San Francisco Library Usage Analysis

From 2003 to 2016

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1. Introduction

The San Francisco Public Library is the public library system of the city of San Francisco and consist of one main library and 27 physical branch libraries. The location of all libraries is shown in the library map in figure 1.

Figure 1 San Francisco Library branches map
(Source: San Francisco library official website)

This report analysis the 423,448 patron records in San Francisco Library, including the digital library, from 2003 to 2016. The report will provide an overview of patron information, library usage information and staff information.

2. Patron information overview

A. Patron type and age range

San Francisco Library defines 18 different patron types. The table 1 demonstrate the patron

type code and name as well as indicate the amount of patrons in each patron type. Because the library is a public library and serve for the whole city, the patron is mainly consist of adults. Juvenile, young adult and senior are also three large group of patrons.

Table 1 Number of Patrons in each type

patron type	count
0: ADULT	272251
1: JUVENILE	59208
2: YOUNG ADULT	28816
3: SENIOR	41619
4: WELCOME	14931
5: STAFF	862
8: FRIENDS FOR LIFE	40
9: SPECIAL	977
10: VISITOR	415
12: BOOKS BY MAIL	95
15: TEACHER CARD	1782
16: DIGITAL ACCESS CARD	1744
55: RETIRED STAFF	157
100: AT USER ADULT	349
101: AT USER JUVENILE	47
102: AT USER TEEN	44
103: AT USER SENIOR	66
104: AT USER WELCOME	45

Further, figure 2 shows the distribution of the age range of all patrons. Apart from some data error to set the patron age default to 0 to 9, most of patrons is in the age range from 25 to 34, which consist of the large amount of adult type patrons.
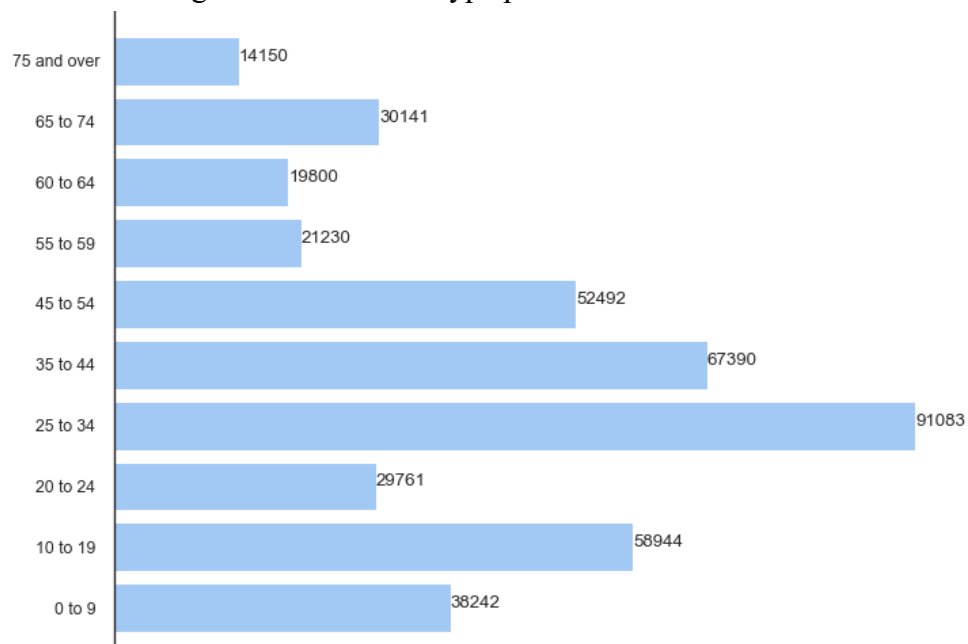

Figure 2 Number of patrons in different age ranges

B. Patron home library

The Patron home library data, which for most situations means the library that a patron registered at, includes 79 different home library code and 34 different home library definition from the usage data. Thirty-five home library code is with unknown home library definition and most of these codes only with few patron records, which can be considered as error data. Moreover, the number of home library definition is greater than the library branches in San Francisco public library system, for several digital libraries is also included in the home library definition list.

Table 2 shows the ten libraries with the largest number of patrons. Apart from main library, Mission and Richmond are the two library branches with most patrons and have more than 22,000 registered patrons.

