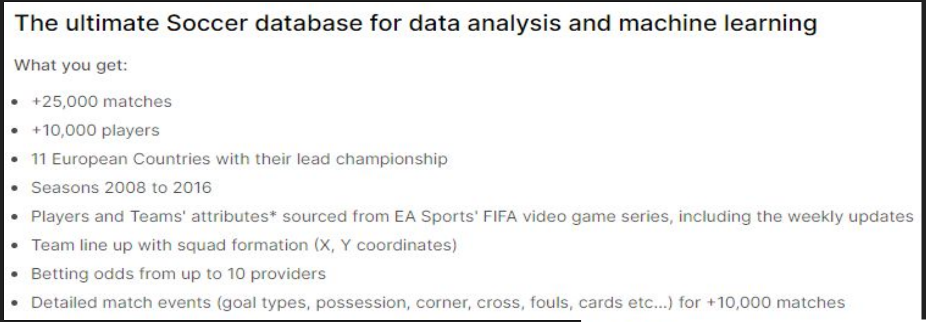
Soccer Player Performance Prediction

2021 혁신_인공지능
채민석

목차

1. 데이터 출처 및 소개

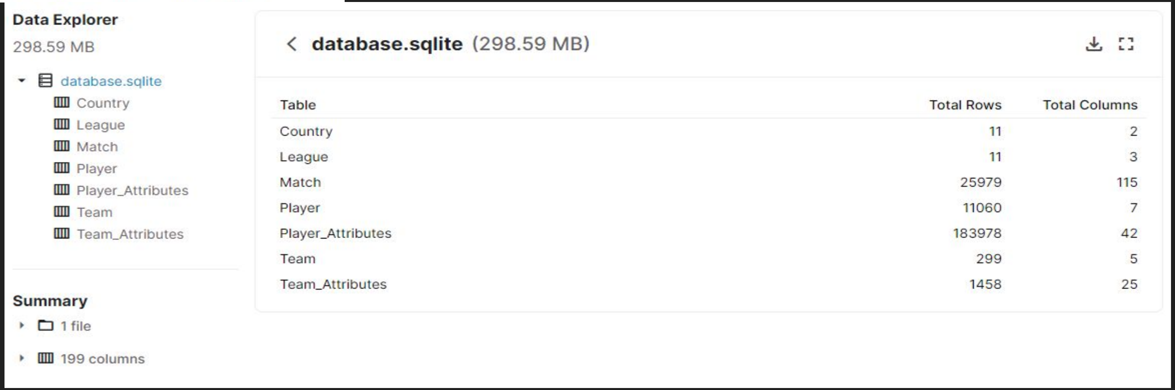
https://www.kaggle.com/hugomathien/soccer



The ultimate Soccer database for data analysis and machine learning

What you get:

- +25,000 matches
- +10,000 players
- 11 European Countries with their lead championship
- Seasons 2008 to 2016
- Players and Teams' attributes* sourced from EA Sports' FIFA video game series, including the weekly updates
- Team line up with squad formation (X, Y coordinates)
- Betting odds from up to 10 providers
- Detailed match events (goal types, possession, corner, cross, fouls, cards etc...) for +10,000 matches



database.sqlite (298.59 MB)

Table	Total Rows	Total Columns
Country	11	2
League	11	3
Match	25979	115
Player	11060	7
Player_Attributes	183978	42
Team	299	5
Team_Attributes	1458	25

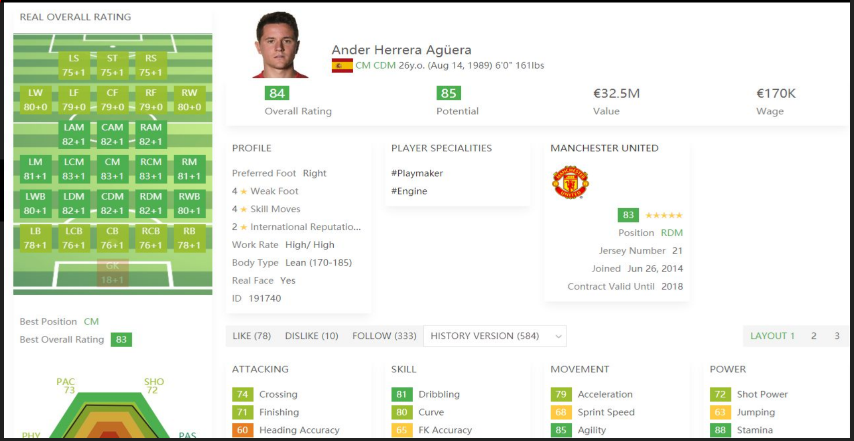
2. 프로젝트 개요

Player 관련 데이터 수집

```
'''for columns in player_attributes.columns:
   print(columns)'''
# [id player_fifa_api_id  player_api_id   date   overall_rating  potential   preferred_foot  attacking_work_rate
# defensive_work_rate crossing   finishing   heading_accuracy   short_passing   volleys dribbling   curve
# free_kick_accuracy  long_passing   ball_control   acceleration   sprint_speed   agility reactions   balance
# shot_power  jumping stamina strength   long_shots  aggression  interceptions  positioning vision  penalties
# marking standing_tackle sliding_tackle  gk_diving  gk_handling gk_kicking  gk_positioning  gk_reflexes]
```

Player Performance 훈련 및 예측

```
y = player_merged['overall_rating']
```



REAL OVERALL RATING

	LS 75+1	ST 75+1	RS 75+1	
LW 80+0	LF 79+0	CF 79+0	RF 79+0	RW 80+0
	LAM 82+1	CAM 82+1	RAM 82+1	
LM 81+1	LCM 83+1	CM 83+1	RCM 83+1	RM 81+1
LWB 80+1	LDM 82+1	CDM 82+1	RDM 82+1	RWB 80+1
LB 78+1	LCB 76+1	CB 76+1	RCB 76+1	RB 78+1
		GK 18+1		

Best Position CM
Best Overall Rating 83

Ander Herrera Agüera
CM CDM 26y.o. (Aug 14, 1989) 6'0" 161lbs

84	85	€32.5M	€170K
Overall Rating	Potential	Value	Wage

PROFILE
Preferred Foot Right
4 ★ Weak Foot
4 ★ Skill Moves
2 ★ International Reputatio...
Work Rate High/ High
Body Type Lean (170-185)
Real Face Yes
ID 191740

PLAYER SPECIALITIES
#Playmaker
#Engine

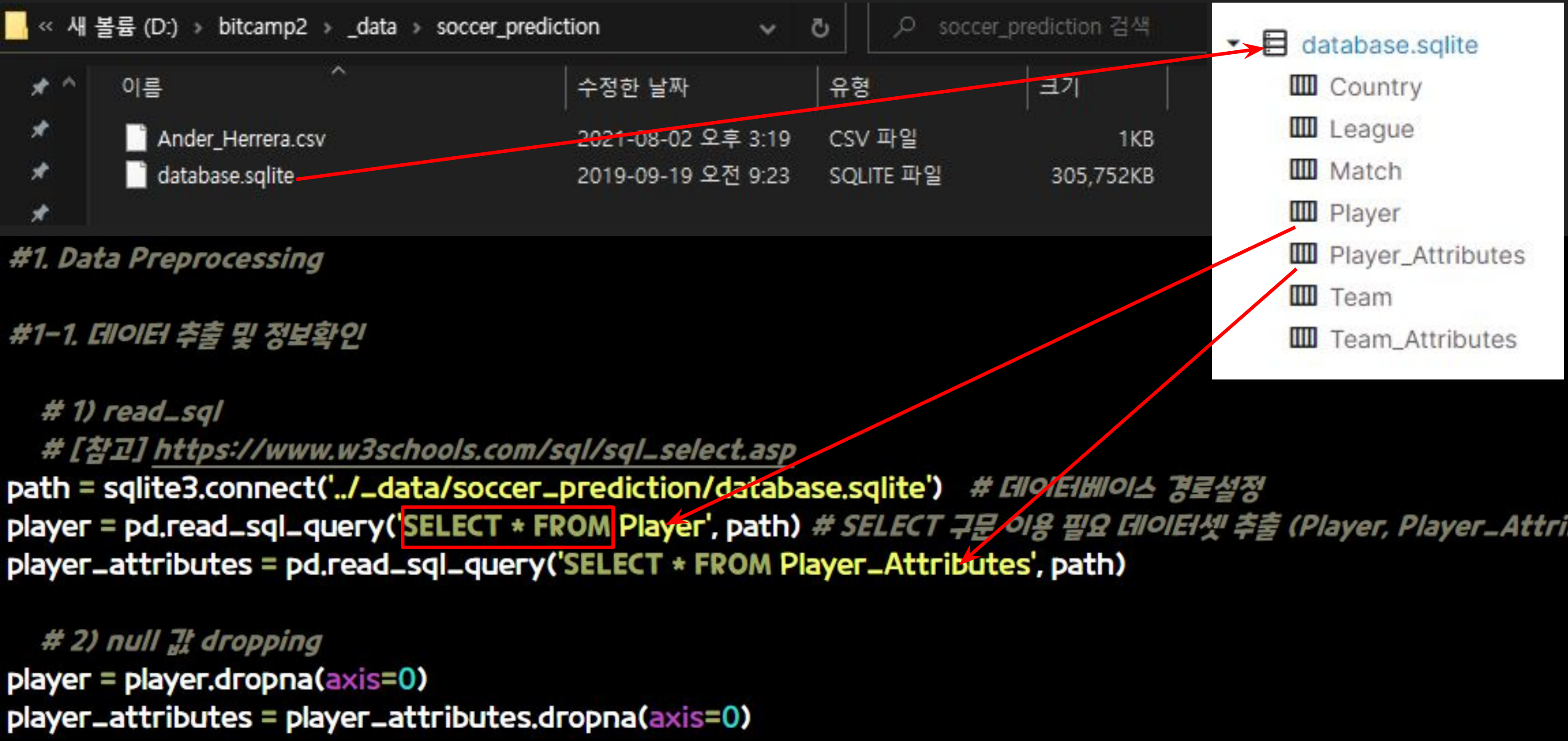
MANCHESTER UNITED
83 ★★★★★
Position RDM
Jersey Number 21
Joined Jun 26, 2014
Contract Valid Until 2018

LIKE (78) DISLIKE (10) FOLLOW (333) HISTORY VERSION (584) LAYOUT 1 2 3

ATTACKING		SKILL		MOVEMENT		POWER	
74	Crossing	81	Dribbling	79	Acceleration	72	Shot Power
71	Finishing	80	Curve	68	Sprint Speed	63	Jumping
60	Heading Accuracy	65	FK Accuracy	85	Agility	88	Stamina

