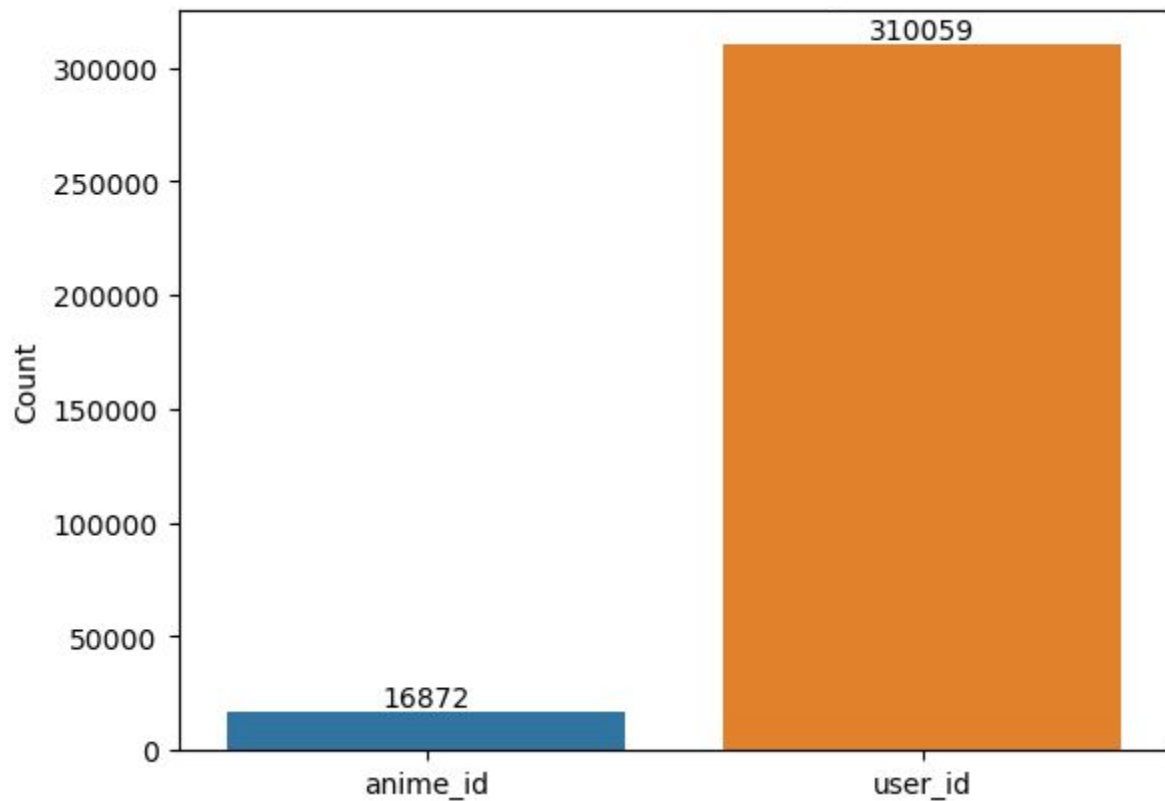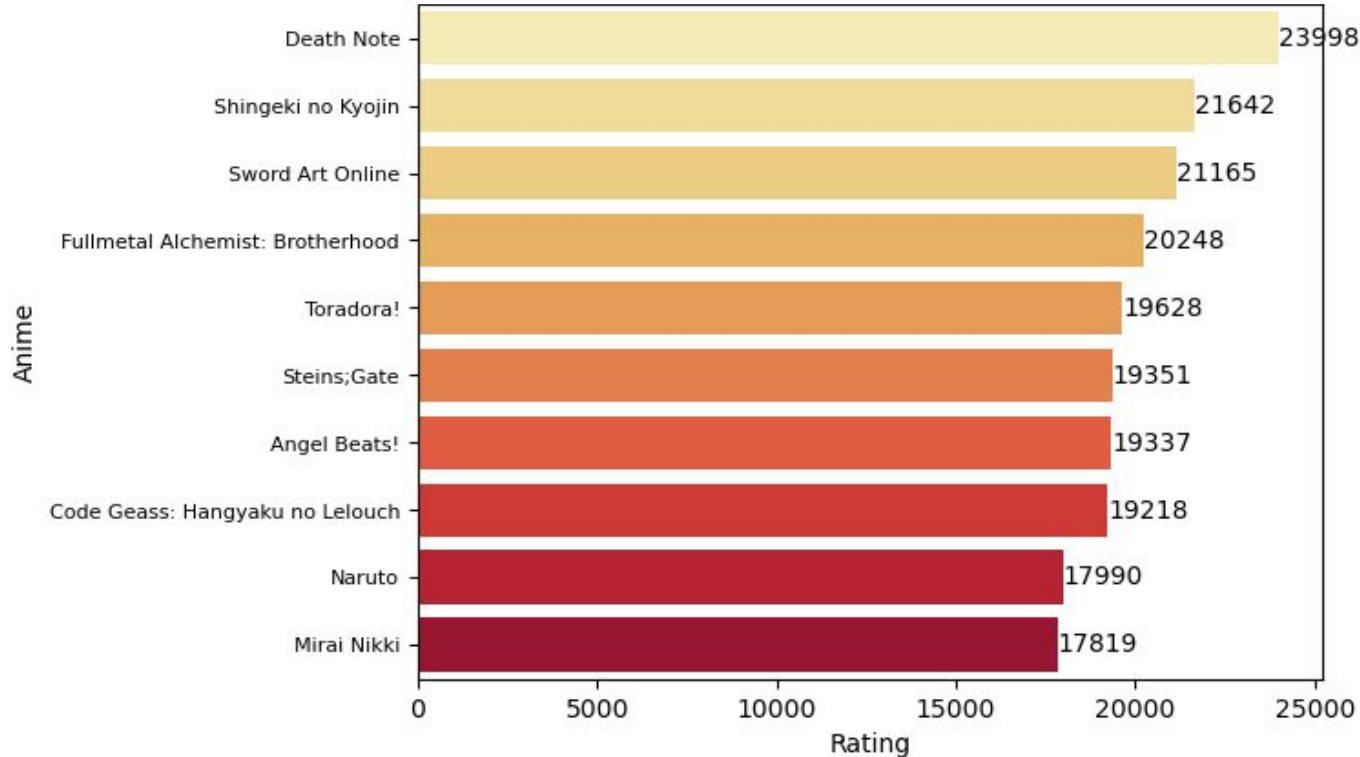# Anime Recommendation System

