

# Broadcaster & Social Recommendation

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# Motivation



Live streaming App(part shown) in China

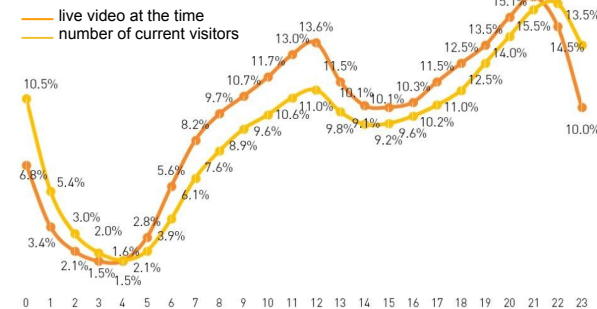


**No. 1 and most active<sup>1</sup>**  
game live streaming platform in China

86.7m  
average  
MAUs<sup>2</sup>

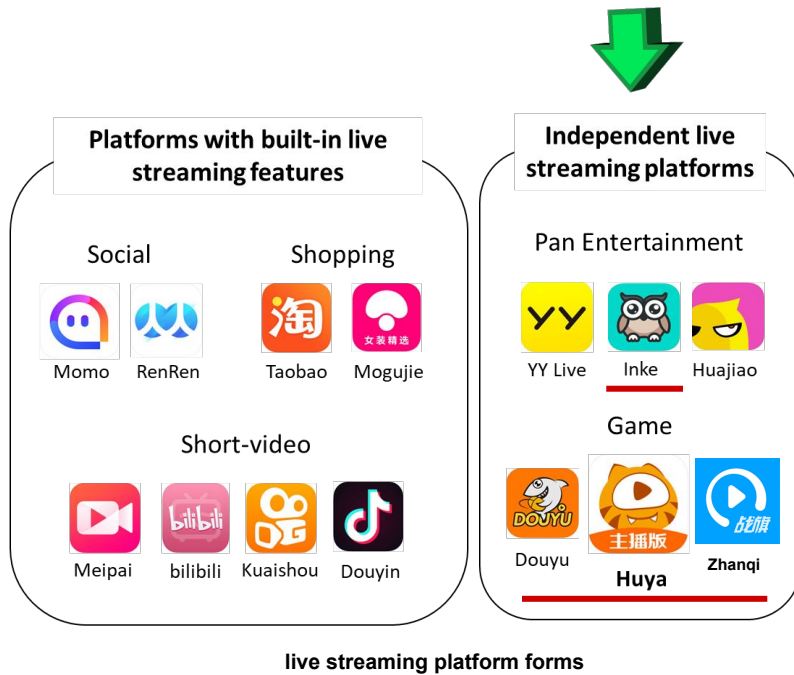
99mins  
spent on app  
per day per  
active user<sup>2</sup>

2,600+  
games  
covered<sup>3</sup>



**NEED:** provide recommendation based on viewers's likes

# Motivation



## Recommendations

3 similar streamer based  
on the category you like

**#SOCIAL#**  
Find the one with similar  
liked streamers

<http://jl4939.pythonanywhere.com/>

# Scrape Data



A big data service platform of streamers in China

排名	主播	直播内容	最高人气	平均人气	新增粉丝	人气值
1	人民日报	娱乐新闻 对贾樟柯说：中国电影太难了...	2581	217	3万	4093
2	多九户外	户外 跳伞、跑酷、极限运动...	240万	26万	7657	4292
3	央视	新闻 央视新闻客户端	111万	47万	6731	3450
4	央视网	央视网 央视网	954	219	56475	3589
5	人民网	娱乐新闻 贾樟柯：中国电影太难了...	956	59	4063万	3488
6	央视网	央视网 央视网	307万	64万	426万	4040
7	央视网	央视网 央视网	66万	20万	2万	4063



A Python library for pulling data out of HTML and XML files

Scrape data of 2000 streamers.

Rank	Streamer	Platform	Category	URL
1	kaerlol	虎牙	LOL	<a href="http://www.huya.com/kaerlol">http://www.huya.com/kaerlol</a>
2	xuxubaobao	龙珠	DNF	<a href="http://star.longzhu.com/xuxubaobao">http://star.longzhu.com/xuxubaobao</a>
3	66666	熊猫	PUBG	<a href="http://www.panda.tv/66666">http://www.panda.tv/66666</a>
4	haddis	虎牙	王者荣耀	<a href="http://www.huya.com/haddis">http://www.huya.com/haddis</a>
5	229346	斗鱼	TRAVELING	<a href="https://www.douyu.com/229346">https://www.douyu.com/229346</a>
6	dongxiaosa	虎牙	PUBG	<a href="http://www.huya.com/dongxiaosa">http://www.huya.com/dongxiaosa</a>
7	heigou	虎牙	PUBG	<a href="http://www.huya.com/heigou">http://www.huya.com/heigou</a>
8	xiaozhan	虎牙	PUBG	<a href="http://www.huya.com/xiaozhan">http://www.huya.com/xiaozhan</a>
9	24422	斗鱼	PUBG	<a href="https://www.douyu.com/24422">https://www.douyu.com/24422</a>
10	44397	全民	LOL	<a href="http://www.quanmin.tv/44397">http://www.quanmin.tv/44397</a>

