AI

XG Boost VS Light GBM

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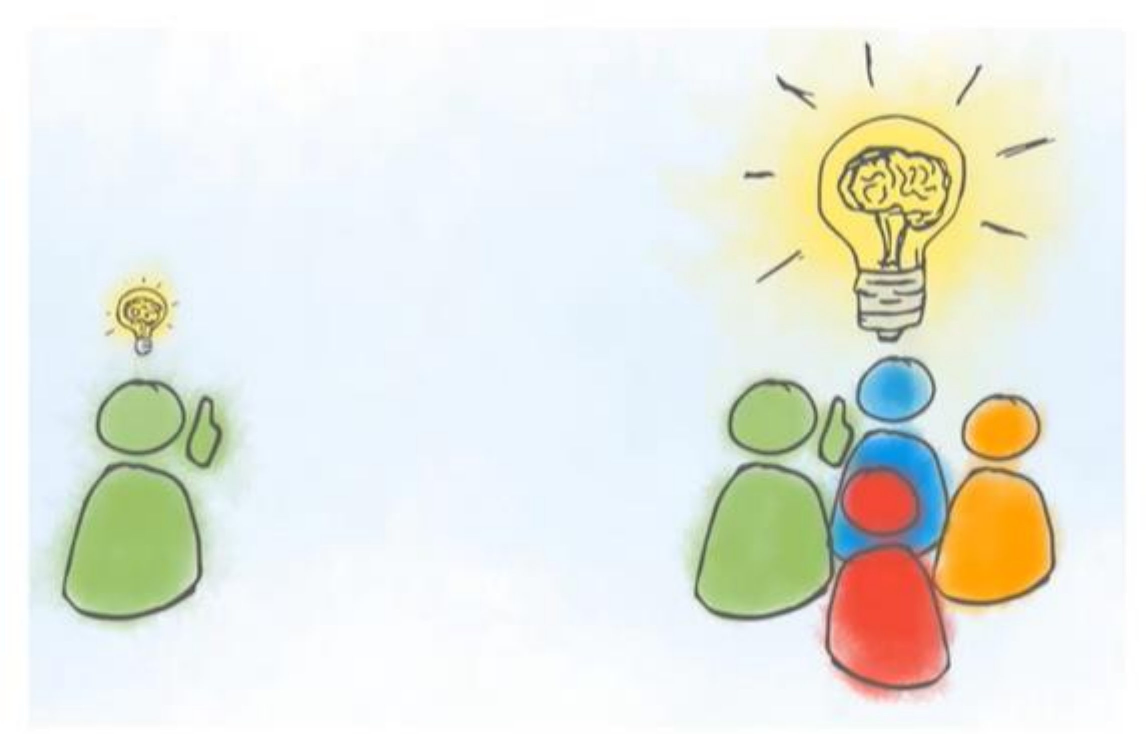
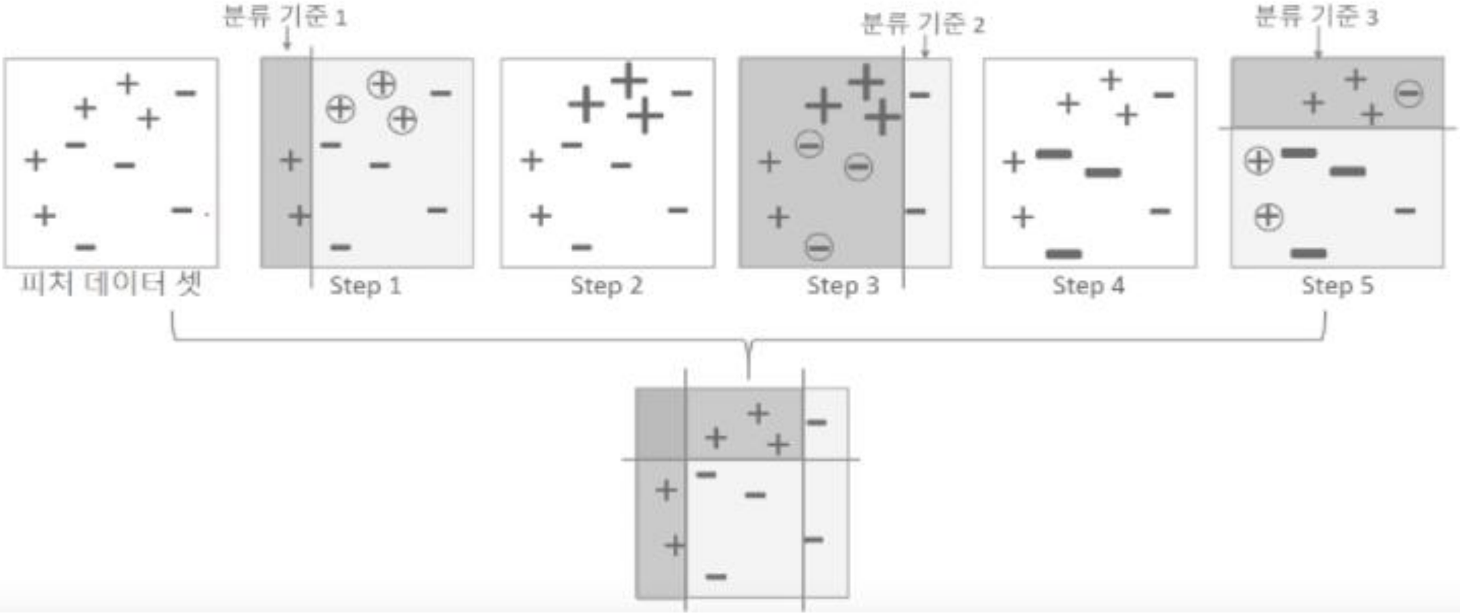
01. 사전지식

