Data science HW2

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HW2

- Description
- How to submit and choose predictions
- Baseline method
- Hints

Kaggle

- HW2 will be held on Kaggle
  - **Please register a Kaggle account first**
- A platform of
  - Machine learning competition
  - Sharing dataset
- https://zh.wikipedia.org/wiki/Kaggle

HW2

- HW2 Kaggle link
  - https://www.kaggle.com/t/5e802ad74032485e94a4e1d1d91c0870

- Deadline: 2021/04/19 23:59 (3 weeks)

- We will **use the result on Kaggle to score** this homework
  - *Please hand in a python file*
  - **Remember to fill your Kaggle name in the google form** https://docs.google.com/spreadsheets/d/1nh0shU11SOPmwZFAzIVv71yB2olcIMHW/edit?usp=sharing&ouid=108250933224256718627&rtpof=true&sd=true

Problem description

- **Supervised binary classification problem**
- Given a data set
  - Training set with label
  - Testing set without
- You need to predict the labels of testing data

Dataset description

- The dataset is **transformed** from real weather observations dataset

- 16 numeric features, 5 nominal features, 1 label
  - *Numeric feature are nonlinear transformed*
  - *About 20% data become missing value*

- Our dataset label is '**Label**'

Output format

- For each testing instance, there is a unique id
- Output your prediction to csv file with the following format and submit to kaggle