Check integrity: missing values; non-sensical variables.....

1668	live?anchorid=68891368	企鹅电竞	绝地求生 全军出击
1677	live?anchorid=2527039	企鹅电竞	绝地求生 全军出击
1687	155883	龙珠	全军出击
1722	222530	斗鱼	军事游戏
1756	2478985	斗鱼	全军出击

Code:

```
import requests
from bs4 import BeautifulSoup
import csv
import time
from selenium import webdriver
import pandas as pd

# 使用Chrome浏览器创建浏览器对象
options = webdriver.ChromeOptions()
options.add_argument('--headless')

# Initialize the driver
driver = webdriver.Chrome(chrome_options=options)

# 使用get方法加载页面
driver.get('http://live.chinaz.com/anchor.html?platform=all&gameType=all&ti')

# 展开页面，提取n个数据
for i in range(1, 8):
    # class="zhubo_btn"是下一页按钮，click()是模拟点击
    driver.find_element_by_class_name('zhubo_btn').click()
    # 给3s响应时间
    time.sleep(3)

soup = BeautifulSoup(driver.page_source, 'xml')

# 遍历所有数据
artist_name_list = soup.find_all(class_='info_avatar')
artist_name = []
artist_platform = []

# 从info_avatar找出了一堆文字，挑选span里面的主播名，i是平台名
for a in range(len(artist_name_list)):
    try:
        artist_name.append(artist_name_list[a].find('span').contents[0])
        artist_platform.append(artist_name_list[a].find('i').contents[0])
    except:
        print(a+1) # 出错数据的序号
        artist_name.append('Error Name')
        artist_platform.append('Error Platform')
```



# Set up Database



Set up database to store users' information

```
mysql> DESCRIBE Users;
```

Field	Type	Null	Key	Default	Extra
uid	int(11)	NO	PRI	NULL	auto_increment
username	varchar(20)	YES		NULL	
password	varchar(50)	YES		NULL	
email	varchar(50)	YES		NULL	
settings	varchar(500)	YES		NULL	

Code:

```
mysql> CREATE TABLE users (  
-> uid INT(11) AUTO_INCREMENT PRIMARY KEY,  
-> username VARCHAR(20),  
-> password VARCHAR(50),  
-> email VARCHAR(50),  
-> setting VARCHAR(32500));  
Query OK, 0 rows affected, 1 warning (0.20 sec)  
  
mysql> SHOW TABLES  
-> ;  


|                                     |
|-------------------------------------|
| Tables_in_DianwenJin\$DataSci_final |
| Users                               |
| users                               |

  
2 rows in set (0.01 sec)
```





# Storage & Retrieval of Data

Connect database by python

Functions related to database:

- (1)Storage: register; add 3 favorite streamer
- (2)Retrieval: login; show users' profile; social