Types of Recommendation

- Item-based recommendation - given an anime, similar anime can be recommended to the user. This can be done based on different features of the anime such as genre, synopsis, source and so on. One common feature used is rating.

- User-based collaborative recommendation - recommend the anime liked by similar users. Similar users are those who liked the favorite animes of the user.

- LightGBM Ranking - Recommendation based on the ranking by LGBMRanker algorithm.
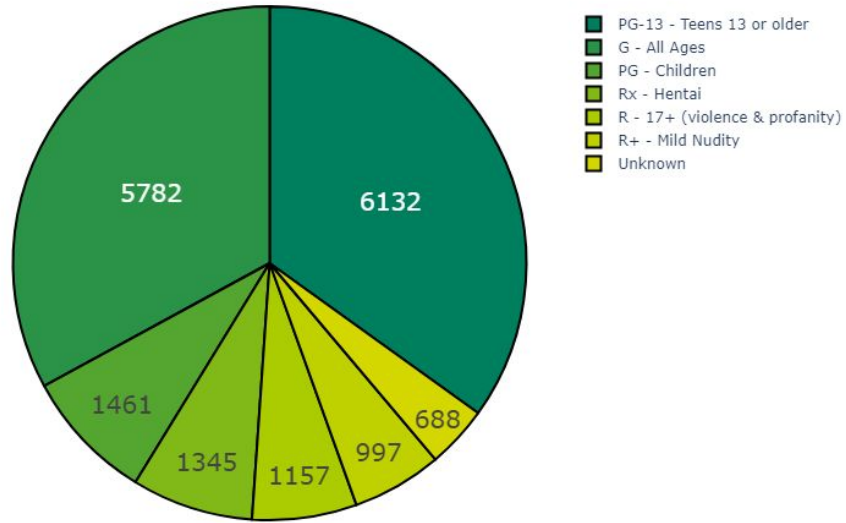
Anime Vs Users count

