



MACHINE LEARNING

MACHINE LEARNING STUDY 2019 WINTER

PROCESS

Session 0

I ntroduce

- STUDY GOALS
- STUDY KEYPOINTS

P lan & Details

- STUDY DETAILS
- WEEKLY TASKS
- STUDY PLANS

Q nA & Team Building

- Team Building
- FIX TOPICS
- QnA & NETWORKING TIME



INTRODUCE

STUDY GOALS



BASIC-EXPERT

MACHINE LEARNING STUDY 2019 WINTER

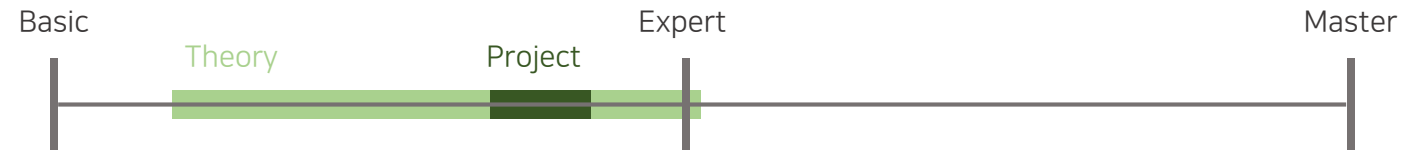
Machine Learning Basics and Utilization Study

Learning about the basic algorithm of machine learning

Acquire implementation capability based on theory or formula

Quick learning through project experience with machine learning algorithms

Overall Level



INTRODUCE

STUDY KEYPOINTS



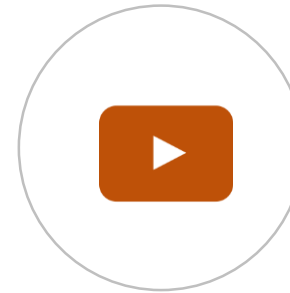
GROUP STUDY

Group-based projects and learning presentations.



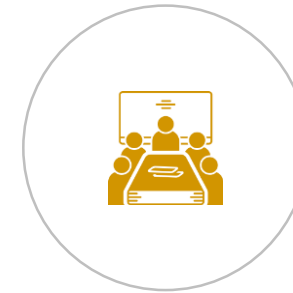
HOME WORK

Lecture summary and research homework of the lecture.



ONLINE CLASS

Online machine learning lecture.



WEEKLY MEETING

Weekly meeting on every Wednesday.

PLAN

STUDY DETAILS



Presentation seminar

Presented once a week by team about Machine Learning Related Topics

Must implement code for each ML topics

Participants submit a preliminary search report about the topic before the seminar



Team Project

Team-by-team project with machine learning algorithms

Designed as a 8 week project, share weekly progress

Mentoring feedback and progress on project progress



Team Study

Take online lectures on machine learning

Write a summary of the lecture and share it with team

Currently scheduled lecture (CS231N)

PLAN

WEEKLY TASKS



PERSONER TASK

Take the online Machine Learning Lecture

Submit summary of Lecture contents by online

Submit Preliminary research about topic of the next presentation

'Warning' if not submitted
3 warnings == expulsion



GROUP TASK

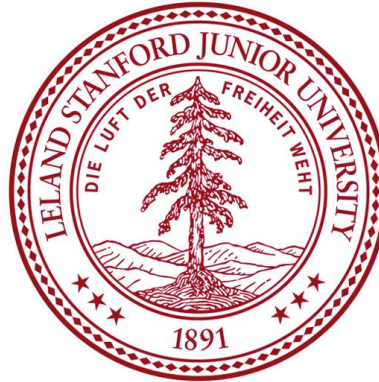
Prepare a topic presentation PPT
Presentations should be written in English.
(Assigned randomly presenter in team)