uid	username	password	email	settings
2	test1	\$5\$rounds=535000\$.Iq7d6c848aSnWNL5yG8qs8mxYtqgeFfaifwqquzPuvSi.sc4b5YakXyga/	test1@gmail.com	47,15,31
2	test2	\$5\$rounds=535000\$WjAKmkq1CND8N8K\$uTTIqurtwCk0tYn.rLmikuD1azjHj01v4/y2p0jaQeC	test2@gmail.com	175,225,221
3	test3	\$5\$rounds=535000\$PweZa8k11E1kwP6\$he3Zohy9C2FoxceprF244CV2p20YRuEAGm05V/07	test3@gmail.com	31,47,15
6	hy2523	\$5\$rounds=535000\$./ymUVFdKlW8p151ldas3Mu0s8wQcX/Hhqu2H51XgkHk\$zayYwZ9zcbFp6	hy2523@columbia.edu	NULL
7	yh21	\$5\$rounds=535000\$ENesZCDK2M0/UUM\$DPi2t7Pp.jub0d8VmxGONFSfEGUpR031tkmuke132D	yh21@gmail.com	NULL
8	yh22	\$5\$rounds=535000\$RH10rSPj6Pn7wyz1SV90jY99jN29pkqP2XcJ2N9Bnx1KKYwH6Pp7QUJj7G36	yh22@gmail.com	NULL
9	yh23	\$5\$rounds=535000\$HeRuSD2MZPMKw7E\$M2PGRX2Ogwu8Yp0TimpjM2R0Ru3G6/DsRdgj1.OfoM/	yh23@gmail.com	NULL
10	diandian1	\$5\$rounds=535000\$aiAfP9j11Jc0ZqL\$0XLVV1XQUM6Fs0FVRbSVdHvXkboEXYq4XDFj5CqYT08	diandian1@163.com	1014,680,4
11	diandian2	\$5\$rounds=535000\$gkdxV/2AEpMLX/Xc\$4vQ00wTYO/.T6qdz2aH1arVMTA1I0I.Ox9Hqk0010	diandian2@163.com	505,870,1015
12	try1	\$5\$rounds=535000\$11AkHf0Emh90HG6\$YRfr76A/ZbHg1C10MBWFSj.Jam1qv0dH87KPELUEU6	try1@163.com	NULL
13	diandian3	\$5\$rounds=535000\$16bqm15545x221E\$HTS17cVE0gX7PzHDnMjwCvHuef99e71hxu7w1wUE6	diandian3@163.com	NULL
14	diandian4	\$5\$rounds=535000\$dgspMEVbm1AwXh1P\$scduq1KskLnyk3ti1qWvEu/3mF5bixyHsnxFe2YzKza	diandian4@163.com	NULL
15	try2	\$5\$rounds=535000\$w9yn7fw8v3xf1DU\$FadXmDj390KtLMiENwtyC7Iq1s.MbYc79TN6Nm4o86	try2@163.com	NULL
16	try3	\$5\$rounds=535000\$FqB8Lz/AkULdZt2Z0a0NkY42B10cb2.b53w2dCj3h1fRFG5vnx3p.ta	try3@163.com	NULL
17	jdw1	\$5\$rounds=535000\$SRZEVLzEamKMu6K\$b7CAFAMpN3.8tVw2m.g7CTASG7Z34rD24901mgfWd	jdw1@163.com	NULL
18	try4	\$5\$rounds=535000\$1Lr1r0jKNNb.xE1s36rJPdd3KOWAYqsdX11Q7r/wphzDQXgN8C5uygsuke.5	try4@163.com	NULL
19	test5	\$5\$rounds=535000\$5y6LmW\$HGF49M/.5NmkONSDFYV1IqoAR0wz15UUNRPqk0A06K/8dg2480	test5@gmail.com	15,31,47
20	test6	\$5\$rounds=535000\$ArHRfHNCwAuph\$8Erx03A05DFmROqFK15KkLRYxrwC34CV65b1TJ3H8	test6@gmail.com	47,15,31
21	123123	\$5\$rounds=535000\$5Zt6c3j0qjaTBrp0t3SLubw23owC9SwozaAT19LAC1pTMGBnX0p5eJkEP1.	123123@163.com	864,1184,11
22	wanshab1	\$5\$rounds=535000\$VpHR7p8UGqknreE3Z.2/me6mg525EcuPme3mc3X4G00D/gfPd13HvPt3	wanzh1he@msu.edu	NULL

Storage & Retrieval code:

```
##### Profile Page #####
#
@app.route('/profile/')
@login_required
def profile_page():
    try:
        c, conn = connection()
        profile_username = str(session['username'])
        c.execute('SELECT * FROM users WHERE username=' + str(session['username']))
        profile_data = c.fetchall()
        profile_email = profile_data[0][3]
        profile_settings = profile_data[0][4]
        c.close()
        conn.close()

        return render_template("profile.html", profile_username=profile_username, ...|
                                profile_email=profile_email, profile_settings=profile_settings)

    except Exception as e:
        return str(e)

##### Add 3 Liked Streamer Page #####
#
@app.route('/add_streamer/', methods=['POST'])
@login_required
def add_streamer_page():
    try:
        temp_streamer_rank = []
        temp_streamer_rank.append(str(request.form['streamer_rank_1']))
        temp_streamer_rank.append(str(request.form['streamer_rank_2']))
        temp_streamer_rank.append(str(request.form['streamer_rank_3']))
        streamer_rank = list(set(temp_streamer_rank))
        sql_data = ','.join(streamer_rank)

        c, conn = connection()
        c.execute('UPDATE users SET settings=' + str(session['username']) + ' WHERE username=' + str(session['username']))
        conn.commit()
        flash('Success! User added!')
        c.close()
        conn.close()

        return redirect(url_for('test'))
    except Exception as e:
        return str(e)
```