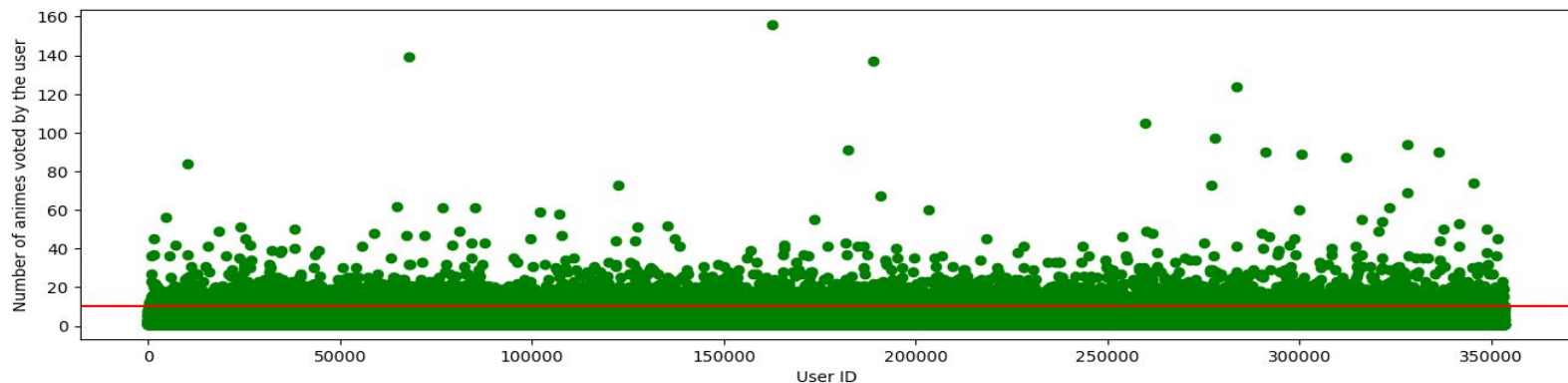# Anime with most number of views
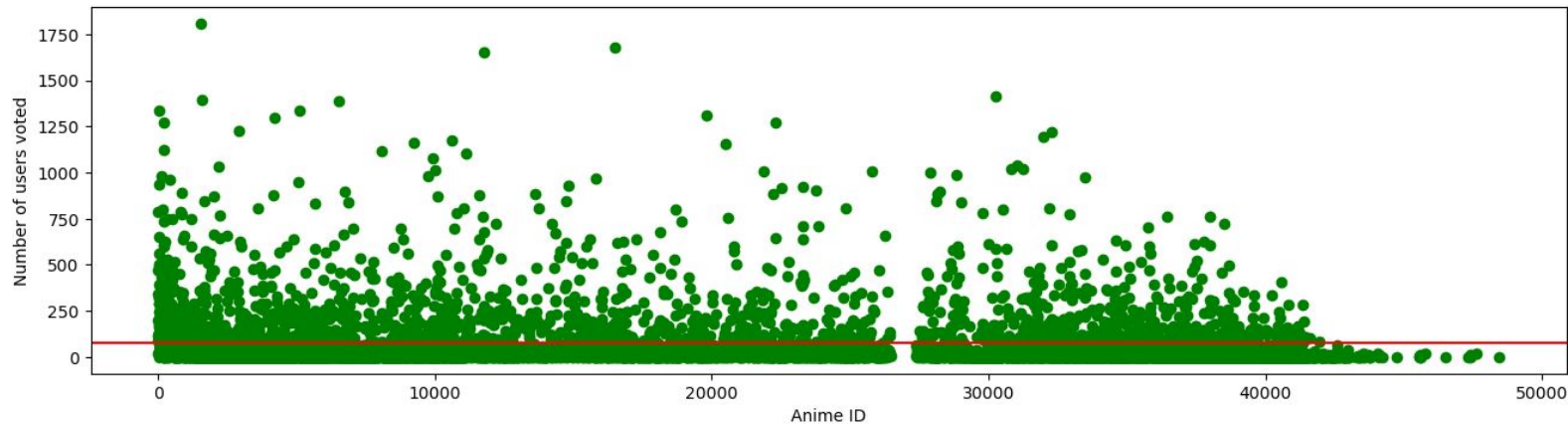
Anime by age-rating

Anime - Genres wordcloud

Users voted for at least 10 animes

Anime rated by at least 75 users

Item-based recommendation - NearestNeighbors

The model has been built based on cosine similarity.