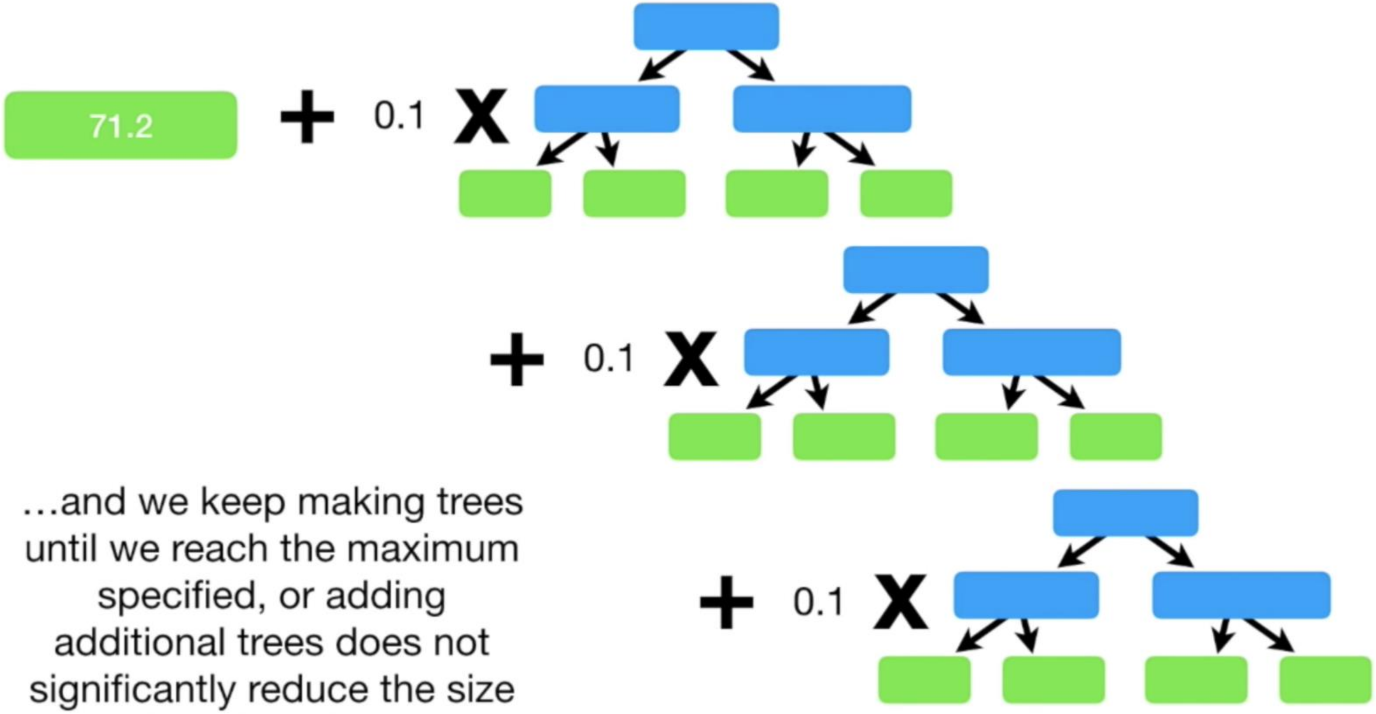
앙상블 학습



Boosting?



GBM



…and we keep making trees until we reach the maximum specified, or adding additional trees does not significantly reduce the size of the **Residuals**.

…etc…etc…etc…

02. XGBoost

XGBoost

- 과적합 규제
- CPU병렬처리 지원

- Y = $M(x) + error(1)$

XGBoost

- $\mathrm{Y} = M(x) + error(1)$
- $error(1) = G(x) + error(2)$

- $\mathrm{Y} = M(x) + error(1)$
- $error(1) = G(x) + error(2)$
- $error(2) = H(x) + error(3)$

- $\mathrm{Y} = M(x) + error(1)$
- $error(1) = G(x) + error(2)$
- $error(2) = H(x) + error(3)$

- $\mathrm{Y} = M(x) + G(x) + H(x) + error(4)$

- Y = $M(x)\ +\ error(1)$
- $error(1) = G(x)\ +\ error(2)$
- $error(2) = H(x) + error(3)$