Table 2 Top ten home libraries

Home library	Amount
Main Library	124814
Mission	25443
Richmond	22475
Chinatown	17140
Excelsior	16706
Sunset	15020
Ortega	14456
West Portal	13338
Mission Bay	11271
Ingleside	10738

C. Patron type and age distribution in different home libraries

The patron type and age range in different home libraries can varies, which depends on the location of the library.

Based on the top ten libraries from previous section, the relationship between home library and five main patron type is first analysed. As shown in figure 3, adults are main patron type in all home libraries. Moreover, the second largest group is juvenile in all libraries except the main library. Senior patron type is relevantly a large group in Main library, Richmond library, Chinatown library, West Portal library and Sunset library.
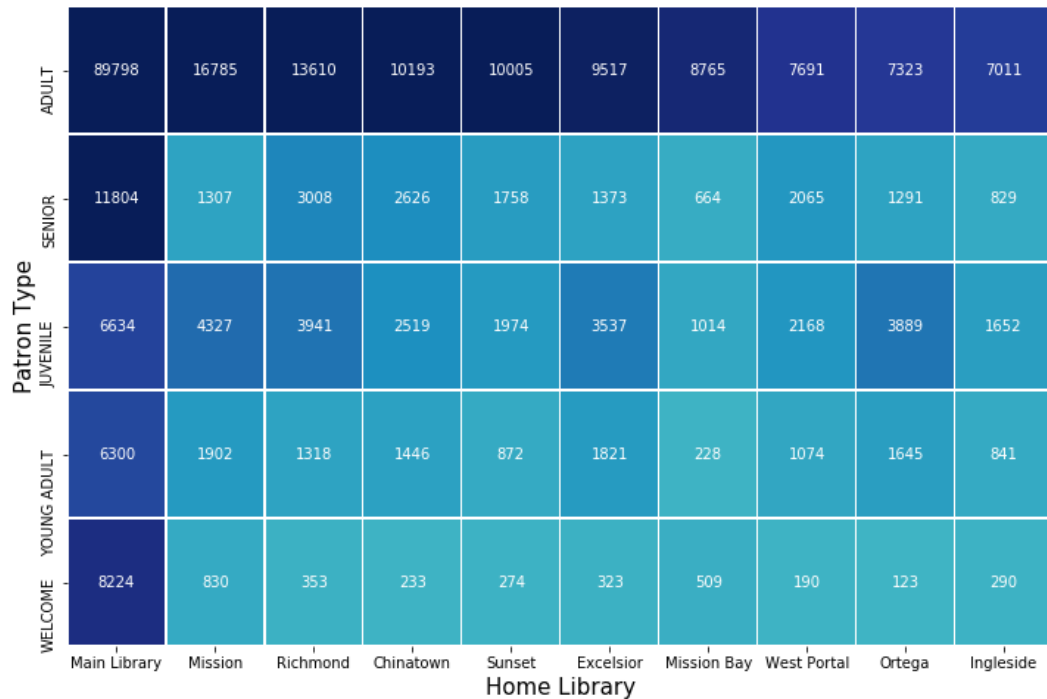
Patron Type	Main Library	Mission	Richmond	Chinatown	Sunset	Excelsior	Mission Bay	West Portal	Ortega	Ingleside
ADULT	89798	16785	13610	10193	10005	9517	8765	7691	7323	7011
SENIOR	11804	1307	3008	2626	1758	1373	664	2065	1291	829
JUVENILE	6634	4327	3941	2519	1974	3537	1014	2168	3889	1652
YOUNG ADULT	6300	1902	1318	1446	872	1821	228	1074	1645	841
WELCOME	8224	830	353	233	274	323	509	190	123	290