In [89]: ▶ get_recommendation_for('Cowboy Bebop')

The overall score for the anime, Cowboy Bebop, is 8.78

Out[89]:

	Anime	Score	Distance
0	Diamond no Ace: Second Season	8.32	0.930311
1	Fullmetal Alchemist: Premium Collection	7.35	0.929910
2	Rozen Maiden	7.44	0.925376
3	Okusama ga Seitokaichou!+!	6.65	0.924135
4	Murder Princess	7.02	0.923775
5	ChäoS;Child	6.39	0.922198
6	Hidan no Aria	6.88	0.922051
7	Uchi no Ko no Tame naraba, Ore wa Moshikashita...	7.04	0.911138
8	Rewrite 2nd Season	7.26	0.909580

User-based collaborative recommendation
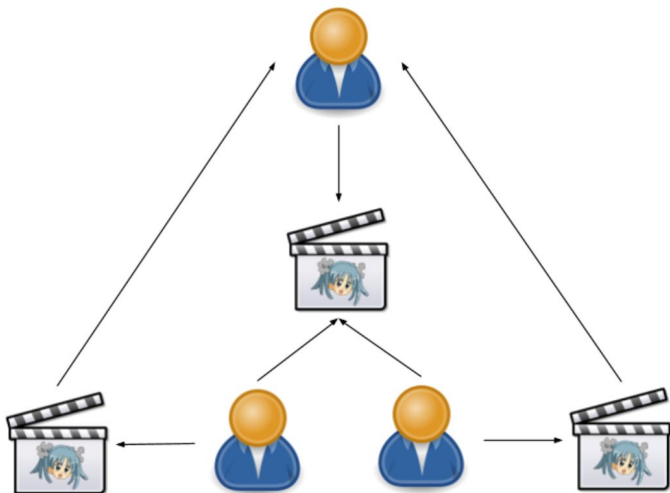

```
In [91]:  ▶  recommendation_for_user = collab_recommendation(merged_df,6556)
```

```
Favorite animes of the user 6556 are:
Shingeki no Kyojin
Kidou Senkan Nadesico: The Prince of Darkness
Dragon Half

Recommended animes for 6556:
Shigatsu wa Kimi no Uso: Moments
Clannad
Hibike! Euphonium
Digimon Adventure
Soukyuu no Fafner: Right of Left - Single Program
Gotcha!
Guilty Crown
Nisekoi: OVA
Death Parade
Tokyo Ghoul √A
```

LGBMRanker

- Light Gradient Boosting Machine - free, open-source, distributed, gradient-boosting framework based on decision-tree algorithms
- Developed by Microsoft and used for ranking, classification and other machine learning tasks.
- Ranking order typically induced by giving a numerical or ordinal score for each item
- Optuna, an open-source hyperparameter optimization framework for hyperparameter search automation.

Important Features and Best Parameters

Feature Importance
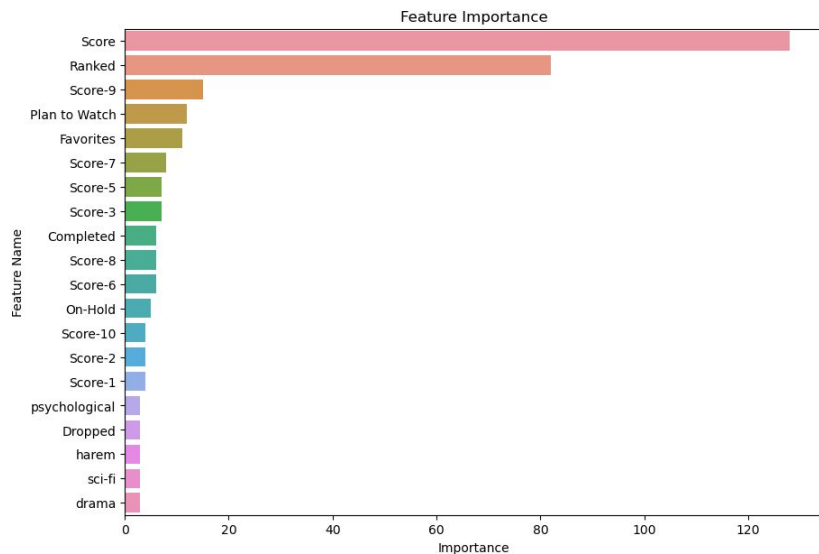
Best parameter values after tuning:
 {'lambda_l1': 3.001700605238165,
 'lambda_l2': 2.2085252160803295,
'max_depth': 3, 'num_leaves': 135,
'colsample_bytree': 0.4747326915651492,
'min_child_samples': 9}

The recommendation system can rank the anime with the Normalized Discounted Cumulative Gain score of 0.9862.