Code of connection:

```
import MySQLdb

def connection():
    conn = MySQLdb.connect(host="j14939.mysql.pythonanywhere-services.com",...
                           user="j14939", passwd="apma4990", db="j14939$apma4990")

    c = conn.cursor()

    return c, conn
```



# Recommendation

## Recommend Streamer

Rank	Category	P	U	B	G
1	LOL	0	0	0	0
2	DNF	0	0	0	0
3	PUBG	1	1	1	1
4	王者荣耀	0	0	0	0
5	TRAVELING	0	0	0	1

Rank		Streamer	Platform	Category	URL
0	1	kaerlol	虎牙	LOL	<a href="http://www.huya.com/kaerlol">http://www.huya.com/kaerlol</a>
1	2	xuxubaobao	龙珠	DNF	<a href="http://star.longzhu.com/xuxubaobao">http://star.longzhu.com/xuxubaobao</a>
2	3	66666	熊猫	PUBG	<a href="http://www.panda.tv/66666">http://www.panda.tv/66666</a>
3	4	haddis	虎牙	王者荣耀	<a href="http://www.huya.com/haddis">http://www.huya.com/haddis</a>
4	5	229346	斗鱼	TRAVELING	<a href="https://www.douyu.com/229346">https://www.douyu.com/229346</a>
5	6	dongxiaosa	虎牙	PUBG	<a href="http://www.huya.com/dongxiaosa">http://www.huya.com/dongxiaosa</a>

```
def set_matrix(df, REF_VAR):  
    for s in REF_VAR: df[s] = pd.Series([0 for _ in range(len(df))])  
    colonnes = ['Category']  
    for categorie in colonnes:  
        for index, row in df.iterrows():  
            if pd.isnull(row[categorie]): continue  
            for s in row[categorie]:  
                if s in REF_VAR: df.set_value(index, s, 1)  
    return df  
  
df_new = set_matrix(df, variables)  
df_new
```

# Recommendation

## Recommend Streamer

```
nbrs = NearestNeighbors(n_neighbors=31, algorithm='auto', metric='euclidean').fit(X)
#nbrs.kneighbors(X)
xtest = df_new.iloc[id_entry].as_matrix(variables)
xtest = xtest.reshape(1, -1)
distances, indices = nbrs.kneighbors(xtest)
nbrs.kneighbors(xtest)

listed_streamer = indices[0][:]
listed_streamer
```

KNN

```
[3, '66666', '熊猫', 'PUBG', 'http://www.panda.tv/66666'],
[26, '20360', '斗鱼', 'PUBG', 'https://www.douyu.com/20360'],
[78, '10066', '熊猫', 'PUBG', 'http://www.panda.tv/10066'],
[98, '199211', '全民', 'PUBG', 'http://www.quanmin.tv/199211'],
[99, '80000', '熊猫', 'PUBG', 'http://www.panda.tv/80000'],
[190, '339610', '斗鱼', 'PUBG', 'https://www.douyu.com/339610'],
[342, '10177', '虎牙', 'PUBG', 'http://www.huya.com/10177'],
[346, '687423', '斗鱼', 'PUBG', 'https://www.douyu.com/687423'],
[424, '652734', '熊猫', 'PUBG', 'http://www.panda.tv/652734'],
[505, '101367', '斗鱼', 'PUBG', 'https://www.douyu.com/101367']]
```

Rank	Category	X			
		P	U	B	G
1	LOL	0	0	0	0
2	DNF	0	0	0	0
3	PUBG	1	1	1	1
4	王者荣耀	0	0	0	0
5	TRAVELING	0	0	0	1