Figure 3 Main patron type in Top 10 libraries

In addition, figure 4 shows the age range distribution in the top 10 libraries. As mentioned before, some patrons registered with the default 0 to 9 years, which means the data of 0 to 9 years is useless. The data shows the age range distribution in each library branch is similar to the whole distribution which demonstrated in figure 2.
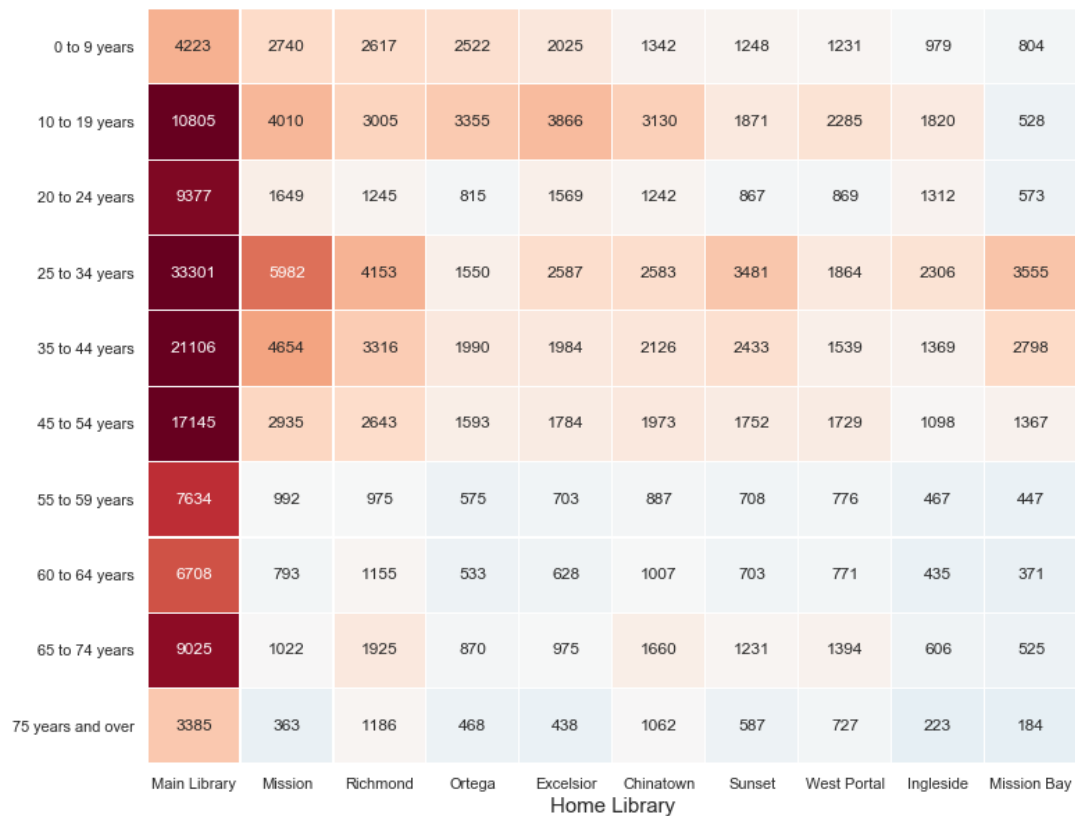

	Main Library	Mission	Richmond	Ortega	Excelsior	Chinatown	Sunset	West Portal	Ingleside	Mission Bay
0 to 9 years	4223	2740	2617	2522	2025	1342	1248	1231	979	804
10 to 19 years	10805	4010	3005	3355	3866	3130	1871	2285	1820	528
20 to 24 years	9377	1649	1245	815	1569	1242	867	869	1312	573
25 to 34 years	33301	5982	4153	1550	2587	2583	3481	1864	2306	3555
35 to 44 years	21106	4654	3316	1990	1984	2126	2433	1539	1369	2798
45 to 54 years	17145	2935	2643	1593	1784	1973	1752	1729	1098	1367
55 to 59 years	7634	992	975	575	703	887	708	776	467	447
60 to 64 years	6708	793	1155	533	628	1007	703	771	435	371
65 to 74 years	9025	1022	1925	870	975	1660	1231	1394	606	525
75 years and over	3385	363	1186	468	438	1062	587	727	223	184

Figure 4 Age range in Top 10 libraries

D. Patron registration year

Patron registration year can explains how many new patrons that the library acquire every year and can help the library to understand the effectiveness of marketing projects or events.

