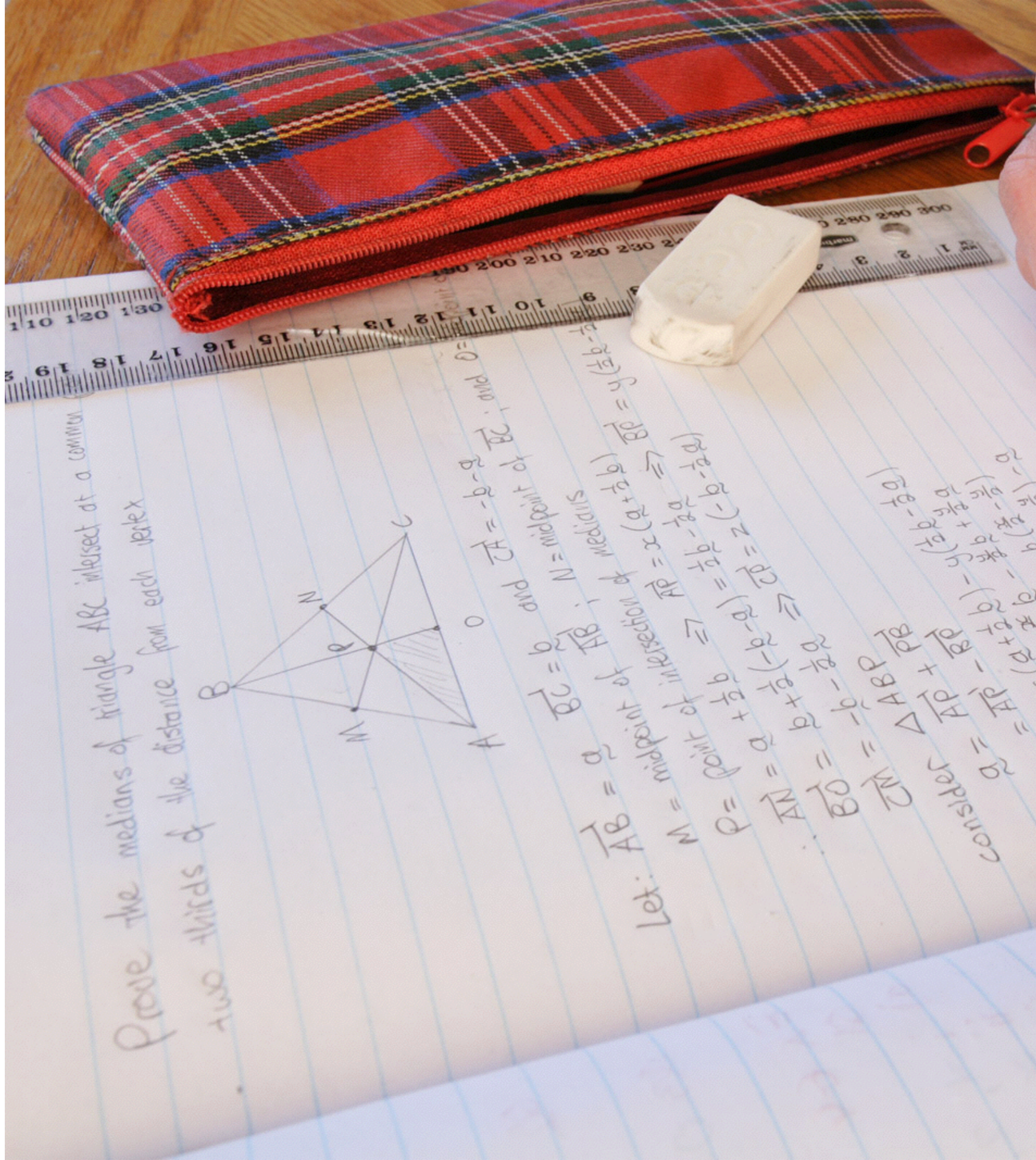
LECTURE NOTE

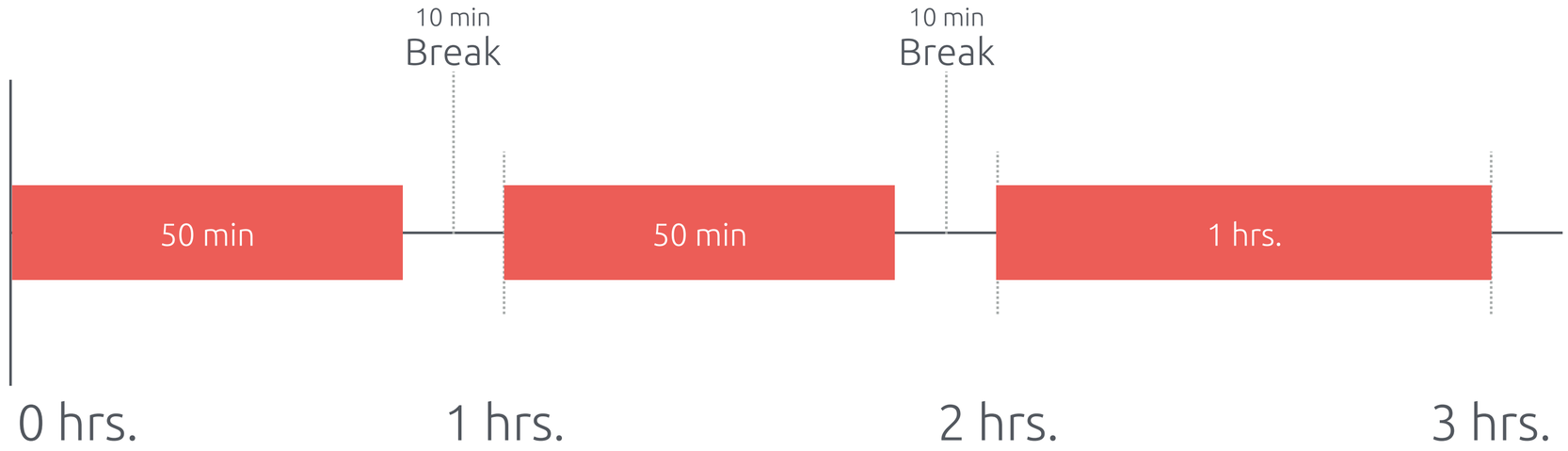




LESS math
MORE concept

Be self-taught
with
Challenging HOMEWORK




10 min
Break
10 min
Break
50 min
50 min
1 hrs.
0 hrs.
1 hrs.
2 hrs.
3 hrs.


START
NOW

LINUX AND LINUX SERVER ESSENTIALS

— 손윤택

스터디 세부사항

강의료
10/15/20+

강의시작
중간고사 이후

강의시간
강사별 개별공지

소셜네트워크과학과
공개 세미나

학과소개

FACULTY INFORMATION

김재경 교수	경영학과 겸임교수	비즈니스 인텔리전스 추천시스템
남윤재 교수	문화관광컨텐츠학과 겸임교수	소셜네트워크이론 인간-컴퓨터 상호작용
육순형 교수	물리학과 겸임교수	네트워크분석 복잡계 정보물리
이경전 교수	경영학과 겸임교수	사물인터넷 인공지능
정선호 교수	경영학과 겸임교수	다변량통계분석
최진무 교수	지리학과 겸임교수	지리정보시스템

FACULTY INFORMATION

형용준 박사과정	CYWORLD	페이스북 무너뜨리기
박진홍 박사과정	사회학과	지리정보시스템을 활용한 신뢰구간 95% 연구
김진호 박사과정	물리학과	전세계의 삼라만상을 딥러닝으로 분석하기
황보유정 박사과정(진)	컴퓨터과학과	인간의 욕심은 끝이 없고 같은 실수를 반복하기
조용주 석사과정	수학과	졸업을 눈앞에 둔 추천 시스템