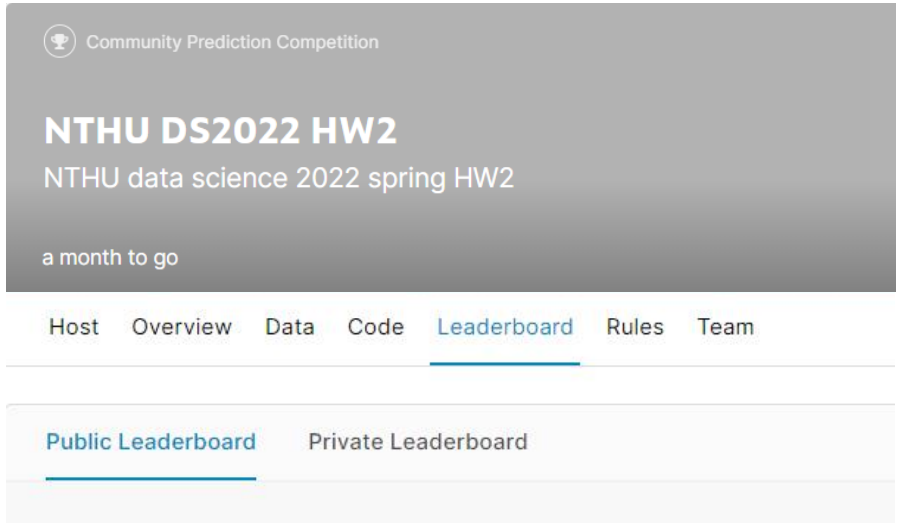
  Remember to output the first line

  - Id, Label
  - Id1, Label 1
  - Id2, Label 2
  - …

Id	Label
0	0
1	0
2	0
3	0
4	0
5	0
6	0

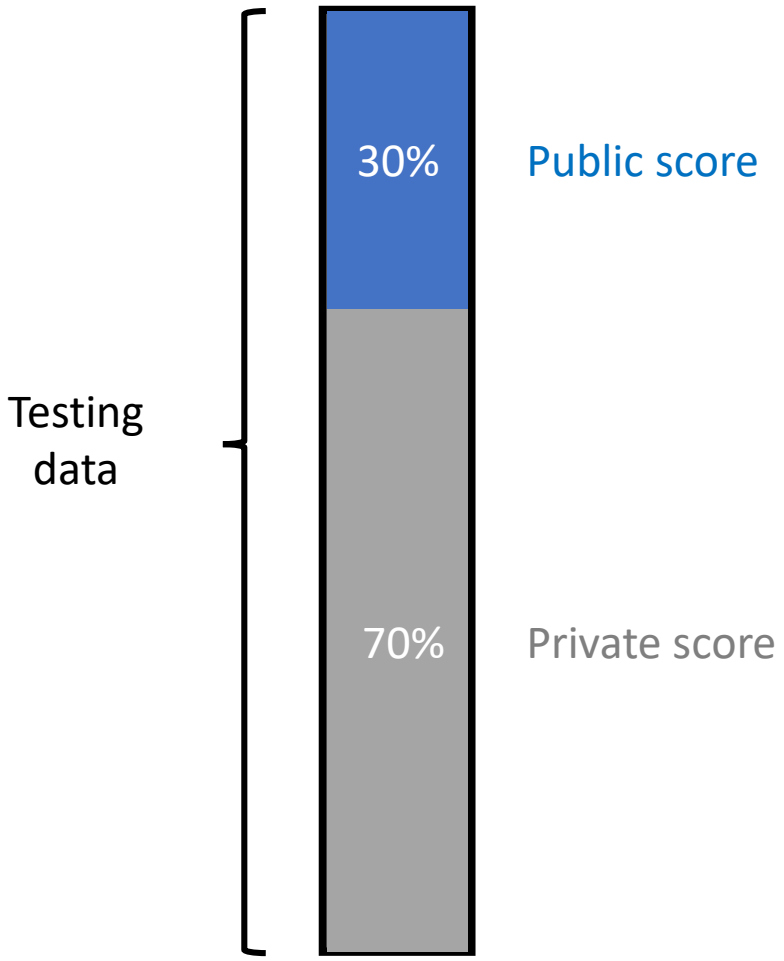
Evaluation

- We use F1-score
  - $2 \times \frac{precision \times recall}{precision + recall}$
- There are two leaderboards on Kaggle
  - **Public**
    - Can be seen during competition
  - **Private**
    - Can be seen after competition



Public and Private leaderboard

- **Public** (Can be seen during competition)
  - 30% testing data
  - For reference
- **Private** (Can be seen after competition)
  - the other 70%
  - **Use this result for final scoring**

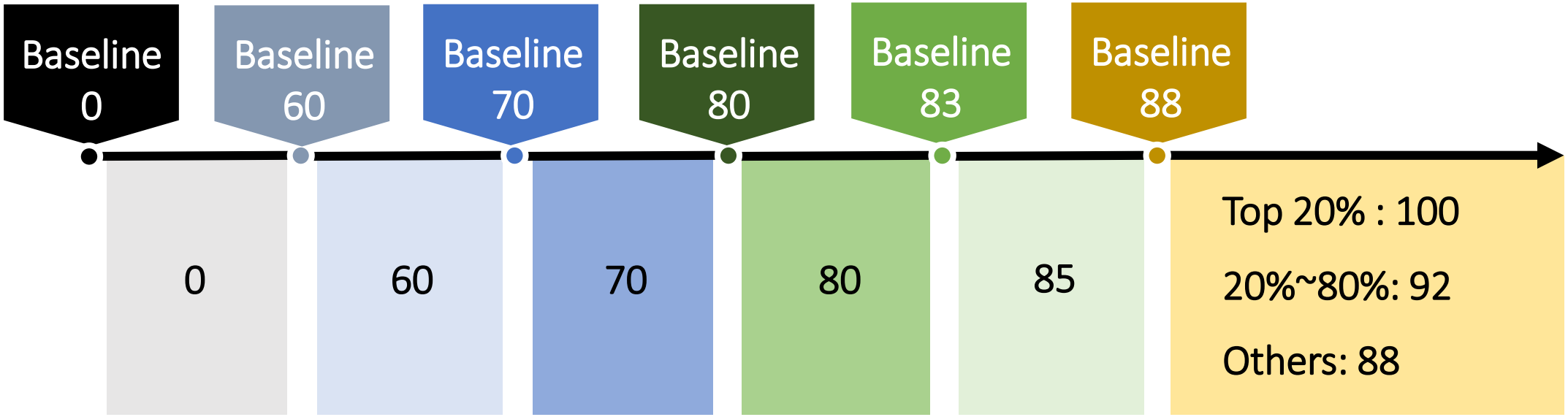


Scoring

- Use *private leaderboard result* for final scoring
- Baseline scores
  - We will score according to given 7 baseline scores