# Recommendation

## User System and Social

uid	username	password	email	settings
2	test1	\$5\$rounds=535000\$.Iq7d6c848aSnwNL\$yG8QsBmxYtqgeFfaiwfpQquZpUVsI.sc4b5YAkXVgA/	test1@gmail.com	47,15,31
3	test2	\$5\$rounds=535000\$WjiAKWkg1CNDBN8K\$uTTiqUrtwckOtyN.rLmikuDlazzjHj01v4/yJpoja0EC	test2@gmail.com	175,225,221
5	test3	\$5\$rounds=535000\$PWeZA8kd1EltwqP6\$me3zoHyeQo2FoXCzprf2a4cv2Ap2OyRuEAgMr05v707	test3@gmail.com	31,47,15
6	hy2523	\$5\$rounds=535000\$.YmUVFdKLW8pq15\$LdasMuogS9wQCXI/Hhqu2h51xghkkSzYyYwz9zCBfP6	hy2523@columbia.edu	NULL
7	yh21	\$5\$rounds=535000\$JENesZCDKzMO/UMM\$DPi2TF7P.jub0dBvmxGONfsfEGWupRQ31tkmuke13ZD	yh21@gmail.com	NULL
8	yh22	\$5\$rounds=535000\$RH10rSpj6Pn7wyzI\$V9ojY99jN29pkqP2XcJ2N9bNxiKKYWH6Pp7QUj7G36	yh22@gmail.com	NULL
9	yh23	\$5\$rounds=535000\$HeRuSDzMPMKMv7E\$MZPGRX2Ogwu8Yp0ImpjmJRroRu3g6/DsRDgjj.ofoM/	yh23@gmail.com	NULL
10	diandian1	\$5\$rounds=535000\$aiaFp9jj1iJcoZqL\$0XLvVLXQUM6Fs0fvRbsVDHvxKboExYq4XDFjSCqYt0B	diandian1@163.com	1014,680,4
11	diandian2	\$5\$rounds=535000\$gkdVX/2AEpW1X/xC\$dvQ0wrTY0/.T6q3dzaHULArvWTAiI0I.ox9hgk00i0	diandian2@163.com	505,870,1015
12	try1	\$5\$rounds=535000\$nl1AKkhFoEmh9OHG\$eYRfr76A/ZbHg1cJ0MBWFSj.JeMiqvDdH87KPELUeU6	try1@163.com	NULL
13	diandian3	\$5\$rounds=535000\$16lBqmI\$545xz21E\$gHT5i7cvEogJX7PzHDnMjwCvHuef99e71hxu7W1xw6	diandian3@163.com	NULL
14	diandian4	\$5\$rounds=535000\$dGspmEVbm1AWXhiP\$scduQ1KskLnYk3tiigWVeU/JmF5bIXyHsnxFe2YzKZA	diandian4@163.com	NULL
15	try2	\$5\$rounds=535000\$w9Yn7rw8vJ3xfiDU\$FadxmDjX390KTLMIENwtYc71Q1s.MbYc79TN6Nm4o86	try2@163.com	NULL
16	try3	\$5\$rounds=535000\$.FgkBsLI/NkWLdZI\$ZI0aNOky4ZBI0Cb2.b53w28ckjahifQFG56vnK3p.ta	try3@163.com	NULL
17	jdwl	\$5\$rounds=535000\$SRZEVLzEawKMKu6kb7CAFAMpn3.8tvxwJm.g7cTASGc7Z3ArD2n9Qlmgfwd	jdwl@163.com	NULL
18	try4	\$5\$rounds=535000\$jlirjoJkNNb.xEis\$6rjPdd3KOWAYgsdX11Q7r/wphzdQXgN8C5uysuke.5	try4@163.com	NULL
19	test5	\$5\$rounds=535000\$5Gy6LwW\$HGf49M/. \$NWkON5DJFVY1ZqoAr0wz15UUWRPqKOAO606K/8dG2480	test5@gmail.com	15,31,47
20	test6	\$5\$rounds=535000\$ArthRfhgNCWAutpH\$BExXO3A05DfmrOQfKKi5KILRYxrwC34CV65biTjH8/	test6@gmail.com	47,15,31
21	123123	\$5\$rounds=535000\$3Ztt6cj5QjaTbrpo\$ts1ubw23owC9SwozaAI19LACipTMGBnX0xp5ejkeP1.	123123@163.com	864,1184,11
22	wanshab1	\$5\$rounds=535000\$VoPHR7p8UGqknreE\$Z.2/me6mg525EcuPmEjM5cw3xLGoDD/gfDP13HvPgI3	wanzhihe@msu.edu	NULL



# Recommendation

## User System and Social

### User/User based collaborative filtering

- 0-1 Matrix
- Compute User/User Cosine similarity

```
# Generate the "0-1" Matrix and Compute Cosine Similarity
df = pd.DataFrame(0, index=list_all_username, columns=item)
length_of_users = 0

for i in list_all_username:
    for index, row in df.iterrows():
        if user_liked_list[length_of_users] != None:
            for s in user_liked_list[length_of_users].split(','):
                if s in row:
                    df.set_value(i, s, 1)
            length_of_users = length_of_users+1

# Compute User to User cosine distance
user_user = 1-pairwise_distances(df, metric="cosine")
df_users = pd.DataFrame(user_user, columns=df.index, index=df.index)
```

In [30]: df\_users.head()