The yearly total patron registration number from 2003 to 2016 is shown in figure 5. The extremely high data in 2003 is lead by the digital system is built on 2003 and all previous paper-based record need to be transferred to digital and set to the registration year automatically to 2003. Apart from the data in 2003, the number of total new patrons is steadily increasing from 2003. Additionally, the dataset records the data to the end of June 2016, which means the data only indicate the new patrons in the first half year in 2016. For the new patron number has already reached half of total new patron number in 2015, it is expected that the new patron number in 2016 will continue the rising trend.
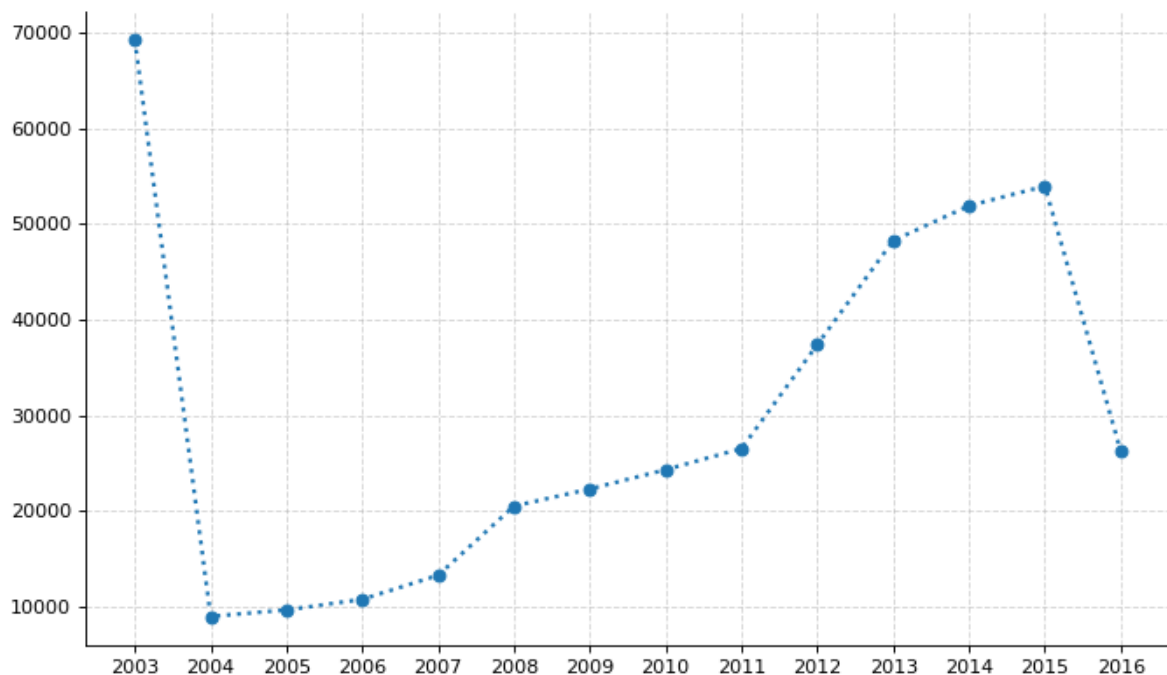
Figure 5 Total patron registration every year