Preparing the project progress presentation

'Warning' to all team member if not prepared
3 warnings == expulsion

PLAN

About Online Lecture



<http://cs230.stanford.edu/>

Fall 2018 offering of CS 230 From Stanford Univ
by ANDREW NG

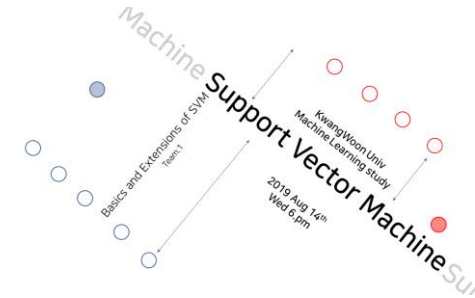
<http://cs231n.stanford.edu/>

Convolutional Neural Networks for Visual
Recognition

<https://www.youtube.com/playlist?list=PL3FW7Lu3i5JvHM8ljYj-zLfQRF3EO8sYv>

EXAMPLE

Section PPT



Definition of SVM

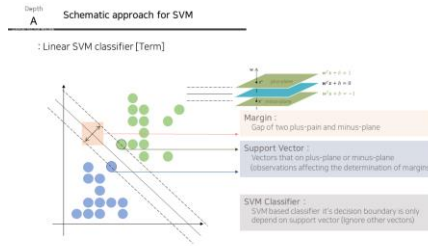
Support Vector Machine

Input - set of (input, output) training pair samples
Output - set of weights w

In SVM use the optimization of maximizing the margin ("street width") to reduce the number of weights

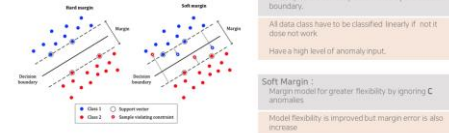
Neural Nets

< Intro >



Schematic approach for SVM

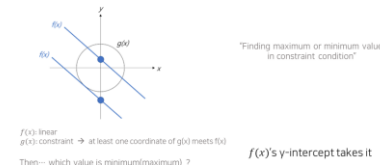
: Linear SVM classifier [Hard Margin-Soft Margin]



< Graphical Inst >

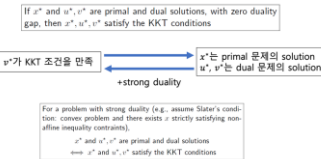
Background knowledge for mathematical access of svm

: Linear SVM classifier [Lagrange multiplier method]



Schematic approach for SVM

: Linear SVM classifier [Karush-Kuhn-Tucker & Duality]



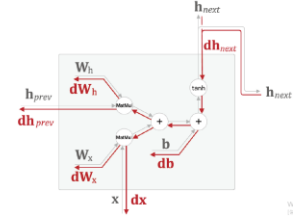
In the theory of optimization, duality is the principle that certain optimization problems can be viewed from two perspectives: the fundamental problem and the dual problem.

원래문제(dual)이란 어떤 최적화 문제가 원문제(the primal problem)의 쌍대문제(the dual problem)의 두 가지 관점에서 볼 수 있다는 원리

< Mathematical Inst >

RNN Implement

그림 5-20 RNN 계층의 계산 그래프(역전파 포함)



```
def backward(self, dh_next):  
    # W, b = self.params  
    x, h_prev, h_next = self.cache  
    # dh_prev = 0 (if h_prev is None)  
    dL = dh_next * (1 - h_next ** 2)  
    dW = np.dot(dL, x) + dh_prev * h_prev  
    dWx = np.dot(dL, x)  
    dh = np.dot(dL, h_prev) + dh_prev  
    dh = np.dot(dL, h_prev) + dh_prev  
    dL = np.dot(dL, h_prev)  
    dL = np.dot(dL, h_prev)  
    return dL, dh_prev
```

```
# 전이 확률과 은닉 상태  
batch_size = 10  
wordvec_size = 100  
hidden_size = 100 # hidden state의 원소 수  
time_size = 5 # Transposed RNN의 행, 열을 결정하는 시간 크기  
lr = 0.1  
max_epochs = 100  
# 학습 데이터(문장 중 단어)를 불러옴  
corpus, word_to_idx, idx_to_word = ptb.load_data('train')  
corpus_size = 1000  
corpus = corpus[:corpus_size]  
vocab_size = len(set(corpus)) + 1  
# 학습 시 시퀀스는 분할  
max_iters = data_size // (batch_size * time_size)  
time_idx = 0  
total_loss = 0  
loss_count = 0  
api_list = []  
# 모델 생성  
model = SimpleRNN(vocab_size, wordvec_size, hidden_size)  
optimizer = SGD(lr)
```

Part of Pen TreeBank Dataset

VRZ	Verb, 3rd ps. sg. present
WDT	Wh-determiner
WP	Wh-pronoun
WPS	Possessive wh-pronoun
WRB	Wh-adverb
#	Pound sign
\$	Dollar sign
.	Sentence-final punctuation
,	Comma
:	Colon, semi-colon