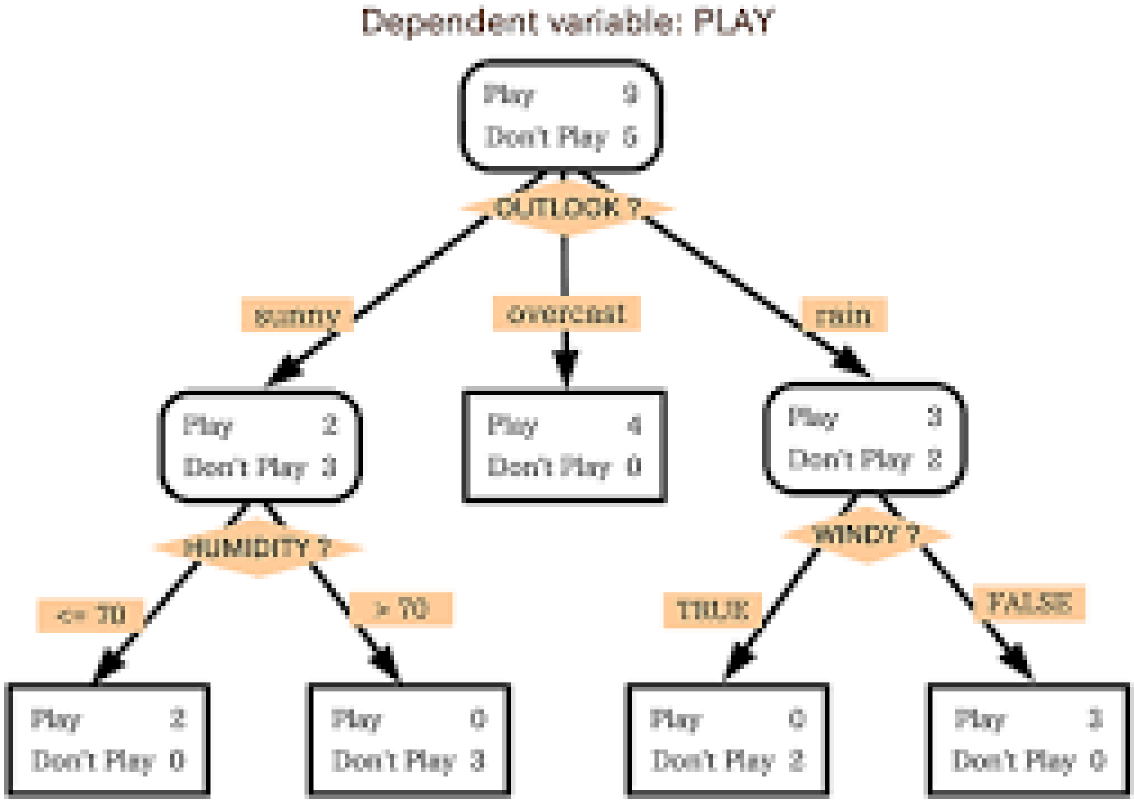
- Y = $M(x) + G(x) + H(x) + error(4)$

- Y = $\alpha M(x) + \beta G(x) + rH(x) + error(4)$

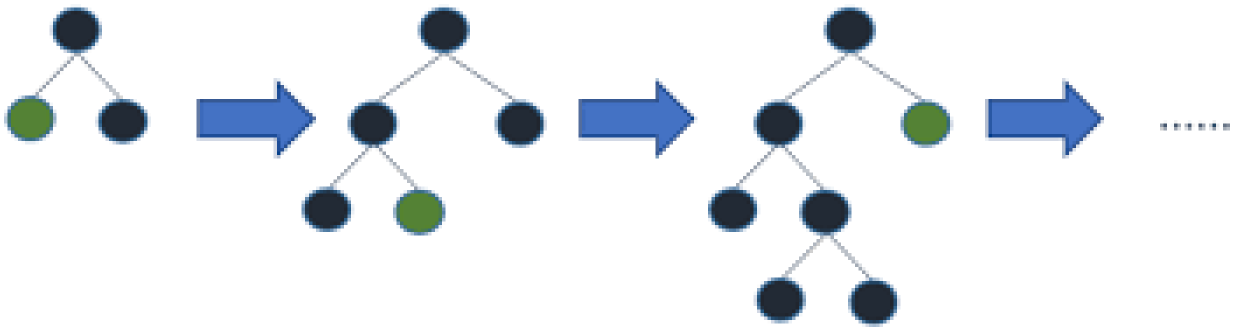
03. LightGBM

LightGBM

- 과적합에 민감합니다
- CPU병렬처리 지원 + GPU지원


Dependent variable: PLAY
Play 9
Don't Play 5
OUTLOOK ?
sunny
overcast
rain
Play 2
Don't Play 3
Play 4
Don't Play 0
Play 3
Don't Play 2
HUMIDITY ?
<= 70
> 70
WINDY ?
TRUE
FALSE
Play 2
Don't Play 0
Play 0
Don't Play 3
Play 0
Don't Play 2
Play 3
Don't Play 0