Further, figure 6 demonstrate the number of five main patron types registration every year. The data shows that the library add Juvenile patron type on 2006 and add welcome patron type on 2012. The number of registered adults is keep increasing every year, while the number of registered young adult is keep on the similar level every year. Moreover, two new patron types, juvenile and welcome, has a significantly rising trend since built. It shows that the San Francisco library pay more attention to provide service to younger generation from 2006.
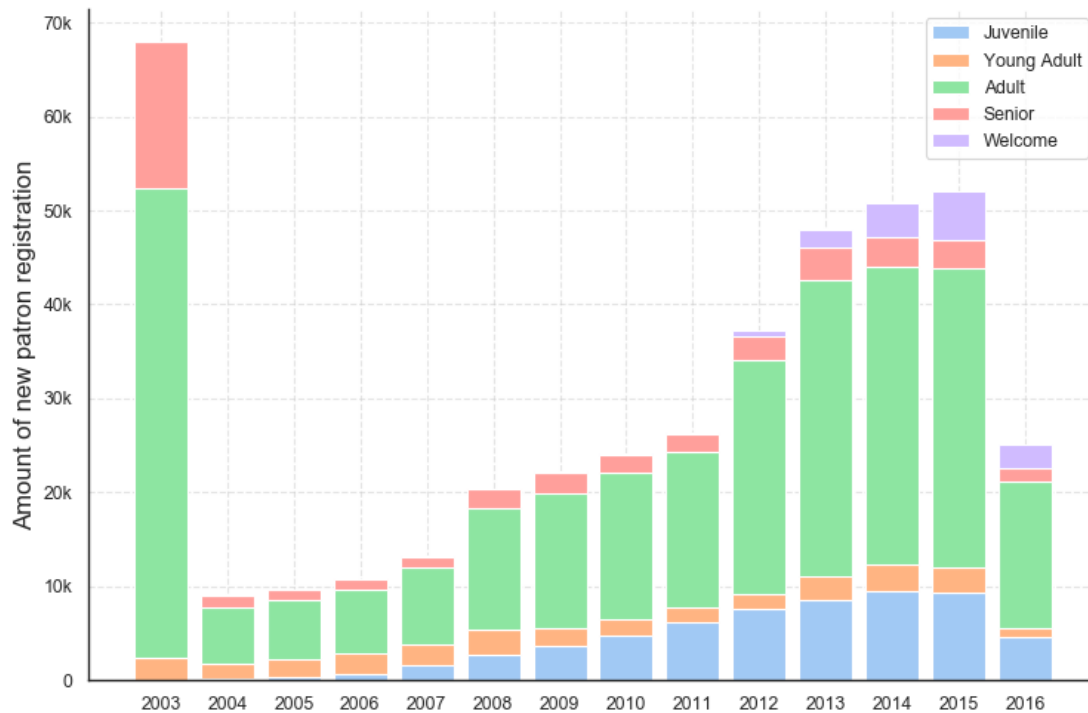
Figure 6 Main patron types registration every year

E. Patron last active date

Patron last active data is when the patron last checkout a book or browse the resource online. There are 355,544 patrons have active record, which is 84% of total patrons. The non-active months for each patron is summarized in figure 7. The average of non-active month for all patrons who have active is 16 months and more than half of patrons have not active for more than 11 months.
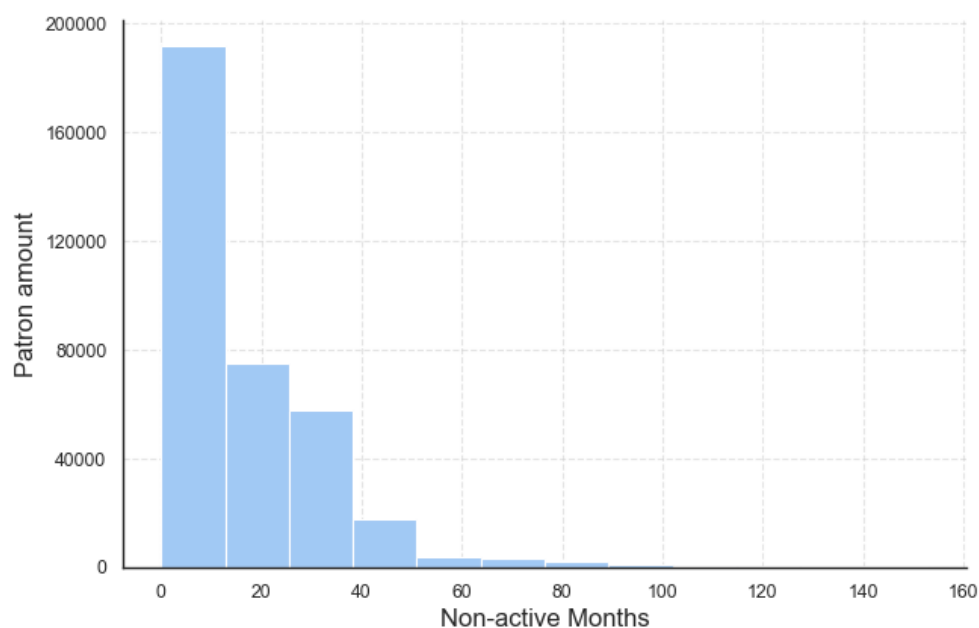

Figure 7 Patrons non-active months

Additionally, the non-active months varies among patron types. As shown in table 3, the median of non-active months for staff and retired staff is zero, which is reasonable for they work in the

library. Further, teacher chard holders and juvenile are the most active library users. Visitor and welcome, which can be understood as a temporary patron type, have a high non-active months.