Out[30]:

	test1	test2	test3	test4	test5	test6	test7	test8	test9	test10	...	test91	test92	test93	test94	test95	test96	test97	test98	test99
test1	1.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	...	0.000000	0.0	0.0	0.000000	0.0	0.0	0.0	0.0	0.0
test2	0.0	1.000000	0.333333	0.0	0.0	0.0	0.0	0.0	0.333333	0.0	...	0.333333	0.0	0.0	0.333333	0.0	0.0	0.0	0.0	0.0
test3	0.0	0.333333	1.000000	0.0	0.0	0.0	0.0	0.0	0.333333	0.0	...	0.000000	0.0	0.0	0.000000	0.0	0.0	0.0	0.0	0.0
test4	0.0	0.000000	0.000000	1.0	0.0	0.0	0.0	0.0	0.000000	0.0	...	0.000000	0.0	0.0	0.000000	0.0	0.0	0.0	0.0	0.0
test5	0.0	0.000000	0.000000	0.0	1.0	0.0	0.0	0.0	0.000000	0.0	...	0.000000	0.0	0.0	0.000000	0.0	0.0	0.0	0.0	0.0

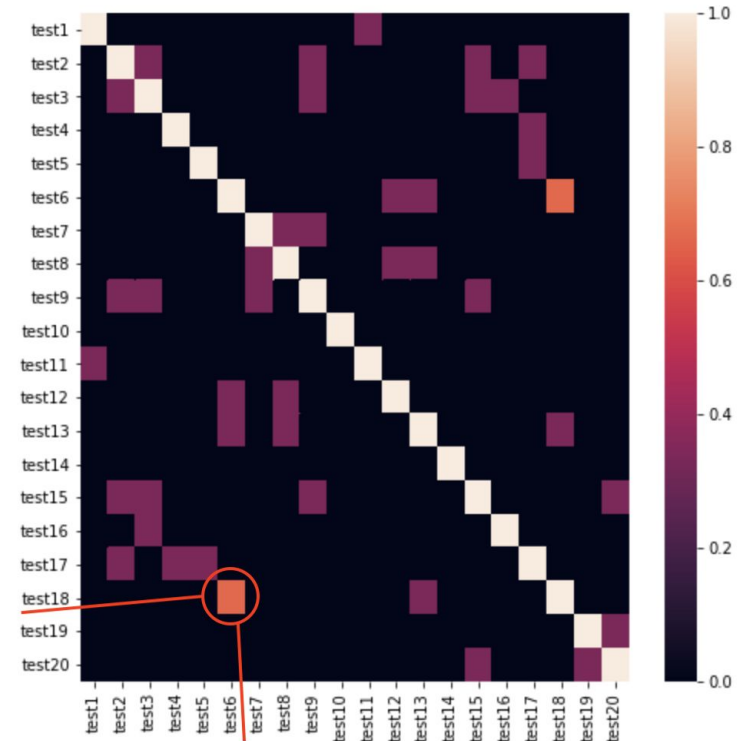
# Recommendation

## User System and Social

Because we do not have enough amount of data in our SQL database. So we randomly generate some user data to verify our method.

```
In [29]: print(user_liked_list[5])  
         print(user_liked_list[17])
```

```
50,98,46  
50,98,71
```

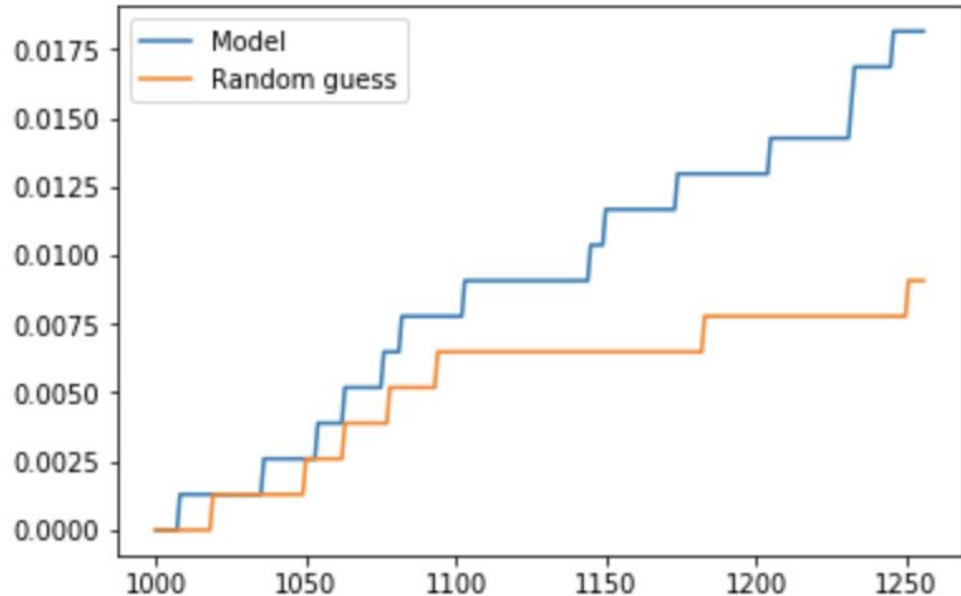


# Recommendation

## User System and Social

### Model Score

- Model compared with random guess about the similarity
- Model accuracy is higher than random guess