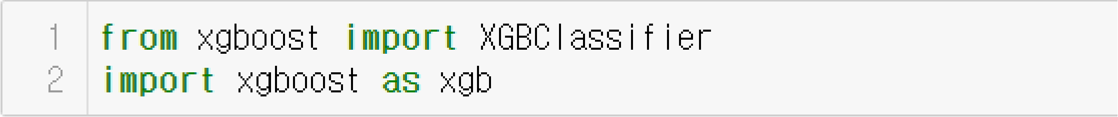
LightGBM



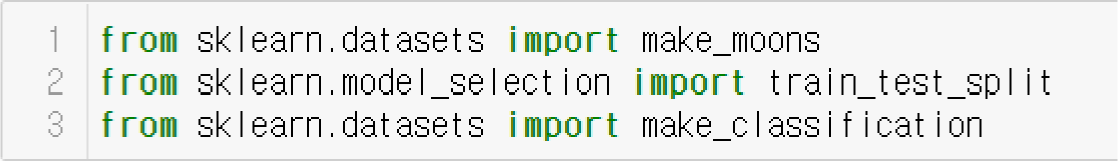
Leaf-wise tree growth

04. XGBoost VS LightGBM

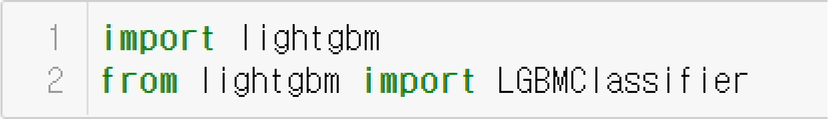
XGBoost VS LightGBM



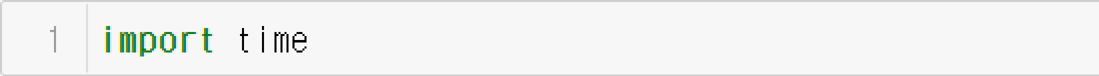
```python
from xgboost import XGBClassifier
import xgboost as xgb
```



```python
from sklearn.datasets import make_moons
from sklearn.model_selection import train_test_split
from sklearn.datasets import make_classification
```

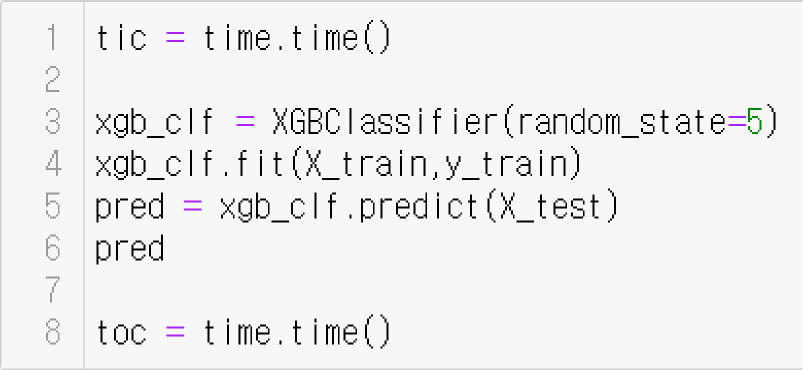


```python
import lightgbm
from lightgbm import LGBMClassifier
```

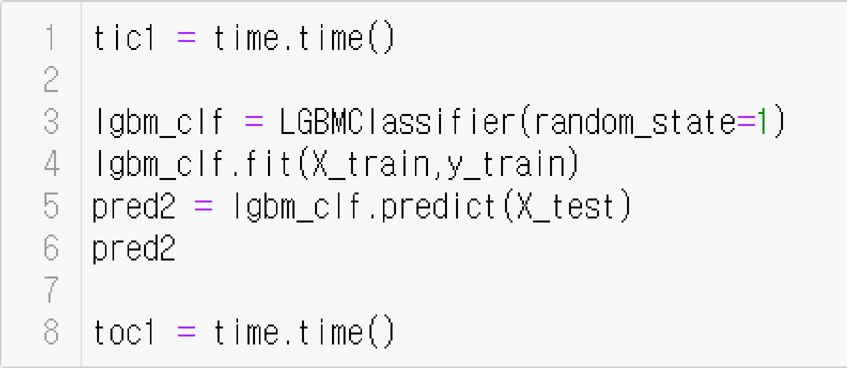


```python
import time
```

XGBoost VS LightGBM

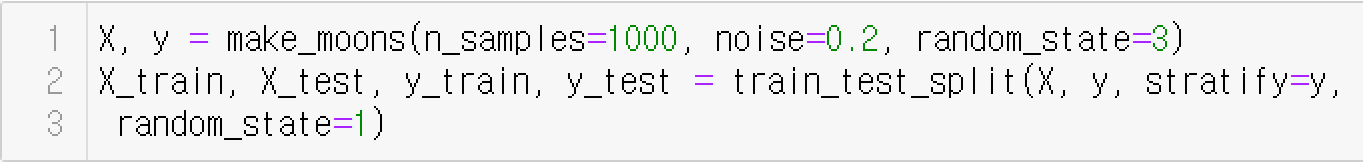


```
tic = time.time()

xgb_clf = XGBClassifier(random_state=5)
xgb_clf.fit(X_train,y_train)
pred = xgb_clf.predict(X_test)
pred

toc = time.time()
```