Table 3 Non-active months for each patron type

Patron type	median	mean
STAFF	0.0	4.8
RETIRED STAFF	0.0	13.2
TEACHER CARD	2.0	4.7
JUVENILE	3.0	9.2
BOOKS BY MAIL	4.0	11.2
SPECIAL	6.0	12.1
SENIOR	6.0	14.7
FRIENDS FOR LIFE	7.0	16.5
AT USER SENIOR	8.0	16.5
DIGITAL ACCESS CARD	10.0	18.1
YOUNG ADULT	11.0	15.5
ADULT	13.0	17.8
AT USER JUVENILE	14.0	16.8
AT USER WELCOME	18.0	21.0
WELCOME	18.0	19.5
AT USER ADULT	18.5	21.9
VISITOR	20.0	18.8
AT USER TEEN	22.5	22.3

3. Checkout and renewal analysis

Besides the basic understanding of patron types, one of main purpose for a library is provide knowledge service to users. It is important to analyze the checkout and renewal in order to know how frequently the library collection is used.

A. Checkout history overview

For all patron records, the average of checkout times is 162. However, this average data is heavily impacted by a small group of patrons who checkout for many times. The patron who checkout for most times checked out 35,907 times in total, and the standard deviation of the checkout times is 453. The median of the checkout times is only 19, which means half of all patrons checkout less than 19 times.

In all patron records, there are 73,578 patrons has never checked out a collection from the library, which is nearly one fifth of all patrons.

As shown in figure 8, the rate of zero checkout for each patron type is demonstrated. The zero checkout rate for digital access card is extremely higher than all other types and even almost twice greater than welcome patrons. The library should analyse whether the system record cannot record the digital access users online checkout correctly, or the digital resources is not attractive. Further, most patron types has zero checkout rate around 15% and juvenile has relevant lower level of zero checkout rate.
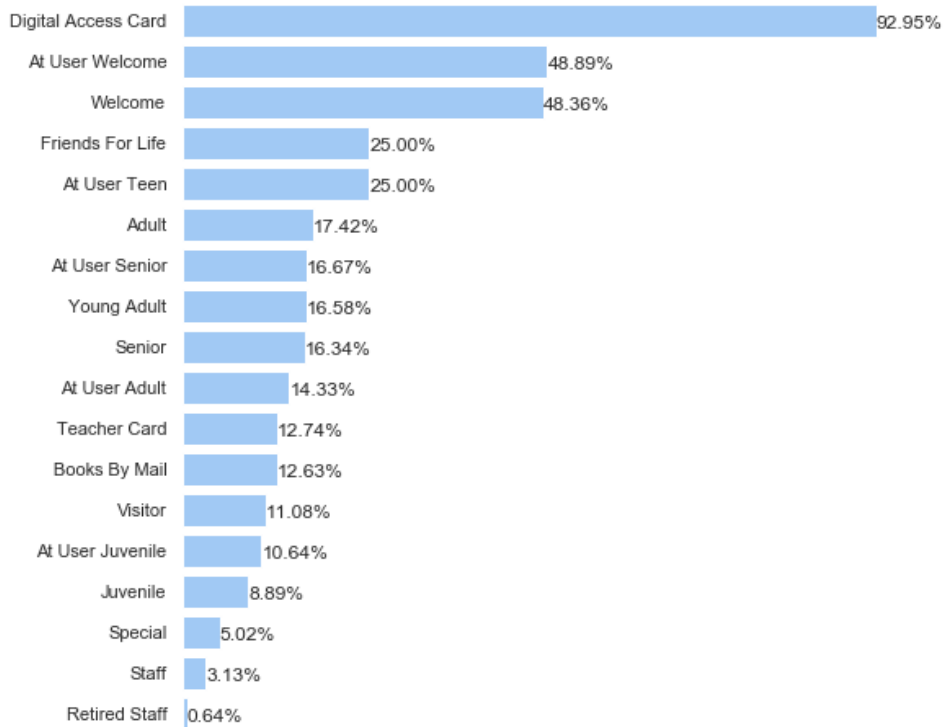
Figure 8 Rate of zero checkout for each patron type