3. Data Preprocessing

1) 데이터 추출 및 정보확인



« 새 볼륨 (D:) › bitcamp2 › _data › soccer_prediction

soccer_prediction 검색

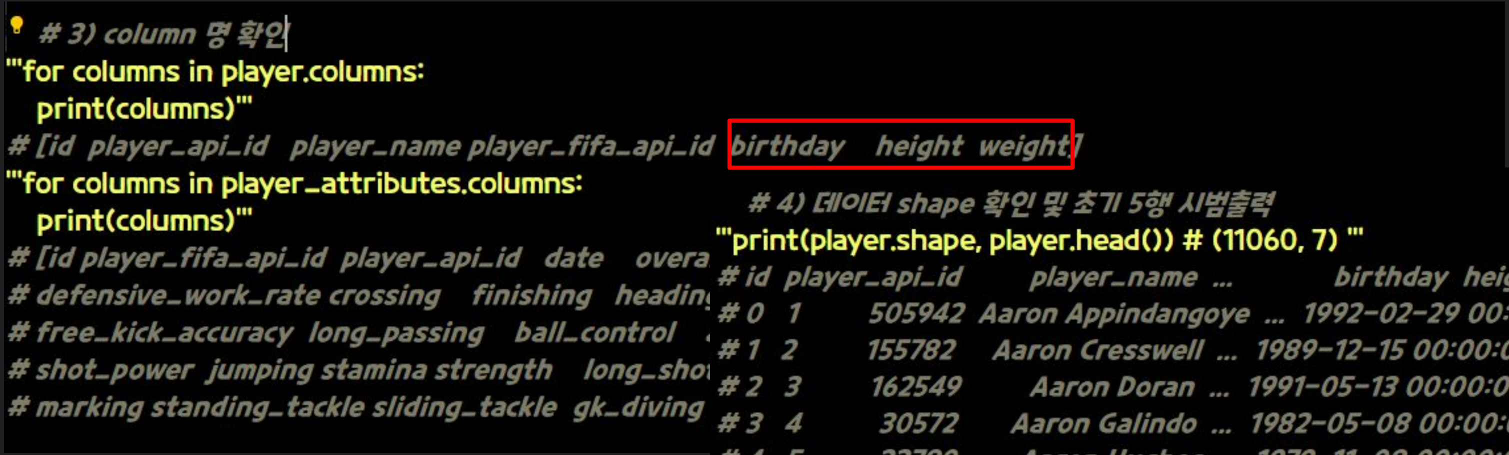
이름	수정한 날짜	유형	크기
Ander_Herrera.csv	2021-08-02 오후 3:19	CSV 파일	1KB
database.sqlite	2019-09-19 오전 9:23	SQLITE 파일	305,752KB

- database.sqlite
  - Country
  - League
  - Match
  - Player
  - Player_Attributes
  - Team
  - Team_Attributes

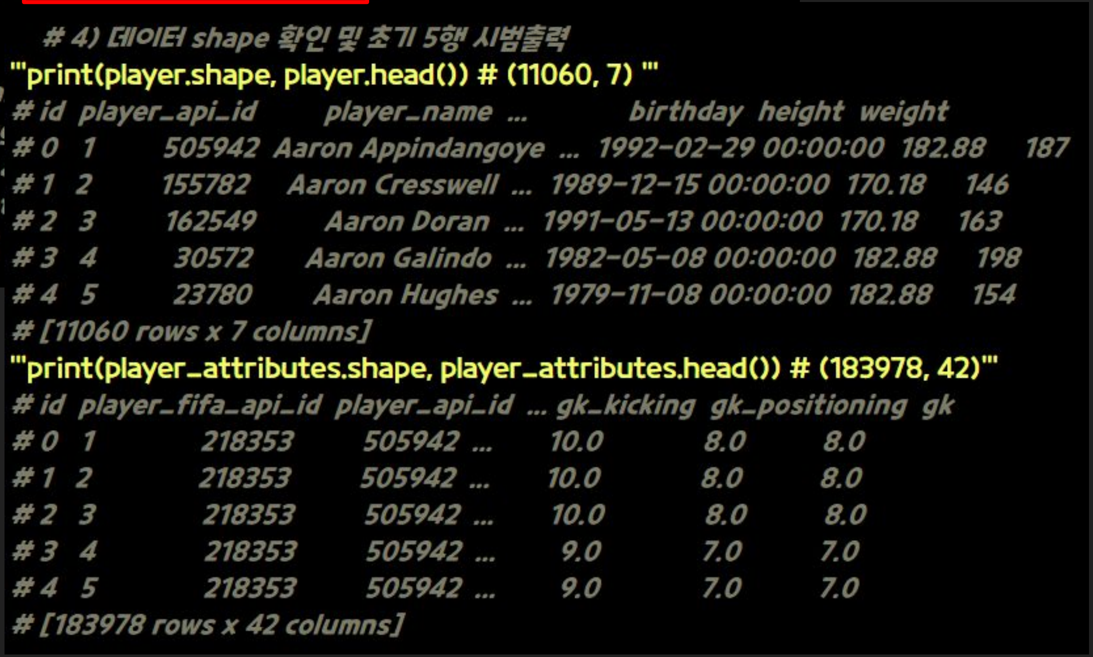
```
#1. Data Preprocessing

#1-1. 데이터 추출 및 정보확인

    # 1) read_sql
    # [참고] https://www.w3schools.com/sql/sql_select.asp
path = sqlite3.connect('../_data/soccer_prediction/database.sqlite')   # 데이터베이스 경로설정
player = pd.read_sql_query('SELECT * FROM Player', path) # SELECT 구문 이용 필요 데이터셋 추출 (Player, Player_Attributes)
player_attributes = pd.read_sql_query('SELECT * FROM Player_Attributes', path)

    # 2) null 값 dropping
player = player.dropna(axis=0)
player_attributes = player_attributes.dropna(axis=0)
```

3. Data Preprocessing

1) 데이터 추출 및 정보확인



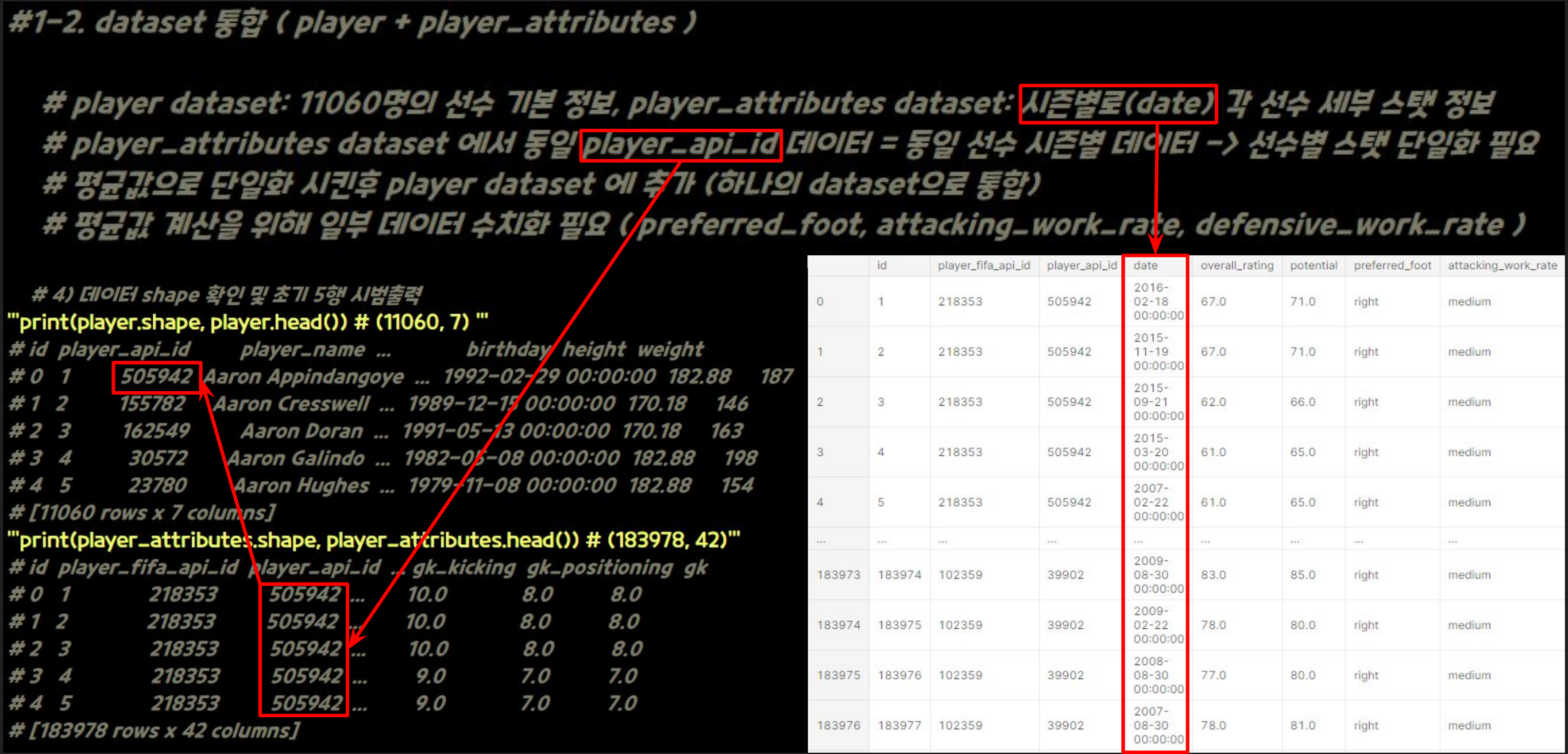
```
# 3) column 명 확인
'''for columns in player.columns:
  print(columns)'''
# [id  player_api_id   player_name player_fifa_api_id  birthday    height  weight]
'''for columns in player_attributes.columns:
  print(columns)'''
# [id player_fifa_api_id  player_api_id   date    overa
# defensive_work_rate crossing    finishing   headin
# free_kick_accuracy  long_passing    ball_control
# shot_power  jumping stamina strength    long_sho
# marking standing_tackle sliding_tackle  gk_diving
```



```
  # 4) 데이터 shape 확인 및 초기 5행 시범출력
'''print(player.shape, player.head()) # (11060, 7) '''
# id  player_api_id        player_name ...         birthday  height  weight
# 0   1         505942  Aaron Appindangoye  ...  1992-02-29 00:00:00  182.88     187
# 1   2         155782    Aaron Cresswell  ...  1989-12-15 00:00:00  170.18     146
# 2   3         162549        Aaron Doran  ...  1991-05-13 00:00:00  170.18     163
# 3   4          30572      Aaron Galindo  ...  1982-05-08 00:00:00  182.88     198
# 4   5          23780       Aaron Hughes  ...  1979-11-08 00:00:00  182.88     154
# [11060 rows x 7 columns]
'''print(player_attributes.shape, player_attributes.head()) # (183978, 42)'''
# id  player_fifa_api_id  player_api_id ... gk_kicking  gk_positioning  gk
# 0   1            218353         505942 ...       10.0             8.0       8.0
# 1   2            218353         505942 ...       10.0             8.0       8.0
# 2   3            218353         505942 ...       10.0             8.0       8.0
# 3   4            218353         505942 ...        9.0             7.0       7.0
# 4   5            218353         505942 ...        9.0             7.0       7.0
# [183978 rows x 42 columns]
```