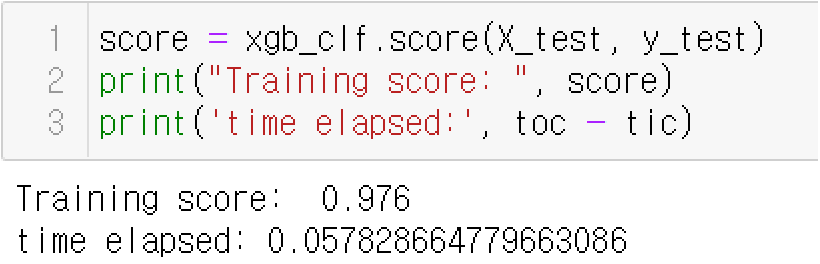


```
tic1 = time.time()

lgbm_clf = LGBMClassifier(random_state=1)
lgbm_clf.fit(X_train,y_train)
pred2 = lgbm_clf.predict(X_test)
pred2

toc1 = time.time()
```

XGBoost VS LightGBM

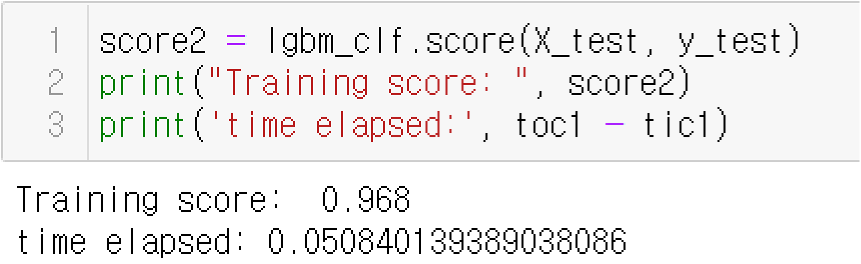


```
X, y = make_moons(n_samples=1000, noise=0.2, random_state=3)
X_train, X_test, y_train, y_test = train_test_split(X, y, stratify=y,
 random_state=1)
```



```
score = xgb_clf.score(X_test, y_test)
print("Training score: ", score)
print('time elapsed:', toc - tic)
```

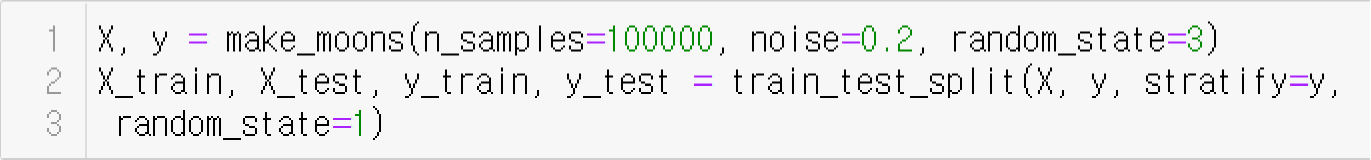
```
Training score:  0.976
time elapsed: 0.05782864779663086
```



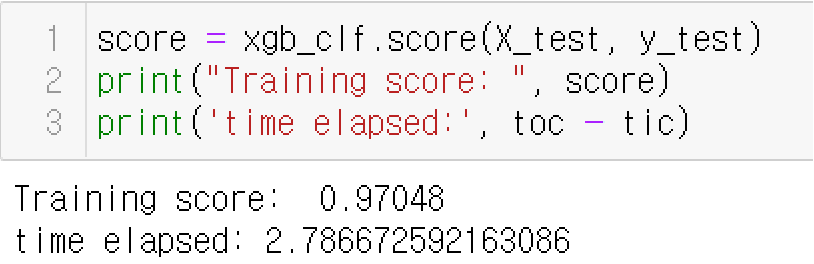
```
score2 = lgbm_clf.score(X_test, y_test)
print("Training score: ", score2)
print('time elapsed:', toc1 - tic1)
```

```
Training score:  0.968
time elapsed: 0.05084013938903808б
```