	Public	Private
Baseline 88	0.44492	**0.43355**
Baseline 83	0.40148	**0.38576**
Baseline 80	0.36224	**0.36259**
Baseline 70	0.32343	**0.33192**
Baseline 60	0.29102	**0.28034**
Baseline 0	0.26840	**0.25701**

Scoring



- You will get **0**, if your private score is between *baseline 0* and *baseline 60*
- You will get **60**, if your private score is between *baseline 60* and *baseline 70*
- You will get **70**, if your private score is between *baseline 70* and *baseline 80*
- And so on

Scoring

- Baseline scores
  - There are benchmarks on the leaderboard for reference

#	Team	Members	Score	Entries	Last	Code
	Baseline 88		0.44492			
	Baseline 83		0.40411			
	Baseline 80		0.36244			
	Baseline 70		0.32343			
	Baseline 60		0.29102			
	Baseline 0		0.26804			
	sampleSubmission.csv		0.15929			

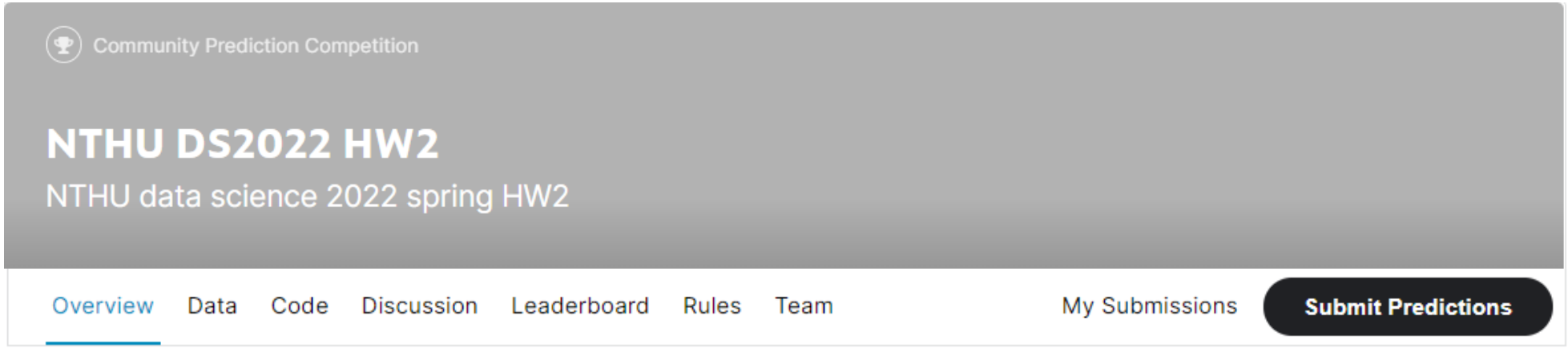
Other rules

- You can submit 15 times per day
- You can choose 4 predictions for final scoring
  - Kaggle will use the best one to be your final result