3. Data Preprocessing

2) dataset 통합

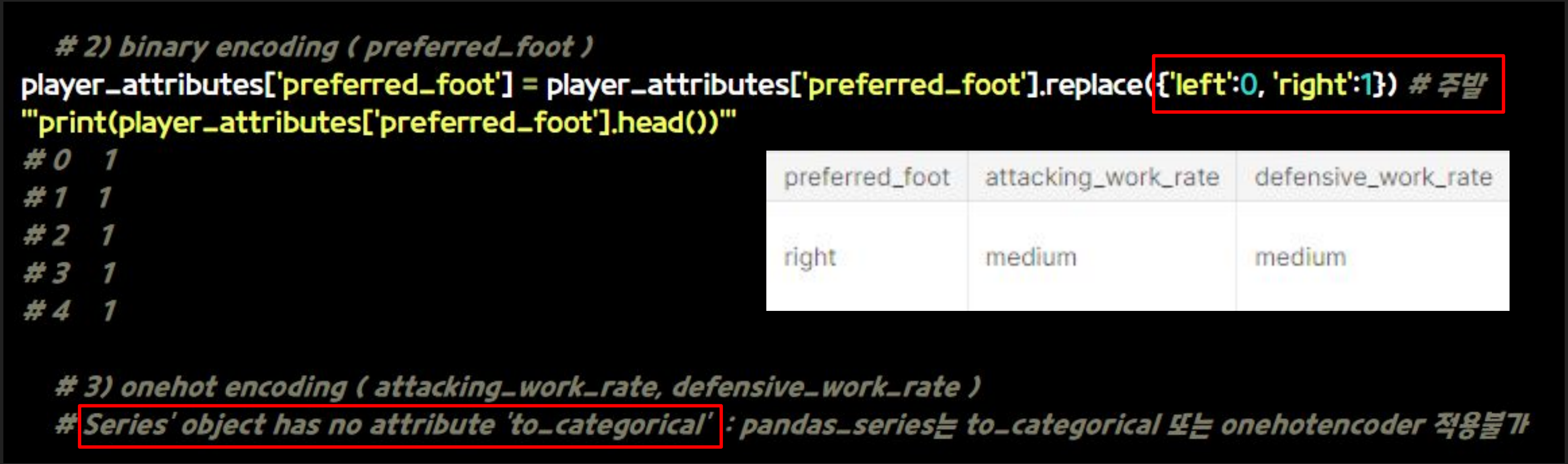


```
#1-2. dataset 통합 ( player + player_attributes )

  # player dataset: 11060명의 선수 기본 정보, player_attributes dataset: 시즌별로(date) 각 선수 세부 스탯 정보
  # player_attributes dataset 에서 동일 player_api_id 데이터 = 동일 선수 시즌별 데이터 -> 선수별 스탯 단일화 필요
  # 평균값으로 단일화 시킨후 player dataset 에 추가 (하나의 dataset으로 통합)
  # 평균값 계산을 위해 일부 데이터 수치화 필요 (preferred_foot, attacking_work_rate, defensive_work_rate )

  # 4) 데이터 shape 확인 및 초기 5행 시범출력
'''print(player.shape, player.head()) # (11060, 7) '''
# id  player_api_id        player_name  ...           birthday  height  weight
# 0   1         505942  Aaron Appindangoye  ...  1992-02-29 00:00:00  182.88     187
# 1   2         155782     Aaron Cresswell  ...  1989-12-15 00:00:00  170.18     146
# 2   3         162549         Aaron Doran  ...  1991-05-13 00:00:00  170.18     163
# 3   4          30572       Aaron Galindo  ...  1982-05-08 00:00:00  182.88     198
# 4   5          23780        Aaron Hughes  ...  1979-11-08 00:00:00  182.88     154
# [11060 rows x 7 columns]
'''print(player_attributes.shape, player_attributes.head()) # (183978, 42)'''
# id  player_fifa_api_id  player_api_id  ... gk_kicking  gk_positioning  gk
# 0   1              218353         505942  ...      10.0             8.0       8.0
# 1   2              218353         505942  ...      10.0             8.0       8.0
# 2   3              218353         505942  ...      10.0             8.0       8.0
# 3   4              218353         505942  ...       9.0             7.0       7.0
# 4   5              218353         505942  ...       9.0             7.0       7.0
# [183978 rows x 42 columns]
```

	id	player_fifa_api_id	player_api_id	date	overall_rating	potential	preferred_foot	attacking_work_rate
0	1	218353	505942	2016-02-18 00:00:00	67.0	71.0	right	medium
1	2	218353	505942	2015-11-19 00:00:00	67.0	71.0	right	medium
2	3	218353	505942	2015-09-21 00:00:00	62.0	66.0	right	medium
3	4	218353	505942	2015-03-20 00:00:00	61.0	65.0	right	medium
4	5	218353	505942	2007-02-22 00:00:00	61.0	65.0	right	medium
...	...	...	...	...	...	...	...	...
183973	183974	102359	39902	2009-08-30 00:00:00	83.0	85.0	right	medium
183974	183975	102359	39902	2009-02-22 00:00:00	78.0	80.0	right	medium
183975	183976	102359	39902	2008-08-30 00:00:00	77.0	80.0	right	medium
183976	183977	102359	39902	2007-08-30 00:00:00	78.0	81.0	right	medium

3. Data Preprocessing

2) dataset 통합

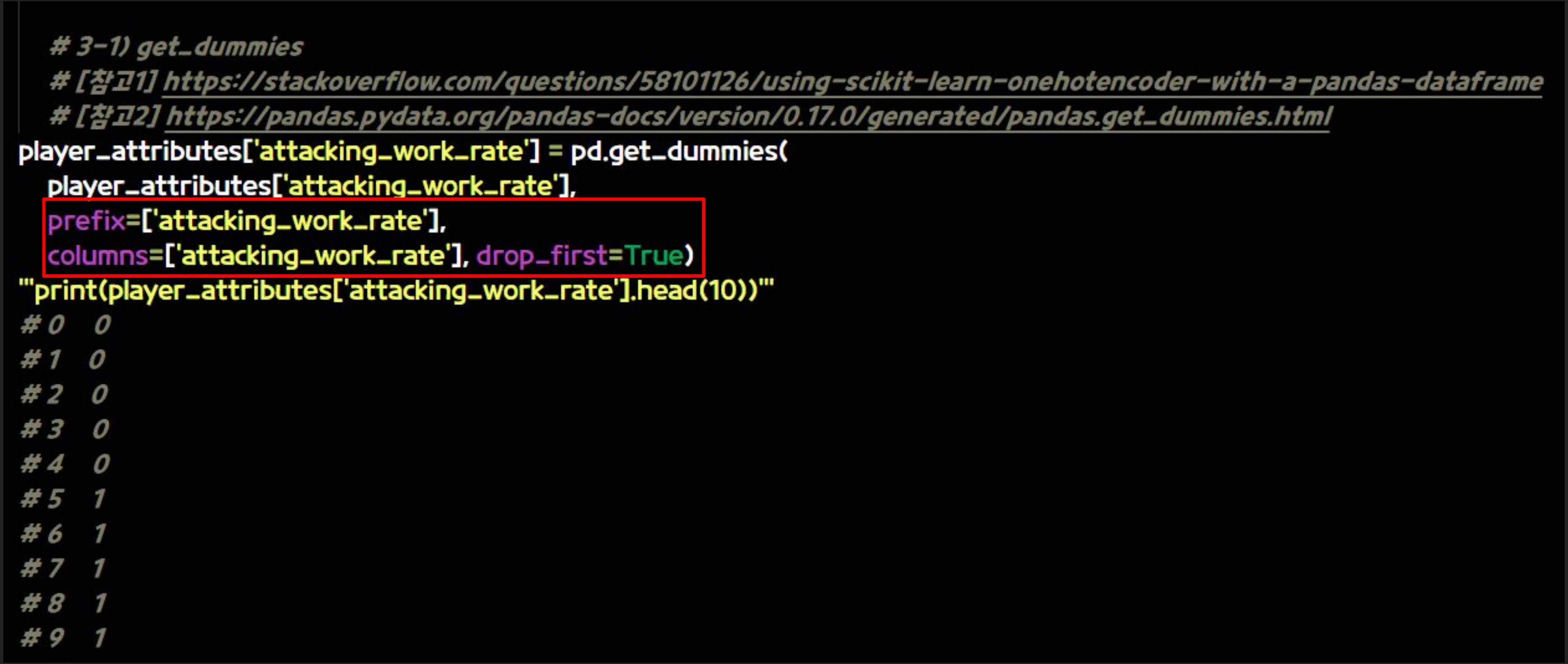


```
   # 2) binary encoding ( preferred_foot )
player_attributes['preferred_foot'] = player_attributes['preferred_foot'].replace({'left':0, 'right':1}) # 주발
'''print(player_attributes['preferred_foot'].head())'''
# 0    1
# 1    1
# 2    1
# 3    1
# 4    1

   # 3) onehot encoding ( attacking_work_rate, defensive_work_rate )
   # Series' object has no attribute 'to_categorical' : pandas_series는 to_categorical 또는 onehotencoder 적용불가
```