XGBoost VS LightGBM

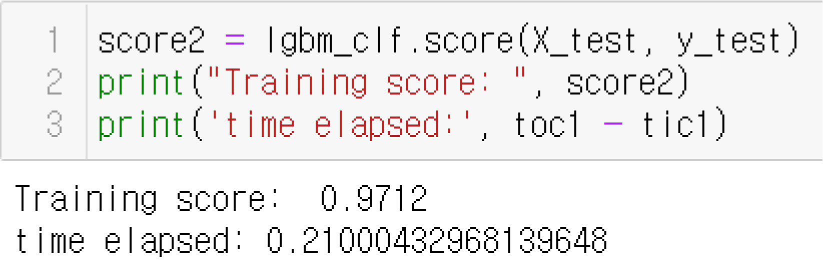


```
X, y = make_moons(n_samples=100000, noise=0.2, random_state=3)
X_train, X_test, y_train, y_test = train_test_split(X, y, stratify=y,
 random_state=1)
```



```
score = xgb_clf.score(X_test, y_test)
print("Training score: ", score)
print('time elapsed:', toc - tic)
```

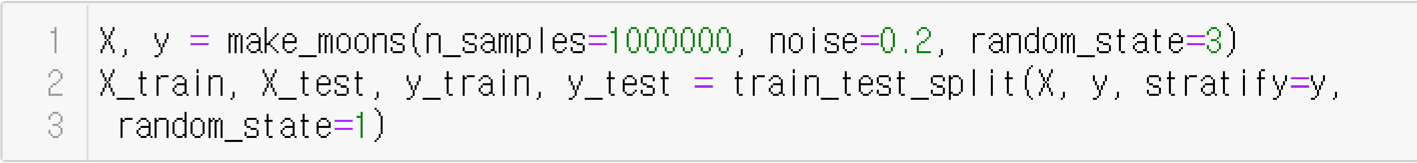
```
Training score:  0.97048
time elapsed: 2.786672592163086
```



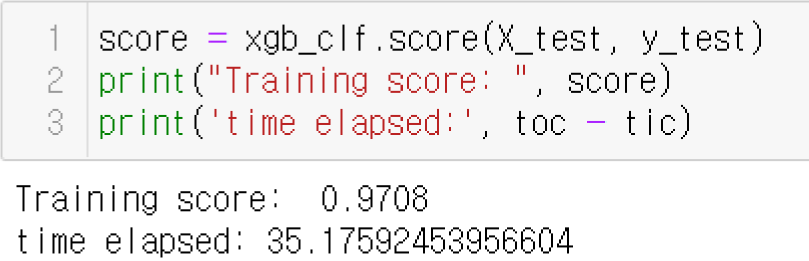
```
score2 = lgbm_clf.score(X_test, y_test)
print("Training score: ", score2)
print('time elapsed:', toc1 - tic1)
```

```
Training score:  0.9712
time elapsed: 0.21000432968139648
```

XGBoost VS LightGBM

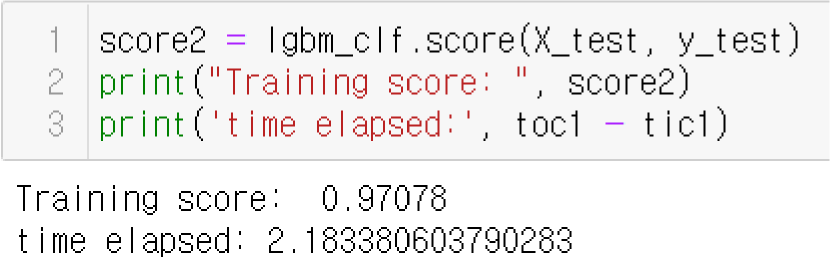


```python
X, y = make_moons(n_samples=1000000, noise=0.2, random_state=3)
X_train, X_test, y_train, y_test = train_test_split(X, y, stratify=y,
 random_state=1)
```



```python
score = xgb_clf.score(X_test, y_test)
print("Training score: ", score)
print('time elapsed:', toc - tic)
```

```
Training score:  0.9708
time elapsed: 35.17592453956604
```



```python
score2 = lgbm_clf.score(X_test, y_test)
print("Training score: ", score2)
print('time elapsed:', toc1 - tic1)
```

```
Training score:  0.97078
time elapsed: 2.183380603790283
```

Question

감사합니다☺