# Web Development

## Main functional pages

1. **Homepage:** show basic info of web

3. **Recommendation:** recommend suitable streamers

Recommend

Recommendation Engine is ready! Please choose a Rank Number of your favorite streamer (from 1 to 1950).

Start

Recommendation Result

Rank	Streamer	Platform	Category	URL
59	hp180	虎牙	热血传奇	<a href="http://www.huya.com/hp180">http://www.huya.com/hp180</a>
73	999uf	虎牙	热血传奇	<a href="http://www.huya.com/999uf">http://www.huya.com/999uf</a>
104	666uf	虎牙	热血传奇	<a href="http://www.huya.com/666uf">http://www.huya.com/666uf</a>
174	hp180	虎牙	热血传奇	<a href="http://www.huya.com/hp180">http://www.huya.com/hp180</a>
182	2024022143	虎牙	热血传奇	<a href="http://www.huya.com/2024022143">http://www.huya.com/2024022143</a>
217	1475698575	虎牙	热血传奇	<a href="http://www.huya.com/1475698575">http://www.huya.com/1475698575</a>
360	154545	虎牙	热血传奇手游	<a href="http://www.huya.com/154545">http://www.huya.com/154545</a>

2. **Sign up & Login:** connect to database to read and write

Register

Please Login

Username

Email Address

Password

Repeat Password

Username

Password

Login

I accept the [Terms of Service](#) and the [Privacy Notice](#) (Last updated 2018)

Register

4. **Social:** recommend the similar user

Make a new friend now !

Add 3 Liked Streamer into Your Profile

test3

test3@gmail.com

This is the contact information of the one holding the same interest with you!

59

754

365

Add



# Web Development

Main functional pages

## Sign up & Login

Register

Username

Email Address

Password

Repeat Password

I accept the [Terms of Service](#) and the [Privacy Notice](#) (Last updated 2018).