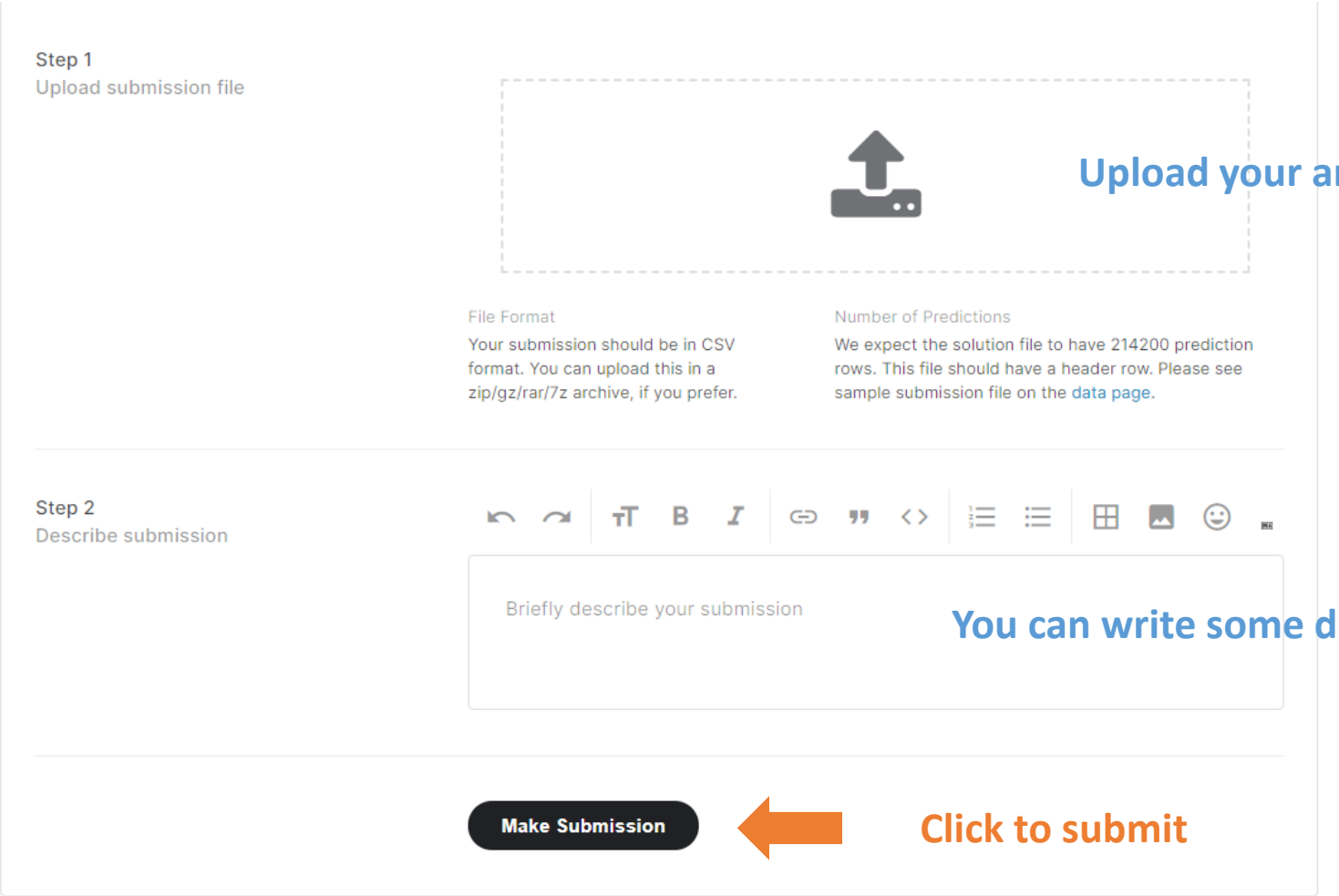
How to submit and choose predictions

How to submit

- Click ***'Submit Predictions'*** button on the navigation bar



How to submit



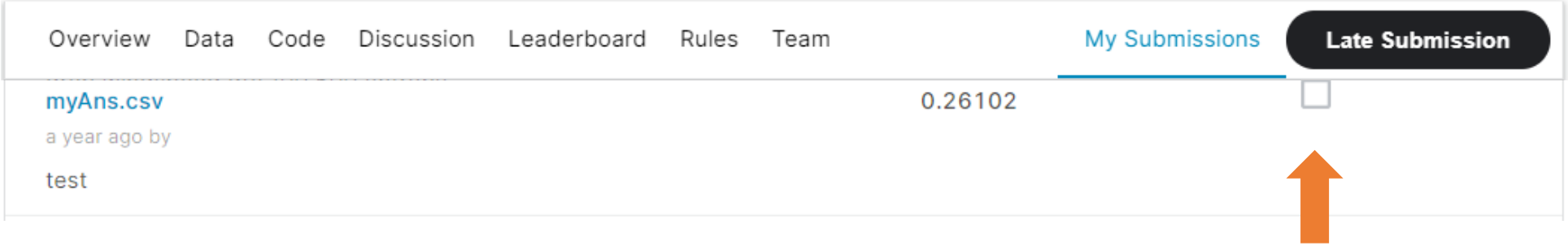
Upload your answer csv file here

You can write some description about the answer csv file

Click to submit

Choose predictions for final scoring

- You can see all your submissions in ***'My Submissions'***



- **Remember to choose 4 predictions before the deadline**

Baseline method

Baseline method

- We provide a simple baseline method code for your reference
  - **Baseline 0**
- The steps in baseline are as below
  - Read training/testing data
  - Drop columns which are not numeric features
  - Fill missing value
  - Train a *decision tree* classifier
  - Output prediction