preferred_foot	attacking_work_rate	defensive_work_rate
right	medium	medium

3. Data Preprocessing

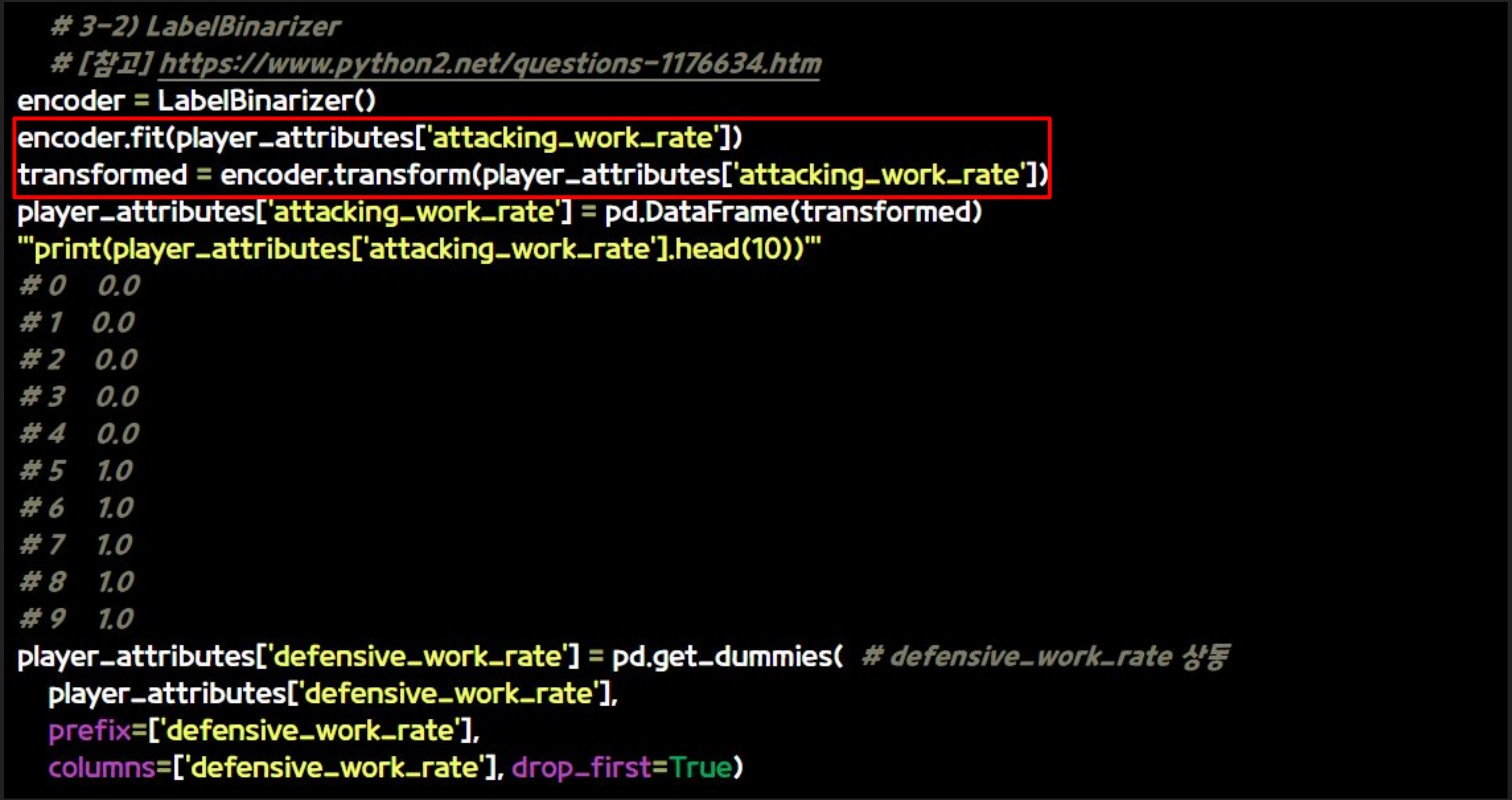
2) dataset 통합



```
  # 3-1) get_dummies
  # [참고1] https://stackoverflow.com/questions/58101126/using-scikit-learn-onehotencoder-with-a-pandas-dataframe
  # [참고2] https://pandas.pydata.org/pandas-docs/version/0.17.0/generated/pandas.get_dummies.html
player_attributes['attacking_work_rate'] = pd.get_dummies(
  player_attributes['attacking_work_rate'],
  prefix=['attacking_work_rate'],
  columns=['attacking_work_rate'], drop_first=True)
'''print(player_attributes['attacking_work_rate'].head(10))'''
# 0   0
# 1   0
# 2   0
# 3   0
# 4   0
# 5   1
# 6   1
# 7   1
# 8   1
# 9   1
```

3. Data Preprocessing

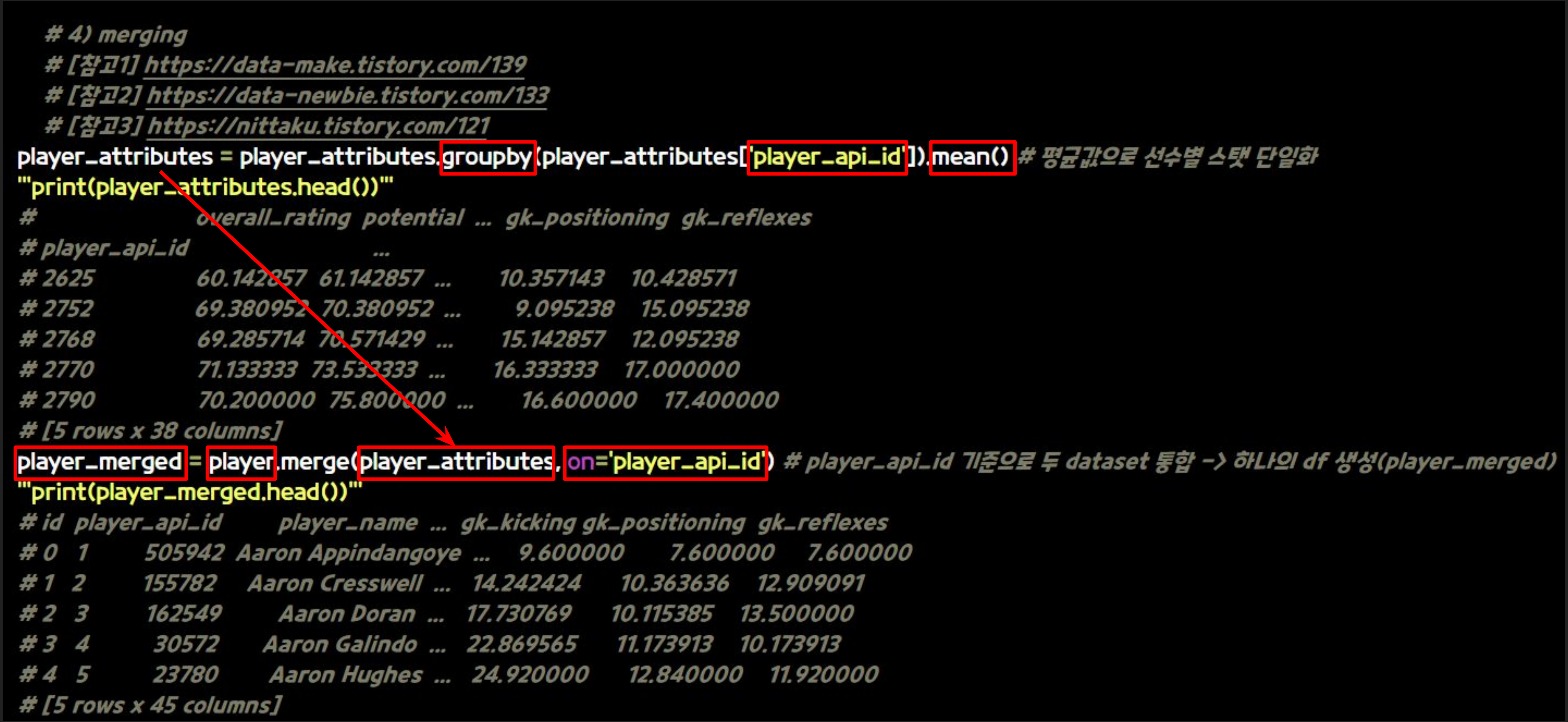
2) dataset 통합



```
   # 3-2) LabelBinarizer
   # [참고] https://www.python2.net/questions-1176634.htm
encoder = LabelBinarizer()
encoder.fit(player_attributes['attacking_work_rate'])
transformed = encoder.transform(player_attributes['attacking_work_rate'])
player_attributes['attacking_work_rate'] = pd.DataFrame(transformed)
'''print(player_attributes['attacking_work_rate'].head(10))'''
# 0    0.0
# 1    0.0
# 2    0.0
# 3    0.0
# 4    0.0
# 5    1.0
# 6    1.0
# 7    1.0
# 8    1.0
# 9    1.0
player_attributes['defensive_work_rate'] = pd.get_dummies(  # defensive_work_rate 상동
   player_attributes['defensive_work_rate'],
   prefix=['defensive_work_rate'],
   columns=['defensive_work_rate'], drop_first=True)
```

3. Data Preprocessing

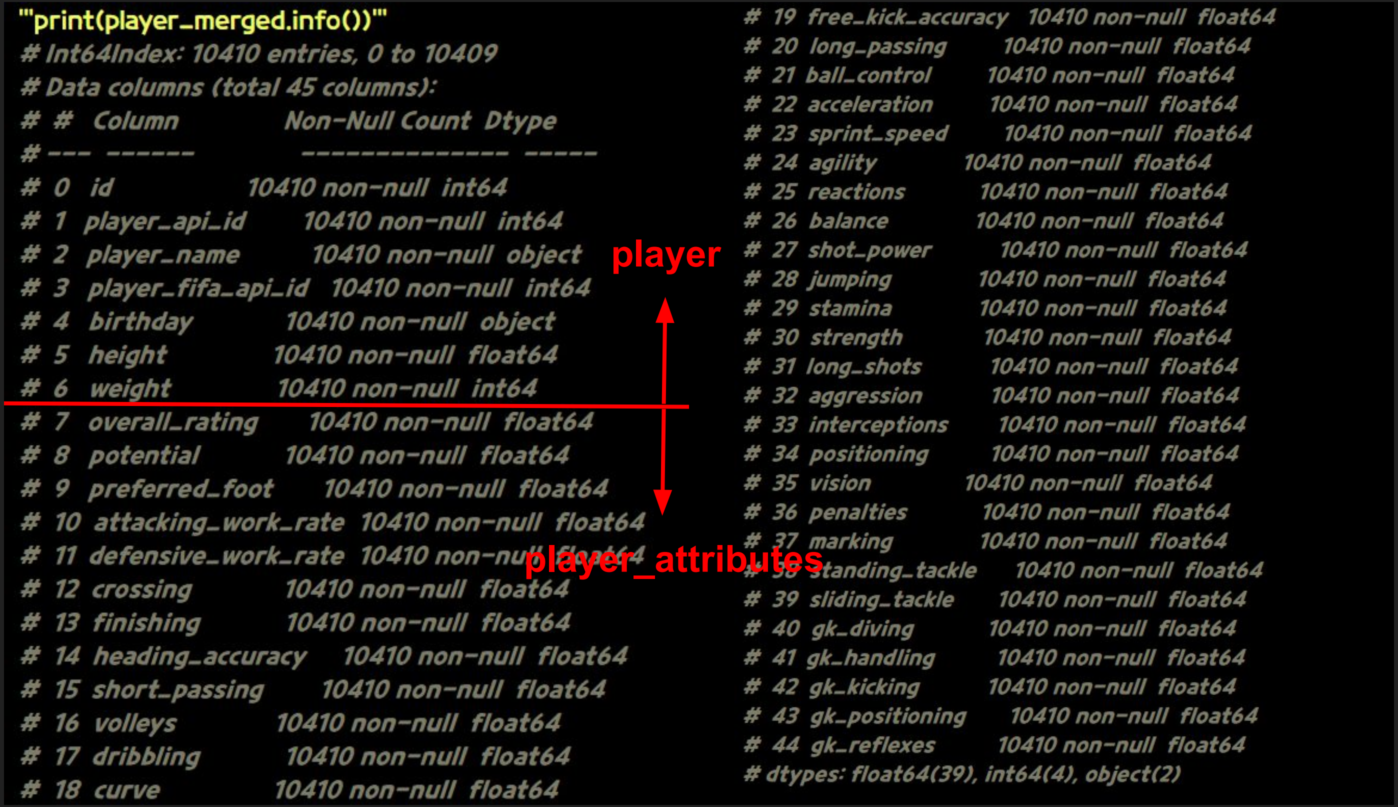
2) dataset 통합



```
    # 4) merging
    # [참고1] https://data-make.tistory.com/139
    # [참고2] https://data-newbie.tistory.com/133
    # [참고3] https://nittaku.tistory.com/121
player_attributes = player_attributes.groupby(player_attributes['player_api_id']).mean() # 평균값으로 선수별 스탯 단일화
'''print(player_attributes.head())'''
#                overall_rating  potential  ...  gk_positioning  gk_reflexes
# player_api_id                             ...
# 2625                60.142857  61.142857  ...       10.357143    10.428571
# 2752                69.380952  70.380952  ...        9.095238    15.095238
# 2768                69.285714  70.571429  ...       15.142857    12.095238
# 2770                71.133333  73.533333  ...       16.333333    17.000000
# 2790                70.200000  75.800000  ...       16.600000    17.400000
# [5 rows x 38 columns]
player_merged = player.merge(player_attributes, on='player_api_id') # player_api_id 기준으로 두 dataset 통합 -> 하나의 df 생성(player_merged)
'''print(player_merged.head())'''
# id  player_api_id        player_name  ...  gk_kicking gk_positioning  gk_reflexes
# 0   1        505942  Aaron Appindangoye  ...   9.600000       7.600000     7.600000
# 1   2        155782     Aaron Cresswell  ...  14.242424      10.363636    12.909091
# 2   3        162549        Aaron Doran  ...  17.730769      10.115385    13.500000
# 3   4         30572      Aaron Galindo  ...  22.869565      11.173913    10.173913
# 4   5         23780      Aaron Hughes  ...  24.920000      12.840000    11.920000
# [5 rows x 45 columns]
```