Recommendation using LGBMRanker model

```
n [65]:  ▶| r = recommend_for_user(266729,model_with_best_params,15,10000)
```

```
---------- Recommend ----------
1:Fullmetal Alchemist:Brotherhood : 鋼の錬金術師 FULLMETAL ALCHEMIST : Action, Military, Adventure, Comedy, Drama, Magic, Fan
tasy, Shounen : 9.19
2:Hunter x Hunter : HUNTER×HUNTER（ハンター×ハンター） : Action, Adventure, Fantasy, Shounen, Super Power : 9.1
3:Gintama Season 4 : 銀魂° : Action, Comedy, Historical, Parody, Samurai, Sci-Fi, Shounen : 9.1
4:Gintama Season 2 : 銀魂' : Action, Sci-Fi, Comedy, Historical, Parody, Samurai, Shounen : 9.08
5:Attack on Titan Season 3 Part 2 : 進撃の巨人 Season3 Part.2 : Action, Drama, Fantasy, Military, Mystery, Shounen, Super Po
wer : 9.1
6:March Comes In Like A Lion 2nd Season : 3月のライオン 第2シリーズ : Drama, Game, Seinen, Slice of Life : 9.0
7:A Silent Voice : 聲の形 : Drama, School, Shounen : 9.0
8:Gintama Season 5 : 銀魂。 : Action, Comedy, Historical, Parody, Samurai, Sci-Fi, Shounen : 8.99
9:Gintama.:Silver Soul Arc - Second Half War : 銀魂. 銀ノ魂篇 後半戦 : Action, Sci-Fi, Comedy, Historical, Parody, Samurai, S
hounen : 8.86
10:Cowboy Bebop : カウボーイビバップ : Action, Adventure, Comedy, Drama, Sci-Fi, Space : 8.78
11:Mob Psycho 100 II : モブサイコ100 II : Action, Slice of Life, Comedy, Supernatural : 8.84
12:Descending Stories:Showa Genroku Rakugo Shinju : 昭和元禄落語心中～助六再び篇～ : Drama, Historical, Josei : 8.79
13:Made in Abyss : メイドインアビス : Sci-Fi, Adventure, Mystery, Drama, Fantasy : 8.74
14:Samurai X:Trust and Betrayal : るろうに剣心—明治剣客浪漫譚-追憶編 : Action, Historical, Drama, Romance, Martial Arts, Samur
ai, Shounen : 8.73
15:Monogatari Series:Second Season : 〈物語〉シリーズ セカンドシーズン : Mystery, Comedy, Supernatural, Romance, Vampire : 8.78
---------- Actual ----------
My Hero Academia 2 : Action, Comedy, Super Power, School, Shounen : 8.33
Perfect Blue : Dementia, Drama, Horror, Psychological : 8.48
Puella Magi Madoka Magica the Movie Part 2:Eternal : Drama, Magic, Psychological, Thriller : 8.39
Everyday Life with Monster Girls OVA : Comedy, Ecchi, Fantasy, Harem, Romance, Seinen : 7.19
Yurikuma Arashi : Psychological, Drama, Fantasy, School, Seinen, Shoujo Ai : 7.08
Unknown : Mystery, Thriller, School : 7.58
Promare : Action, Mecha, Sci-Fi, Super Power : 8.08
Angel's Egg : Fantasy, Dementia, Drama : 7.69
Ghost in the Shell : Action, Mecha, Police, Psychological, Sci-Fi, Seinen : 8.29
Puella Magi Madoka Magica the Movie Part 1:Beginnings : Psychological, Drama, Magic, Thriller : 8.23
```

Further Study

Using the Synopsis data which contains a brief description of each anime in the database and the other text features such as age-rating, producers, licensors and the source of anime, NLP can be applied along with TF-IDF for ranking the anime.

Data citation

The data has been downloaded from the Kaggle website. Link to [Download.](#)
The data files have been scraped from the MyAnimeList website. Link to [Data Source](#).