By grouping the all checkout data into four different groups, which are no checkout, checkout once, two to ten times and more than ten times, figure 9 shows the percentage of checkout frequency for ten patron types. Apart from staff, who has more than 90% of checkout more than 10 times, most long-term patron type (which not include visitor and welcome) has about 60% of patrons checkout more than 10 times. This frequency data indicate the digital access card is abnormal again.
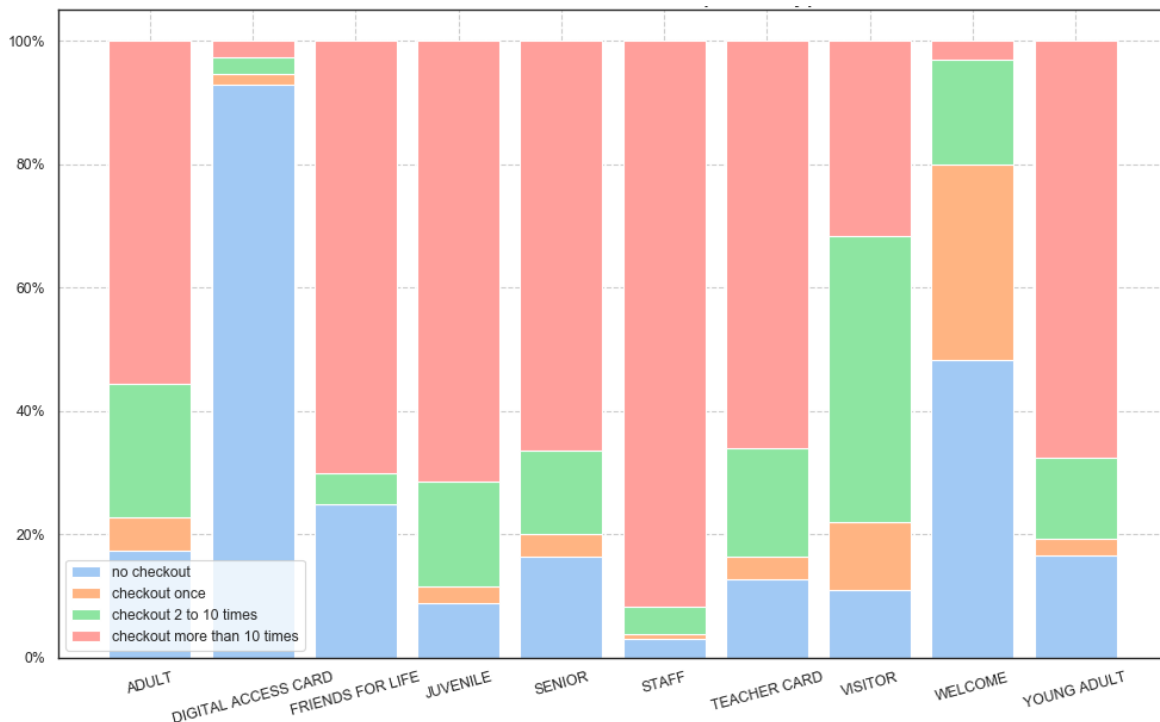
Figure 9 Checkout frequency for each patron type

B. Renewal history overview

There are 246,661 patrons have renewal record, which is 70.5% of the patrons who have checkout record. The average of renewal record is 102 times, which is also significantly impacted by small group of patrons who renewal frequently and the highest total renewal time is 8,965 times. The median of total renewal times is 19, which means half of patrons renew 19 times or less.

Table 4 shows the mean and median of total renewal times for each patron types. Comparing to table 3, the data for staff and retired staff is more dramatically different to other patron types. This shows the habit of staff to renew a resource and not return them at the end of first checkout time period. Further, friends for life, whose checkout frequency data is not outstanding among all patron types, has the highest renewal frequency among all non-staff patrons. The renewal times of books by mail is also higher than other patron types. Most patron types have total renewal time around 20. Senior users are more likely to renew resources than younger generations.