3. Data Preprocessing

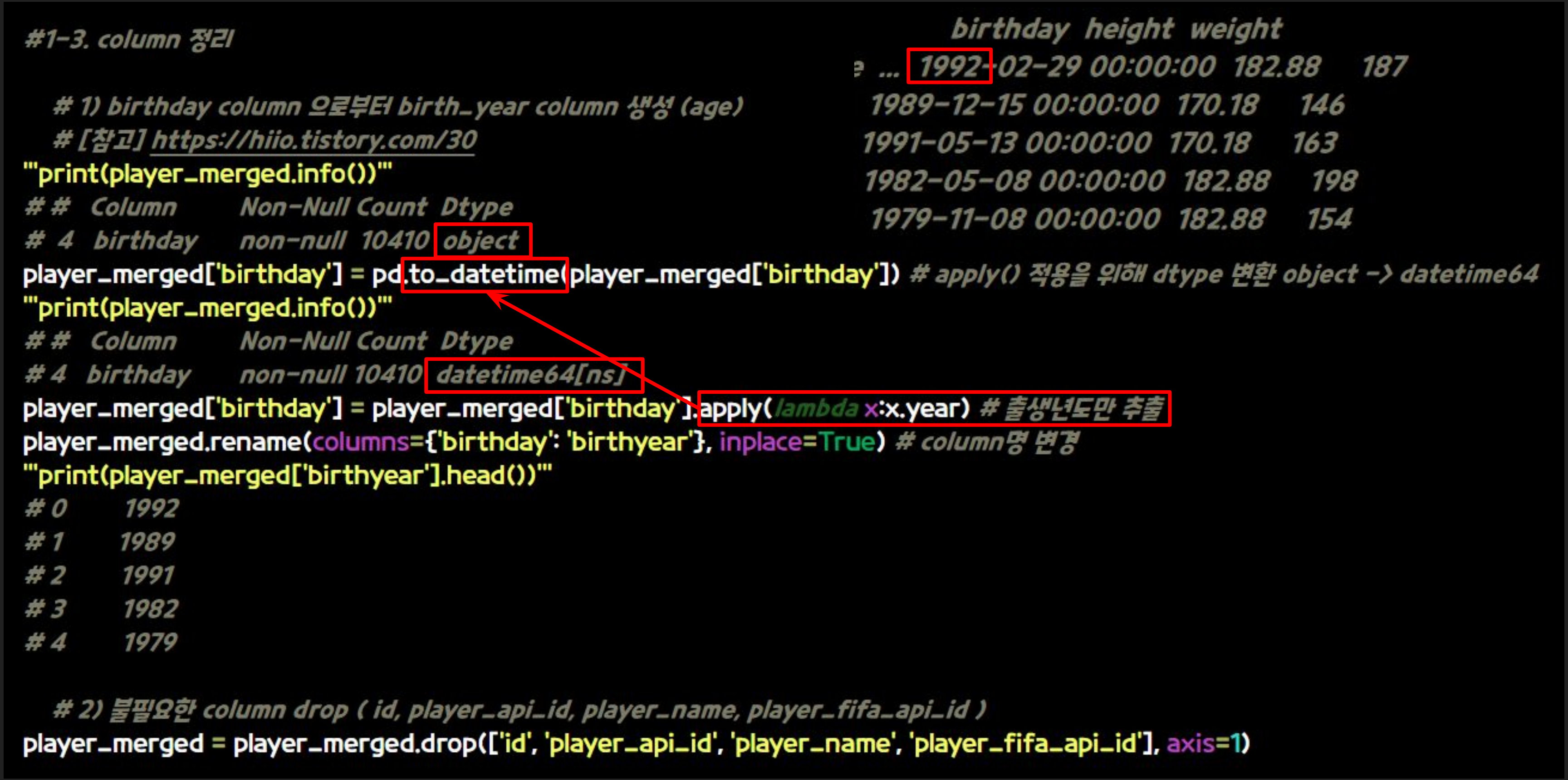
2) dataset 통합



```
'''print(player_merged.info())'''
# Int64Index: 10410 entries, 0 to 10409
# Data columns (total 45 columns):
# #  Column              Non-Null Count  Dtype
# ---  ------              --------------  -----
# 0  id                  10410 non-null  int64
# 1  player_api_id       10410 non-null  int64
# 2  player_name         10410 non-null  object
# 3  player_fifa_api_id  10410 non-null  int64
# 4  birthday            10410 non-null  object
# 5  height              10410 non-null  float64
# 6  weight              10410 non-null  int64
# 7  overall_rating      10410 non-null  float64
# 8  potential           10410 non-null  float64
# 9  preferred_foot      10410 non-null  float64
# 10  attacking_work_rate  10410 non-null  float64
# 11  defensive_work_rate  10410 non-null  float64
# 12  crossing            10410 non-null  float64
# 13  finishing           10410 non-null  float64
# 14  heading_accuracy    10410 non-null  float64
# 15  short_passing       10410 non-null  float64
# 16  volleys             10410 non-null  float64
# 17  dribbling           10410 non-null  float64
# 18  curve               10410 non-null  float64
# 19  free_kick_accuracy  10410 non-null  float64
# 20  long_passing        10410 non-null  float64
# 21  ball_control        10410 non-null  float64
# 22  acceleration        10410 non-null  float64
# 23  sprint_speed        10410 non-null  float64
# 24  agility             10410 non-null  float64
# 25  reactions           10410 non-null  float64
# 26  balance             10410 non-null  float64
# 27  shot_power          10410 non-null  float64
# 28  jumping             10410 non-null  float64
# 29  stamina             10410 non-null  float64
# 30  strength            10410 non-null  float64
# 31  long_shots          10410 non-null  float64
# 32  aggression          10410 non-null  float64
# 33  interceptions       10410 non-null  float64
# 34  positioning         10410 non-null  float64
# 35  vision              10410 non-null  float64
# 36  penalties           10410 non-null  float64
# 37  marking             10410 non-null  float64
# 38  standing_tackle     10410 non-null  float64
# 39  sliding_tackle      10410 non-null  float64
# 40  gk_diving           10410 non-null  float64
# 41  gk_handling         10410 non-null  float64
# 42  gk_kicking          10410 non-null  float64
# 43  gk_positioning      10410 non-null  float64
# 44  gk_reflexes         10410 non-null  float64
# dtypes: float64(39), int64(4), object(2)
```

3. Data Preprocessing

3) column 정리

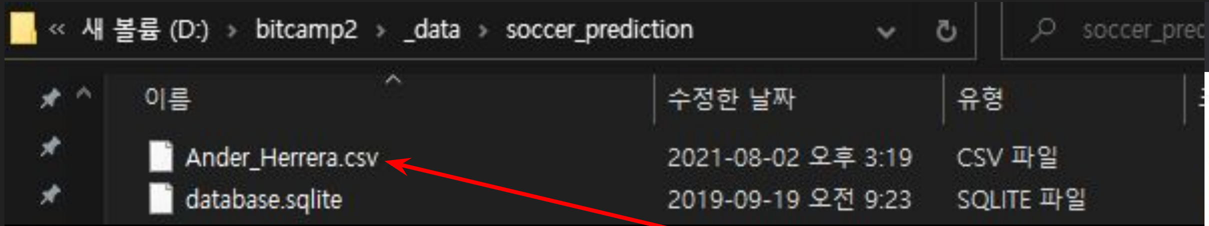


```
#1-3. column 정리

   # 1) birthday column 으로부터 birth_year column 생성 (age)
   # [참고] https://hiio.tistory.com/30
'''print(player_merged.info())'''
## Column       Non-Null Count  Dtype
# 4  birthday    non-null  10410  object
player_merged['birthday'] = pd.to_datetime(player_merged['birthday']) # apply() 적용을 위해 dtype 변환 object -> datetime64
'''print(player_merged.info())'''
## Column       Non-Null Count  Dtype
# 4  birthday    non-null 10410  datetime64[ns]
player_merged['birthday'] = player_merged['birthday'].apply(lambda x:x.year) # 출생년도만 추출
player_merged.rename(columns={'birthday': 'birthyear'}, inplace=True) # column명 변경
'''print(player_merged['birthyear'].head())'''
# 0       1992
# 1       1989
# 2       1991
# 3       1982
# 4       1979

   # 2) 불필요한 column drop ( id, player_api_id, player_name, player_fifa_api_id )
player_merged = player_merged.drop(['id', 'player_api_id', 'player_name', 'player_fifa_api_id'], axis=1)
```

```
              birthday  height  weight
e ...  1992-02-29 00:00:00  182.88     187
       1989-12-15 00:00:00  170.18     146
       1991-05-13 00:00:00  170.18     163
       1982-05-08 00:00:00  182.88     198
       1979-11-08 00:00:00  182.88     154
```