Baseline 0 method

- Read training/testing data

```
# 為了處理方便，把 'train.csv' 和 'test.csv' 合併起來，'test.csv'的 Weather 欄位用 0 補起來。
df = pd.read_csv('train.csv')
df_test = pd.read_csv('test.csv')
df_test['Label'] = np.zeros((len(df_test),))

# 以 train_end_idx 作為 'train.csv' 和 'test.csv' 分界列，
train_end_idx = len(df)
df = pd.concat([df, df_test], sort=False)
```

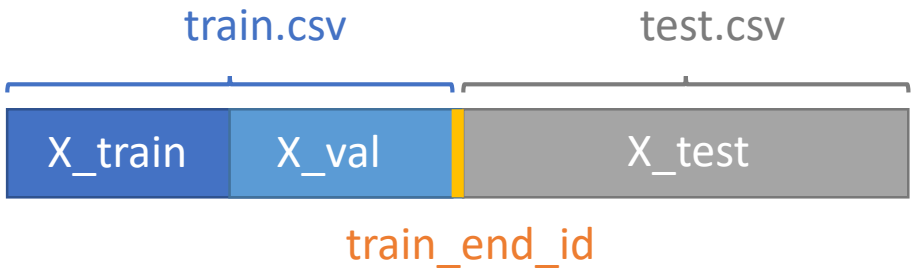
Baseline 0 method

- Drop columns which are not numeric features
- Fill missing value

```
# 將非數值欄位拿掉
df = df.drop(columns = [col for col in df.columns if df[col].dtype == np.object])

# 將 missing value 補 0
df = df.fillna(0)
```

Baseline 0 method



- Split dataset

```
from sklearn.model_selection import train_test_split

X_train, X_val, y_train, y_val = train_test_split(
    df.drop(columns = ['Label']).values[:train_end_idx, :],
    df['Label'].values[:train_end_idx], test_size=0.5)

X_test = df.drop(columns = ['Label']).values[train_end_idx:, :]
```

Baseline 0 method

- Train a decision tree classifier and output prediction

```
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, f1_score

#train tree model
model = DecisionTreeClassifier()
model.fit(X_train,y_train)

#predict
y_pred_decision = model.predict(X_val)
print('Accuracy: %f' % accuracy_score(y_val, y_pred_decision))
print('f1-score: %f' % f1_score(y_val, y_pred_decision))
```

```
ans_pred = model.predict(X_test)
df_sap = pd.DataFrame(ans_pred.astype(int), columns = ['Label'])
df_sap.to_csv('myAns.csv',  index_label = 'Id')
```

Hints

Hints

- You can try to encode features in object type
  - Some features in object type may contain important information

```
from sklearn.preprocessing import LabelEncoder
labelencoder = LabelEncoder()
df['Loc'] = labelencoder.fit_transform(df['Loc'])
...
```

  - Fillna with median in numeric features instead of 0

```
df[i] = df[i].fillna(median)
```

Complete these may achieve the same or higher effect as the baseline 60

Hints

- Try different models
  - KNN, SVM, Logistic Regression, Random Forest ...

```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.linear_model import LogisticRegression
from sklearn.ensemble import RandomForestClassifier
from sklearn.naive_bayes import GaussianNB
```

Finetune the model may achieve higher effect than the baseline 70

Hints

- The numbers of label is imbalance
- Deal with data imbalance
  - There are some sampler you can try

```
from imblearn.over_sampling import SMOTE, ADASYN, RandomOverSampler
```

Complete this may achieve the same or higher effect as the baseline 80

Hints

- More techniques for better performance
  - Feature selection
  - Normalization
  - Dimension reduction (PCA, TSNE)
  - Try other different models (AdaBoost….)
  - …

- We use private leaderboard as the final score
  - Use public score to choose your model is dangerous
  - **It’s better to perform validation**

Packages you may use

- Scikit-learn
  - https://scikit-learn.org/stable/index.html
- Pandas
  - https://pandas.pydata.org/pandas-docs/stable/
- Imbalance learn (for over sampling and down sampling)
  - https://imbalanced-learn.readthedocs.io/en/stable/