**4.Ranking**

我们把排序任务转化为二分类问题。**首先**需要划分数据集，对于线下数据集，使用每个阶段underexpose\_click\_test.csv中所有user的最后一次点击item作为线下测试集，使用underexpose\_click\_test.csv中的其他数据和underexpose\_click\_train.csv中的数据作为线下训练集。对于线上数据集，使用所有样本数据计算召回阶段的item。**其次**选择正负样本，将线下训练集中所有user的最后一次点击item作为标签，使用训练集中的其他数据做item召回，并将召回item中用户实际点的击item数据作为正样本，其他item作为负样本。**再次**对召回的item做特征工程，特征主要包括两个部分，第一部分是构建四路召回item排名和分数的组合特征，第二部分是计算每一个user召回的item和当前user的最后三次，最后二次点击和最后一次点击item的txt\_vec和img\_vec的相似度以及特征向量的组合**。最后**使用训练集训练Catboost模型，使用线下测试集评估模型表现和调参。Catboost的参数如表1所示，使用logloss用作二分类的损失函数，eval\_metric=”F1”,通过对比训练集数据和测试集数据损失函数曲线以及F1分数指标，选择模型不发生过拟合时的最好表现情况下的iterations，使用earlyStoping方法确定iterations=20，通过调参发现max\_depth和subsample以及colsample\_bytree再默认条件下模型表现很好，通过设置class\_weights=[1,20]调节正负样本权重比例，Catboost可以得到更好的F1分数。

We model the ranking task as a binary classification problem.

**Firstly**, the dataset needs to be partitioned. For the offline dataset, the last click data of users in underexpose\_test.csv is added into offline test set, the other click data in underexpose\_test.csv and all the data in underexpose\_train.csv are regarded as offline training set . For the online dataset, all the data in phase 7, 8 and 9 are used to calculate the recall items.

**Secondly**, positive and negative samples are selected and the offline training dataset pooling the all users’ last click item as label , leaving the others calculate recall items. The recalled item hitting the actual clicked item is selected as a positive sample and the others serve as negative samples. Sample features contains two parts. The first part consists of conbination of rank and score of 4 different recalled items. The second one includes comnination of feature vetors and similarity of feature vectors. The comnination of feature vetors are constructed by text vetor or image vetor between the user’s recalled item and the user’s last one, last two and last three click item. Similarly, the similarity is calculated though text vetors or image vetors between the user’s recalled item and the user’s last one,last two and last three click item.

**Finally**, the Catboost model is trained using the offline training data in phase 1, 2, 3, 4, and 5. the model performance and parameters are evaluated using the offline test data in corresponding phase. The impotant parameters of Catboost are shown in Table 1, we set function=”Logloss”, eval\_metric="F1". By comparing the loss function curves and F1 score metrics for training set data and test set data, we set iterations=20 using the the earlystoping method to acquire best model performance before overfitting. With class\_weights=[1,20], model can get a better F1 score In the case of unbalanced positive and negative samples. The trained Catboost model is applied to evaluate online recalled items.