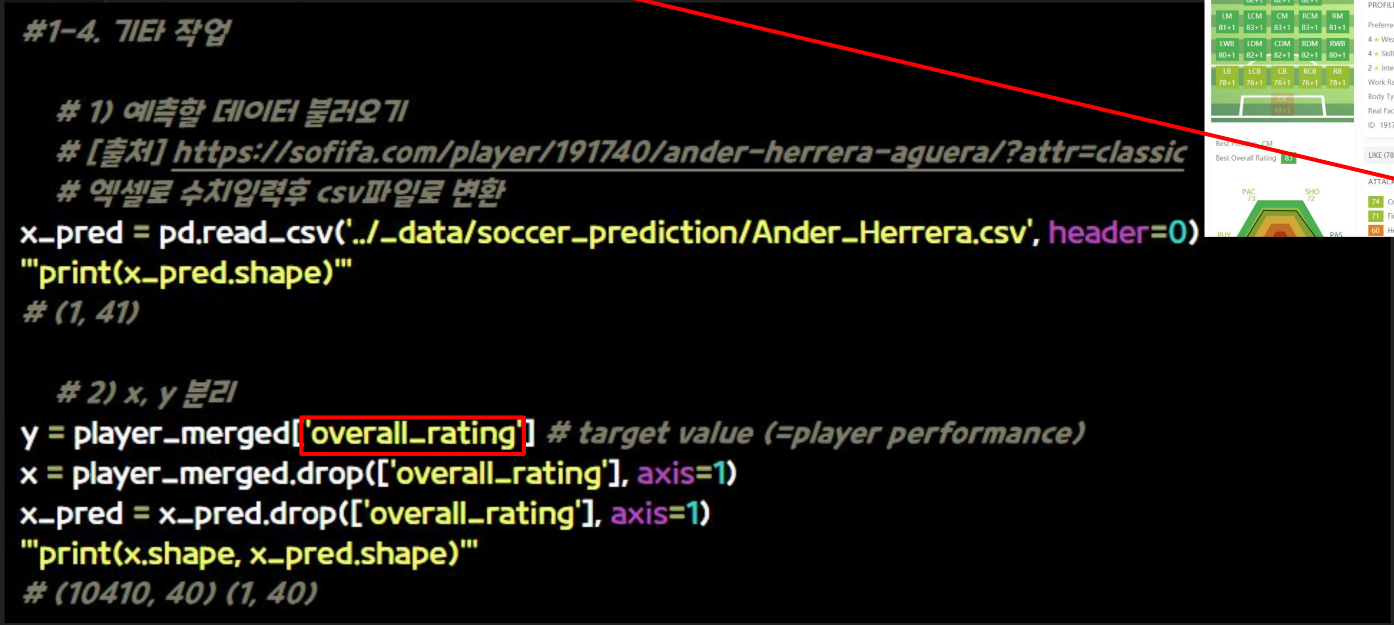
3. Data Preprocessing

4) 기타 작업

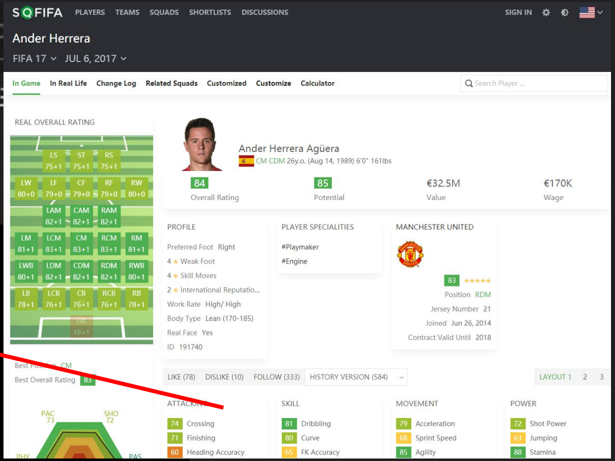


« 새 볼륨 (D:) › bitcamp2 › _data › soccer_prediction

이름	수정한 날짜	유형
Ander_Herrera.csv	2021-08-02 오후 3:19	CSV 파일
database.sqlite	2019-09-19 오전 9:23	SQLITE 파일



```
#1-4. 기타 작업

    # 1) 예측할 데이터 불러오기
    # [출처] https://sofifa.com/player/191740/ander-herrera-aguera/?attr=classic
    # 엑셀로 수치입력후 csv파일로 변환
x_pred = pd.read_csv('../_data/soccer_prediction/Ander_Herrera.csv', header=0)
'''print(x_pred.shape)'''
# (1, 41)

    # 2) x, y 분리
y = player_merged['overall_rating'] # target value (=player performance)
x = player_merged.drop(['overall_rating'], axis=1)
x_pred = x_pred.drop(['overall_rating'], axis=1)
'''print(x.shape, x_pred.shape)'''
# (10410, 40) (1, 40)
```



SOFIFA PLAYERS TEAMS SQUADS SHORTLISTS DISCUSSIONS SIGN IN

Ander Herrera

FIFA 17 JUL 6, 2017

In Game In Real Life Change Log Related Squads Customized Customize Calculator Search Player ...

REAL OVERALL RATING

	LS 75+1	ST 75+1	RS 75+1	
LW 80+0	LF 79+0	CF 79+0	RF 79+0	RW 80+0
	LAM 82+1	CAM 82+1	RAM 82+1	
LM 81+1	LCM 83+1	CM 83+1	RCM 83+1	RM 81+1
LWB 80+1	LDM 82+1	CDM 82+1	RDM 82+1	RWB 80+1
LB 78+1	LCB 76+1	CB 76+1	RCB 76+1	RB 78+1
		GK 18+1		

Best Position CM

Best Overall Rating 83

PAC 73 SHO 72 PHY PAS

Ander Herrera Agüera

CM CDM 26y.o. (Aug 14, 1989) 6'0" 161lbs

84	85	€32.5M	€170K
Overall Rating	Potential	Value	Wage

PROFILE

Preferred Foot Right

4 ★ Weak Foot

4 ★ Skill Moves

2 ★ International Reputatio...

Work Rate High/ High

Body Type Lean (170-185)

Real Face Yes

ID 191740

PLAYER SPECIALITIES

#Playmaker

#Engine

MANCHESTER UNITED

83 ★★★★★

Position RDM

Jersey Number 21

Joined Jun 26, 2014

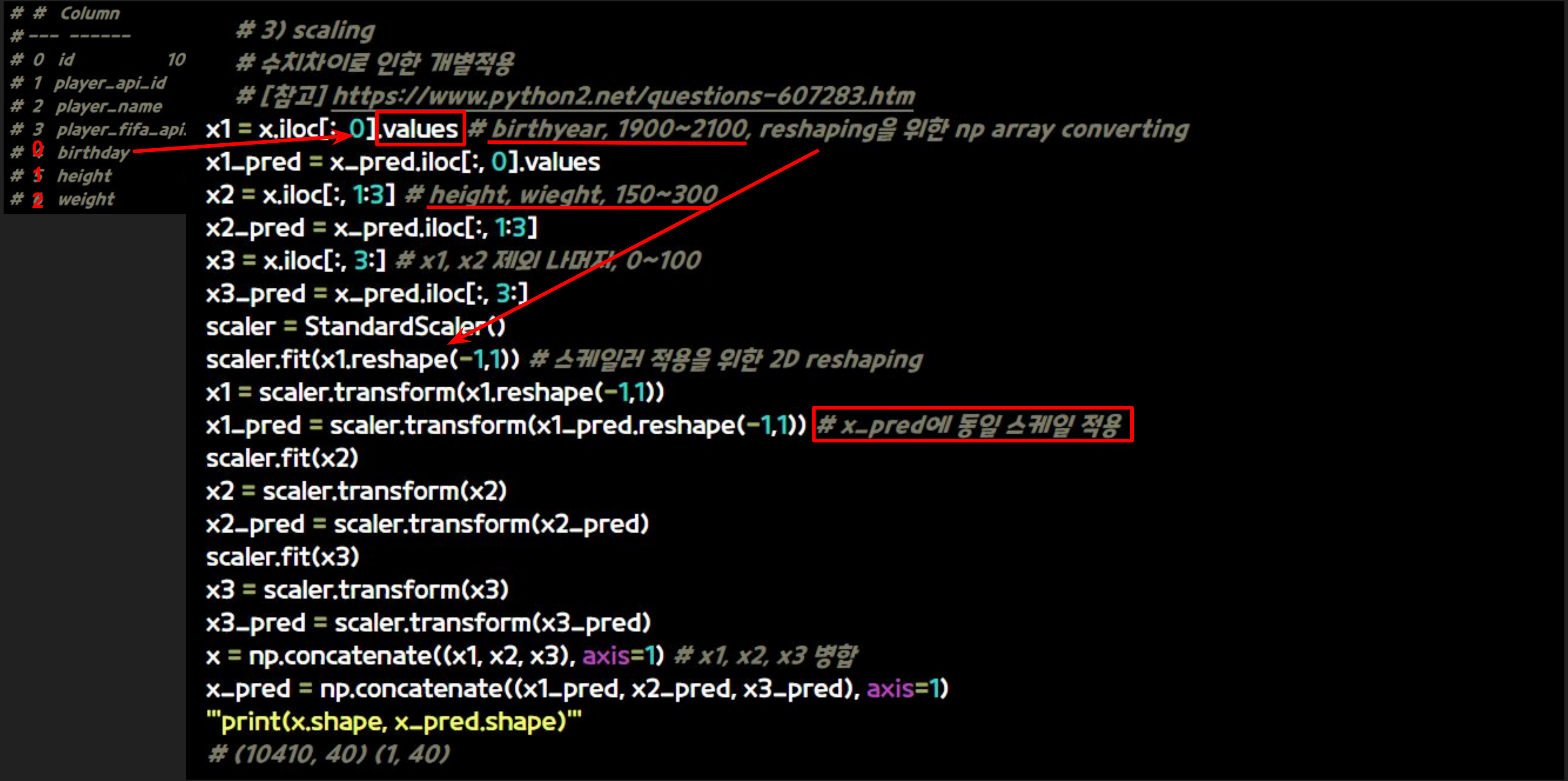
Contract Valid Until 2018

LIKE (78) DISLIKE (10) FOLLOW (333) HISTORY VERSION (584) LAYOUT 1 2 3

ATTACKING	SKILL	MOVEMENT	POWER
74 Crossing	81 Dribbling	79 Acceleration	72 Shot Power
71 Finishing	80 Curve	68 Sprint Speed	63 Jumping
60 Heading Accuracy	65 FK Accuracy	85 Agility	88 Stamina