☐

Register

Please Login

Username

Password

Login

username	password	email
test1	\$5\$rounds=535000\$.Iq7d6c848aSnwNL\$yG8QsBmxYtqgeFfaiwfpQquZpUvSI.sc4b5YAkXVgA/	test1@gmail.com
test2	\$5\$rounds=535000\$WjIAKwkg1CND8N8K\$uTTiqUrtwck0tyN.rLmikuDlazzHj01v4/yJpoja0EC	test2@gmail.com
test3	\$5\$rounds=535000\$PWEZA8kd1EltwqP6\$me3z0HyeQo2FoXCzPzf2a4CV2Ap2OyRuEAgmR05V707	test3@gmail.com
hy2523	\$5\$rounds=535000\$. /YmUVFdkLW8pq15\$LdasMuogS9wQCXI/Hhqu2h51XghkksZyYyWz9zCBfP6	hy2523@columbia.edu
yh1	\$5\$rounds=535000\$JENesZCDKZM0/UMM\$DPi2TF7P.jub0dBvmxGONfSfEGWupRQ31tkmuke13ZD	yh1@gmail.com
yh2	\$5\$rounds=535000\$RH10rSPj6Pn7wyzI\$V90jY99jN29pkqP2xcJ2N9bNxiKKYWH6Pp7QUj7G36	yh2@gmail.com
yh3	\$5\$rounds=535000\$HeRuSDzMZPMKMV7E\$MzPGRX20gwu8Yp0ImpjmJR0Ru3g6/DsRDgjj.OfoM/	yh3@gmail.com
diandian1	\$5\$rounds=535000\$a1Afp9jj1iJcOZqL\$0XLVVLXQUuM6F50FvRbsVDHvXkboExyq4XDFjScqyt08	diandian1@163.com
diandian2	\$5\$rounds=535000\$gkdvX/2AEpw1X/xC\$dvQ00wrTY0/.T6q3dzaHu1ArvWTAiI0I.ox9hgk00i0	diandian2@163.com
try1	\$5\$rounds=535000\$n1lAKKHfOEmh9OHG\$eYRfr76A/ZbHg1cJ0MBWFSj.JeMigvddH87KPELUeU6	try1@163.com
diandian3	\$5\$rounds=535000\$16lbqmI5545xz21E\$gHT5i7cVE0gJX7PzHDnMjwCvHeuef99e71hxu7W1xw6	diandian3@163.com
diandian4	\$5\$rounds=535000\$dGspMEVbmlAWXhiP\$scduQlKskLnYk3tiigwVeU/1mF5bIXyHsnxFe2YzKZA	diandian4@163.com
try2	\$5\$rounds=535000\$w9Yn7rw8vJ3xfiDU\$FadXmDjX390KTLMIENwtyC71Q1s.MbYc79TN6Nm4o86	try2@163.com
try3	\$5\$rounds=535000\$.FgkBSLI/NkWLdZi\$Zi0aNoKy4ZBi0cb2.b53w28ckjahifQfG56vnK3p.tA	try3@163.com
jdw1	\$5\$rounds=535000\$SRZEV1zeAwKMu6k\$b7CAFamPn3.8tvxwJm.q7cTASgc7Z3ArD2n9Qlmgfwd	jdw1@163.com
try4	\$5\$rounds=535000\$j1irjojkNNb.xE1s36rjPdd3KOWAYqsdX11Q7r/wphzdqXgN8C5uysuke.5	try4@163.com
test5	\$5\$rounds=535000\$5Gy6LwWSHGf49M/. \$NwKON50JFVY1IqoAr0wz15UuWRPqKoA606k/8dg2480	test5@gmail.com
test6	\$5\$rounds=535000\$ArthRfHsGncwAutpH\$B\$ErX0A05DfmrOQfKki5KkTLRyXrWC34CV65bitJH8/	test6@gmail.com
123123	\$5\$rounds=535000\$3zt6cj5QjaTbRpo\$Ts1ubw23owC9SwozaAT19LACipTMGBnX0xp5ejkeP1.	123123@163.com
wanshab1	\$5\$rounds=535000\$VoPHR7p8UGqkneE\$Z.2/me6mg525EcuPmEJm5cw3xLGodd/gfdP13HvPg13	wanzhihe@msu.edu



# Web Development

Main functional pages

## Jinja2 & HTML

All Data

Rank	Broadcaster	Platform	Category	URL
1	卡尔	虎牙	英雄联盟	<a href="http://www.huya.com/kaerlol">http://www.huya.com/kaerlol</a>
2	旭旭宝宝	龙珠	地下城与勇士	<a href="http://star.longzhu.com/xuxubaobao">http://star.longzhu.com/xuxubaobao</a>
3	刘杀鸡	熊猫	绝地求生	<a href="http://www.panda.tv/66666">http://www.panda.tv/66666</a>
4	哈迪斯	虎牙	王者荣耀	<a href="http://www.huya.com/haddis">http://www.huya.com/haddis</a>
5	高冷男神钱小佳	斗鱼	户外	<a href="https://www.douyu.com/229346">https://www.douyu.com/229346</a>
6	Style、董小飒-90327	虎牙	绝地求生	<a href="http://www.huya.com/dongxiaosa">http://www.huya.com/dongxiaosa</a>
7	黑店百地	虎牙	绝地求生	<a href="http://www.huya.com/heigou">http://www.huya.com/heigou</a>
8	小战	虎牙	绝地求生	<a href="http://www.huya.com/xiaozhan">http://www.huya.com/xiaozhan</a>
9	pigff	斗鱼	绝地求生	<a href="https://www.douyu.com/24422">https://www.douyu.com/24422</a>
10	英雄联盟职业联赛	全民	英雄联盟	<a href="http://www.quanmin.tv/44397">http://www.quanmin.tv/44397</a>

```
<div class="w3-container">
```

```
<table>
```

```
<tr>
```

```
<th>Rank</th>
```

```
<th>Broadcaster</th>
```

```
<th>Platform</th>
```

```
<th>Category</th>
```

```
<th>URL</th>
```

```
</tr>
```

```
{% for i in range(1950) %}
```

```
<tr>
```

```
<td>{{ data_matrix[0][i] }}</td>
```

```
<td>{{ data_matrix[1][i] }}</td>
```

```
<td>{{ data_matrix[2][i] }}</td>
```

```
<td>{{ data_matrix[3][i] }}</td>
```

```
<td><a href="{{ data_matrix[4][i] }}">{{ data_matrix[4][i] }}</a></td>
```

```
</tr>
```

```
{% endfor %}
```

```
</table>
```

```
</div>
```



# Thanks for listening! & Demo Time

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