Table 4 Renewal frequency for each patron type

Patron Type	median	mean
STAFF	334	635.8
RETIRED STAFF	293	516.3
FRIENDS FOR LIFE	128	292.2
BOOKS BY MAIL	45	177.6
SENIOR	26	138.3
SPECIAL	25	126.2
ADULT	19	100.3
YOUNG ADULT	18	88.8
JUVENILE	14	80.3
TEACHER CARD	14	52.3
VISITOR	4	9.0
DIGITAL ACCESS CARD	3	16.5
WELCOME	2	5.9

4. Staff information analysis

The San Francisco library usage data shows that until mid of 2016, there are 862 registered staffs and 157 retired staffs. However, it is doubted that not all retired staff has registered as retired staff, for only six years has new retired staff registration and at most every year has three new retired staff. Also, the data does not show the cancellation of staff account.

The staff record is more useful than retired staff record. The figure 10 shows the new staffs that the San Francisco library hired from 2004 to 2016. The data varies from 12 to 33 with average of 25.
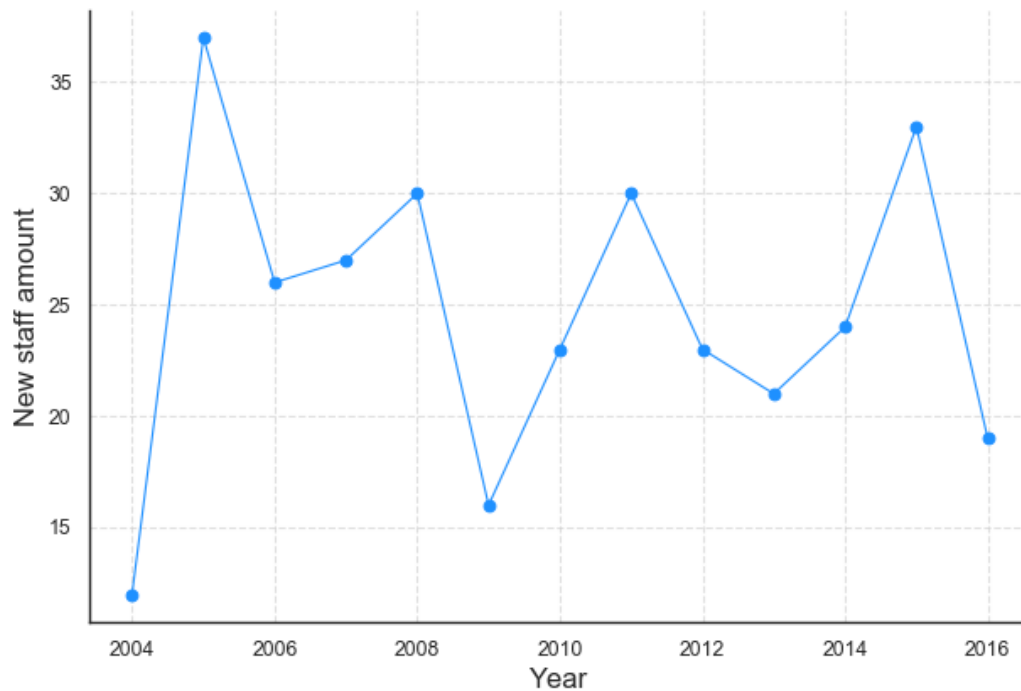
Figure 10 Number of new staffs every year

In total 433 staffs are from main library and for all branch libraries, each branch library has 14 staffs on average. The Chinatown library has 34 staffs which is the largest staff group among all branch libraries. Besides, Mission, Richmond, Ortega, Sunset and West Portal branches also have a large staff group.

5. Conclusion

In conclusion, San Francisco Library has more than 400 thousand registered patrons till July 2016 in all 27 physical branch libraries and a few digital libraries. The library defines 18 different type of patrons and the main group of the patrons are adult, juvenile, young adult, senior and welcome. The type of juvenile is built in 2006 and welcome is built on 2012. From 2004 to 2016, the number of yearly registered patrons is keep increasing. Among all patrons, more than four fifth has active record and half of these active patrons active in the recent one year. Also, half of all patrons checked out resources more than 19 times and 70% of patrons who has checkout record renewed the resources.

In addition, the data shows there are 862 staffs in all San Francisco libraries and every year the library hire about 25 new staffs. The staffs and retired staffs' checkout and renew resources much more than public users.

Finally, the library should pay more attention to digital access users whose checkout and renewal data is abnormal. The library need to exam if the digital user data is collected correctly. Further, the age data has obvious errors and a few patrons is belong to 0 to 9 age range based on default setting.