3. Data Preprocessing

4) 기타 작업

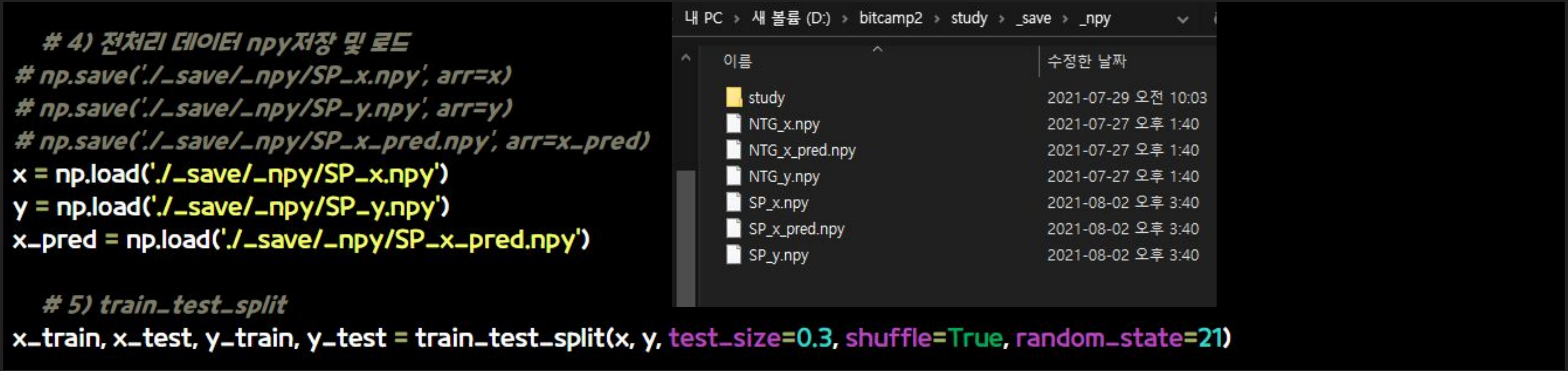


```
# #  Column
# --- ------
# 0  id              10
# 1  player_api_id
# 2  player_name
# 3  player_fifa_api
# 0  birthday
# 1  height
# 2  weight
```

```
# 3) scaling
# 수치차이로 인한 개별적용
# [참고] https://www.python2.net/questions-607283.htm
x1 = x.iloc[:, 0].values # birthyear, 1900~2100, reshaping을 위한 np array converting
x1_pred = x_pred.iloc[:, 0].values
x2 = x.iloc[:, 1:3] # height, wieght, 150~300
x2_pred = x_pred.iloc[:, 1:3]
x3 = x.iloc[:, 3:] # x1, x2 제외 나머지, 0~100
x3_pred = x_pred.iloc[:, 3:]
scaler = StandardScaler()
scaler.fit(x1.reshape(-1,1)) # 스케일러 적용을 위한 2D reshaping
x1 = scaler.transform(x1.reshape(-1,1))
x1_pred = scaler.transform(x1_pred.reshape(-1,1)) # x_pred에 동일 스케일 적용
scaler.fit(x2)
x2 = scaler.transform(x2)
x2_pred = scaler.transform(x2_pred)
scaler.fit(x3)
x3 = scaler.transform(x3)
x3_pred = scaler.transform(x3_pred)
x = np.concatenate((x1, x2, x3), axis=1) # x1, x2, x3 병합
x_pred = np.concatenate((x1_pred, x2_pred, x3_pred), axis=1)
'''print(x.shape, x_pred.shape)'''
# (10410, 40) (1, 40)
```

3. Data Preprocessing

4) 기타 작업

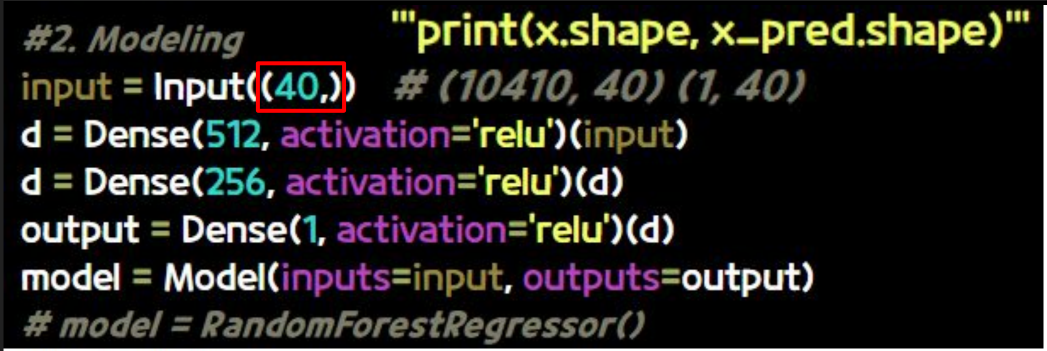


```
# 4) 전처리 데이터 npy저장 및 로드
# np.save('./_save/_npy/SP_x.npy', arr=x)
# np.save('./_save/_npy/SP_y.npy', arr=y)
# np.save('./_save/_npy/SP_x_pred.npy', arr=x_pred)
x = np.load('./_save/_npy/SP_x.npy')
y = np.load('./_save/_npy/SP_y.npy')
x_pred = np.load('./_save/_npy/SP_x_pred.npy')

# 5) train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.3, shuffle=True, random_state=21)
```

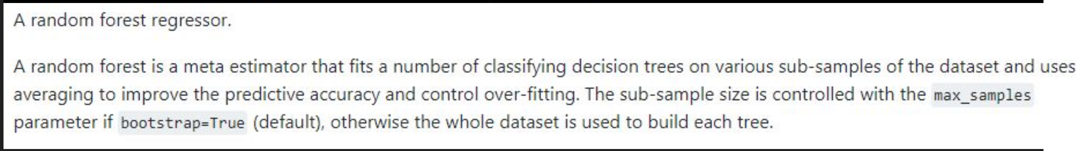
내 PC › 새 볼륨 (D:) › bitcamp2 › study › _save › _npy

이름	수정한 날짜
study	2021-07-29 오전 10:03
NTG_x.npy	2021-07-27 오후 1:40
NTG_x_pred.npy	2021-07-27 오후 1:40
NTG_y.npy	2021-07-27 오후 1:40
SP_x.npy	2021-08-02 오후 3:40
SP_x_pred.npy	2021-08-02 오후 3:40
SP_y.npy	2021-08-02 오후 3:40

4. Modeling

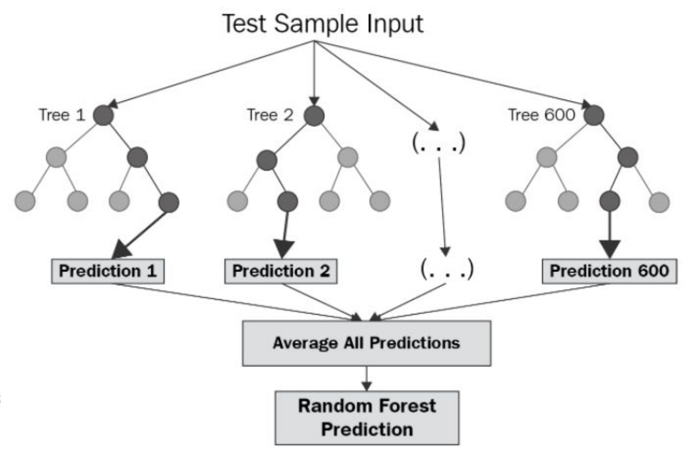


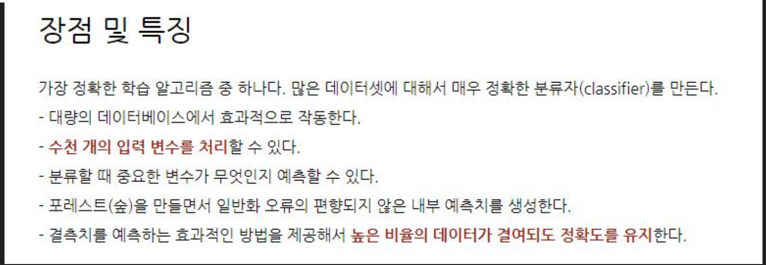
```
#2. Modeling            '''print(x.shape, x_pred.shape)'''
input = Input((40,))    # (10410, 40) (1, 40)
d = Dense(512, activation='relu')(input)
d = Dense(256, activation='relu')(d)
output = Dense(1, activation='relu')(d)
model = Model(inputs=input, outputs=output)
# model = RandomForestRegressor()
```



A random forest regressor.

A random forest is a meta estimator that fits a number of classifying decision trees on various sub-samples of the dataset and uses averaging to improve the predictive accuracy and control over-fitting. The sub-sample size is controlled with the `max_samples` parameter if `bootstrap=True` (default), otherwise the whole dataset is used to build each tree.



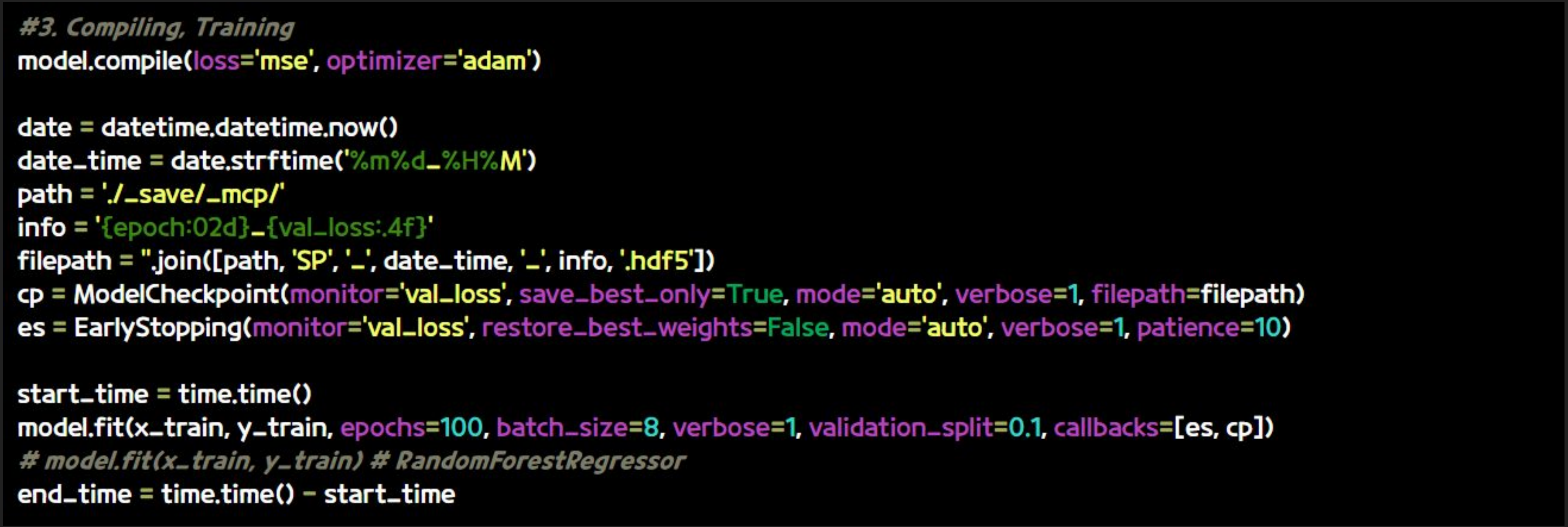


장점 및 특징

가장 정확한 학습 알고리즘 중 하나다. 많은 데이터셋에 대해서 매우 정확한 분류자(classifier)를 만든다.
- 대량의 데이터베이스에서 효과적으로 작동한다.
- 수천 개의 입력 변수를 처리할 수 있다.
- 분류할 때 중요한 변수가 무엇인지 예측할 수 있다.
- 포레스트(숲)을 만들면서 일반화 오류의 편향되지 않은 내부 예측치를 생성한다.
- 결측치를 예측하는 효과적인 방법을 제공해서 높은 비율의 데이터가 결여되도 정확도를 유지한다.