손윤택 석사과정	수학과	졸업과 동떨어진 리눅스 시스템
한재윤 석사과정	수학과	전세계의 삼라만상을 머신러닝으로 분석하기

CURRICULUM

https://sns.khu.ac.kr/2014/03/25/소셜네트워크과학과-내규-및-커리큘럼/

대학원 입시요강

일정 (세부 일정은 조정될 수 있으며, 변경사항은 홈페이지에 공지 예정)

1 원서 접수 : **2016. 10. 10. (월) 10:00 ~ 2016. 10. 14. (금) 17:00** 까지

- http://www.uwayapply.com 에 접수

2 서류 제출 : 2016. 10. 10. (월) 10:00 ~ 2016. 10. 17. (월) 17:00 까지

- 제출방법: 방문 또는 등기 우편
- 지원학과 소속캠퍼스 대학원 행정실로 제출
- 단, 방문제출은 공휴일 및 주말 제외

3 서류 접수 확인 : 2016. 10. 10. (월) 10:00 ~ 2016. 10. 18. (화) 17:00 까지

- http://www.uwayapply.com 에서 확인

4 전형 일시 : **2016. 11. 05 (토) 10:00**

- 학과별 실시
- 전형장소는 2016. 11. 03. (목) 대학원 홈페이지 공지 예정

5 합격자 발표 : 2016. 11. 24. (목) 15:00 예정

- 경희대학교 일반대학원 홈페이지에서 확인
- http://qskh.khu.ac.kr

6 합격자 등록 : 2017. 01. 02. (월) ~ 2017. 01. 06. (금) 16:00 까지

- 지정은행 전국지점

모집요강 : 일반대학원 홈페이지 첨부파일 참조

- 일반대학원링크 바로가기