< Implement >

PLAN

STUDY PLANS

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18 Meetup #0	19	20	21
22	23	24 Meetup #1	25	26	27	28
29	30	31 Meetup #2	1	2	3	4

Lecture #1, #2 (2Hour) CS230	Lecture #3, #4 (2Hour) CS230
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Dec

Meetup#0

- Introduce Study
- Team-Building & Set Topic

Meetup#1

- Basic of Machine Learning(1) by Yi
- Topic Presentation #1- CNN

Meetup#2

- Basic of Machine Learning(2) by Baek
- Topic Presentation #2- LSTM
- Pre-conference about Project

PLAN

STUDY PLANS

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29 →	30	31 Meetup #2	1	2	3	4
5	6	7	8 Meetup #3	9	10	11
12	13	14	15 Meetup #4	16	17	18
19	20	21	22 Meetup #5	23	24	25
26	27	28	29 Meetup #6	30	31	1
Lecture #5, #6 (2Hour) CS230		Lecture #7, #8 (2Hour) CS230		Lecture #9, #10 (2Hour) CS230		Lecture #1, #2 (2Hour) CS231n

Jan

Meetup#3

- Topic Presentation #3- Auto Encoder
- Project Progress sharing (1/8)

Meetup#4

- Topic Presentation #4 - Support Vector Machine
- Project Progress sharing (2/8)

Meetup#5

- Topic Presentation #5 - Random Forest
- Project Progress sharing (3/8)
- Intermediate check of study and project

Meetup#6

- Topic Presentation #6-DQN
- Project Progress sharing (4/8)

PLAN

STUDY PLANS

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29 Meetup #6	30	31 Meetup #4	1
2	3	4	5 Meetup #7	6	7	8
9	10	11	12 Meetup #8	13	14	15
16	17	18	19 Meetup #9	20	21	22
23	24	25	26 Meetup #10	27	28	29
Lecture #3, #4 (2Hour) CS231n		Lecture #5, #6 (2Hour) CS231n		Lecture #7, #8 (2Hour) CS231n		Lecture #9, #10 (2Hour) CS231n

Feb

Meetup#7

- Topic Presentation #7 - DDPG
- Project Progress sharing (5/8)
- Intermediate check of study and project

Meetup#8

- Topic Presentation #8 - Bayesian Optimization
- Project Progress sharing (6/8)

Meetup#9

- Topic Presentation #9 - Hidden Markov Model
- Project Progress sharing (7/8)

Meetup#10

- Topic Presentation #10 - GAN
- Project Progress sharing (8/8)

Team-Building

TOPICS

- Topic Presentation #1 - Convolution Neural Network [CNN]
- Topic Presentation #2 - Long Short Term Memory [LSTM]
- Topic Presentation #3 - Auto Encoder [AE]
- Topic Presentation #4 - Support Vector Machine [SVM]
- Topic Presentation #5 - Random Forest [RF]
- Topic Presentation #6 - Deep Q-Networks [DQN]
- Topic Presentation #7 - Deep Deterministic Policy Gradient [DDPG]
- Topic Presentation #8 - Bayesian Optimization [BO]
- Topic Presentation #9 - Hidden Markov Model [HMM]
- Topic Presentation #10 - Generative Adversarial Networks [GAN]

Easy  Hard

TOPICS	TOPIC 1	TOPIC 2	TOPIC 3	TOPIC 4	TOPIC 5	TOPIC 6	TOPIC 7	TOPIC 8	TOPIC 9	TOPIC 10
Team	C	B	A	C	B	A	A	B	A	C

Team-Building

Team Build

TEAM A	백수환	이지운	권지윤	배석민
TEAM B	이충섭	이원빈	이종수	
TEAM C	서유정	김광호	이현빈	

Topic distribution

Each team will be prepared to present their topic for the week.

If you are not an presentation team, please fill out and submit a preliminary report.

TOPICs	TOPIC 1	TOPIC 2	TOPIC 3	TOPIC 4	TOPIC 5	TOPIC 6	TOPIC 7	TOPIC 8	TOPIC 9	TOPIC 10
Team	C	B	A	C	B	A	A	C	A	B

QnA

QnA



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