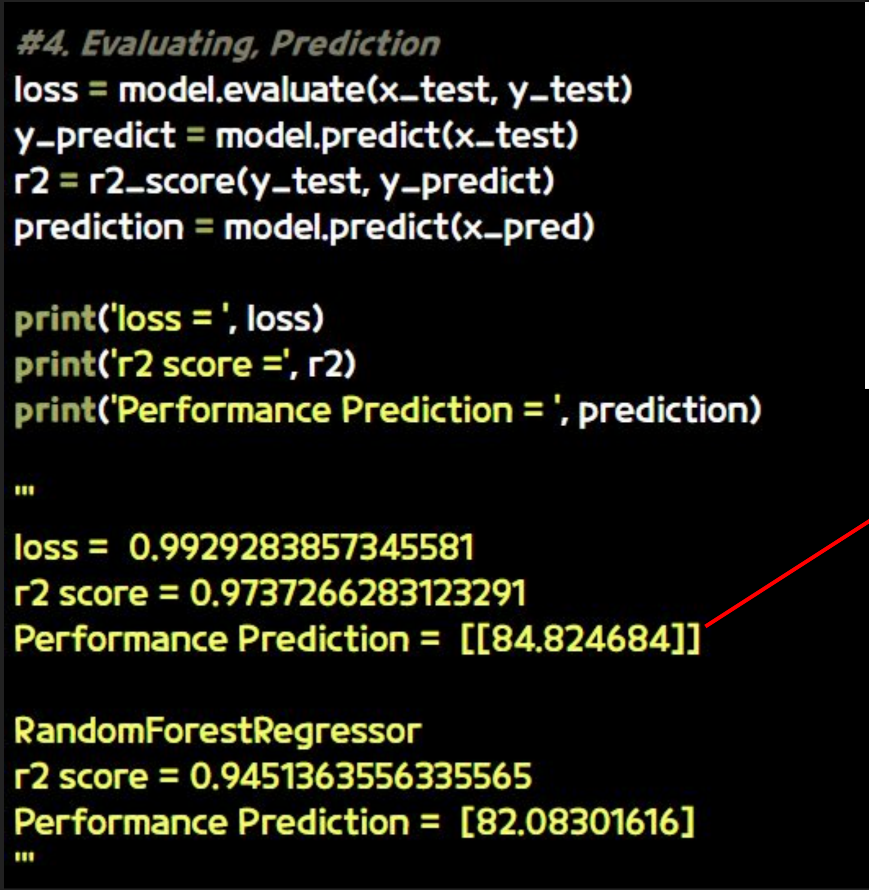
[출처]
https://post.naver.com/viewer/postView.nhn?volumeNo=28037302&memberNo=18071586
https://scikit-learn.org/stable/modules/generated/sklearn.ensemble.RandomForestRegressor.html

5. Compiling, Training

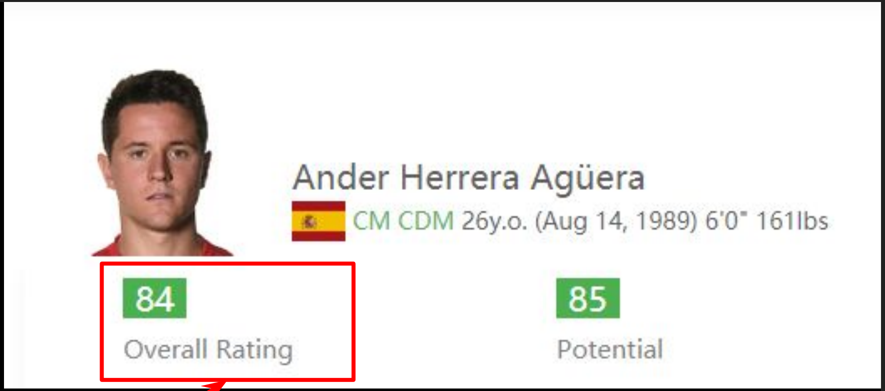


```
#3. Compiling, Training
model.compile(loss='mse', optimizer='adam')

date = datetime.datetime.now()
date_time = date.strftime('%m%d_%H%M')
path = './_save/_mcp/'
info = '{epoch:02d}_{val_loss:.4f}'
filepath = ''.join([path, 'SP', '_', date_time, '_', info, '.hdf5'])
cp = ModelCheckpoint(monitor='val_loss', save_best_only=True, mode='auto', verbose=1, filepath=filepath)
es = EarlyStopping(monitor='val_loss', restore_best_weights=False, mode='auto', verbose=1, patience=10)

start_time = time.time()
model.fit(x_train, y_train, epochs=100, batch_size=8, verbose=1, validation_split=0.1, callbacks=[es, cp])
# model.fit(x_train, y_train) # RandomForestRegressor
end_time = time.time() - start_time
```

6. Evaluating, Prediction



```
#4. Evaluating, Prediction
loss = model.evaluate(x_test, y_test)
y_predict = model.predict(x_test)
r2 = r2_score(y_test, y_predict)
prediction = model.predict(x_pred)

print('loss = ', loss)
print('r2 score =', r2)
print('Performance Prediction = ', prediction)

'''
loss =  0.9929283857345581
r2 score = 0.9737266283123291
Performance Prediction =  [[84.824684]]

RandomForestRegressor
r2 score = 0.9451363556335565
Performance Prediction =  [82.08301616]
'''
```



Ander Herrera Agüera
CM CDM 26y.o. (Aug 14, 1989) 6'0" 161lbs

84
Overall Rating

85
Potential

7. 프로젝트 성과 및 과제

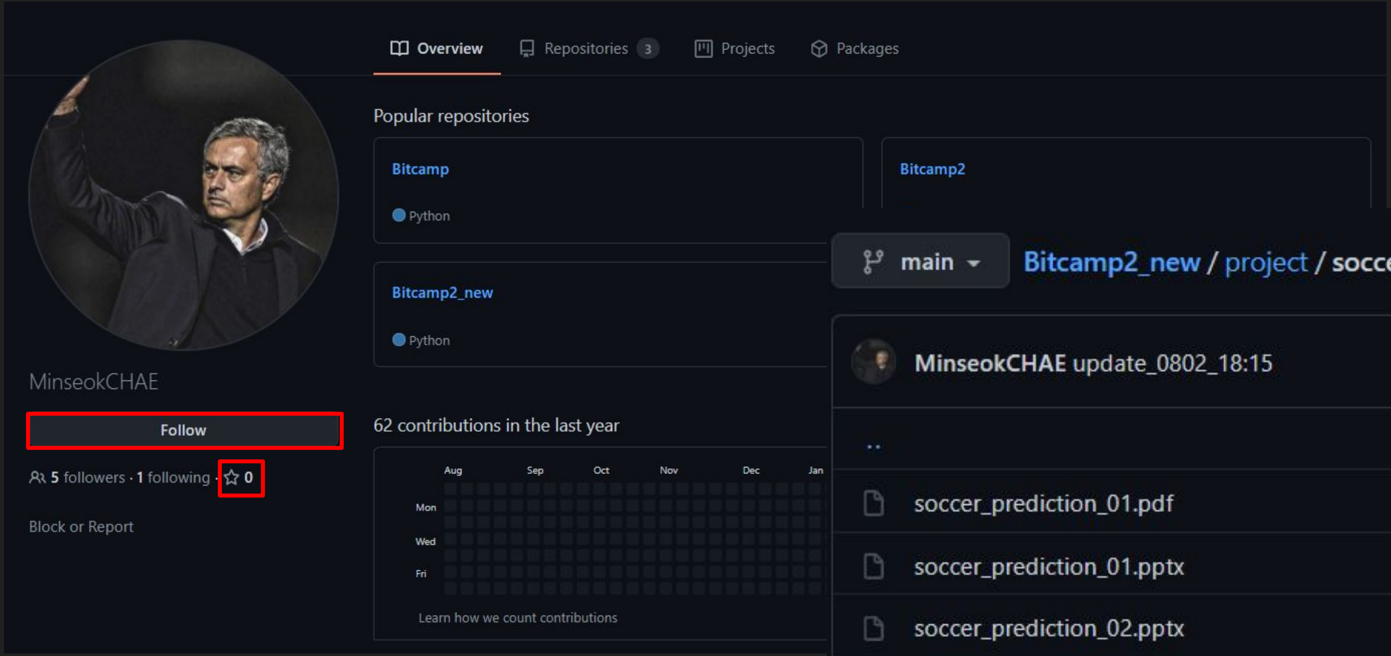
전처리 스킬 학습

- pd.read_sql_query(SELECT * FROM)
- pd.get_dummies()
- LabelBinarizer()
- df.groupby().mean()
- df.merge(on='column')
- pd.to_datetime()
- df.apply(lambda x:)

tensorboard 적용 —> 훈련과정 시각화, loss, val_loss 추적 및 분석

RandomForestRegressor 심화 응용

https://github.com/MinseokCHAE



MinseokCHAE

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62 contributions in the last year

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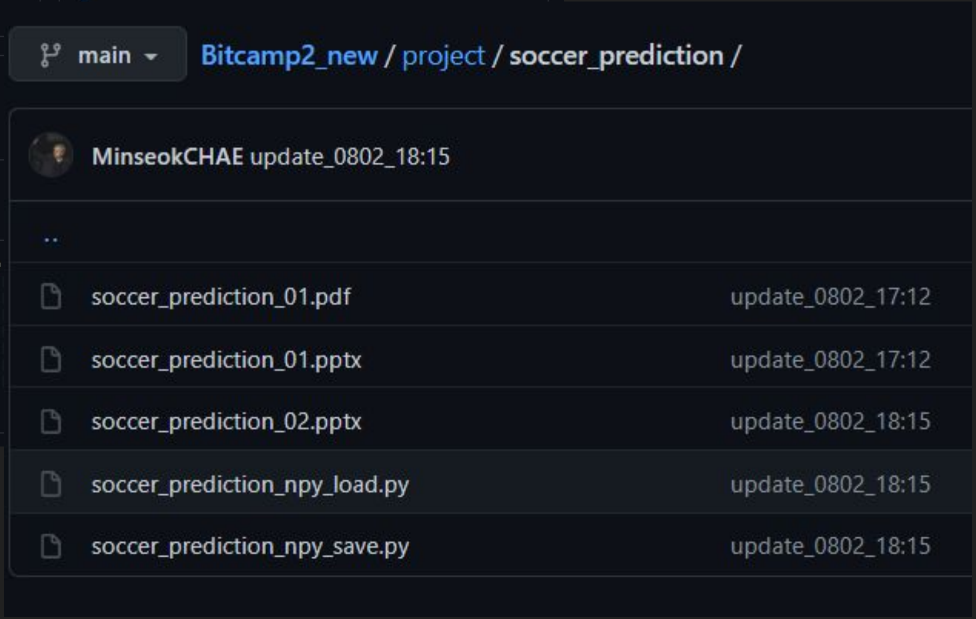

main

Bitcamp2_new / project / soccer_prediction /

MinseokCHAE update_0802_18:15

..

soccer_prediction_01.pdf	update_0802_17:12
soccer_prediction_01.pptx	update_0802_17:12
soccer_prediction_02.pptx	update_0802_18:15
soccer_prediction_npy_load.py	update_0802_18:15
soccer_prediction_npy_save.py	update_0802_18:15