FINANCIAL COMPLAINT ANALYSIS
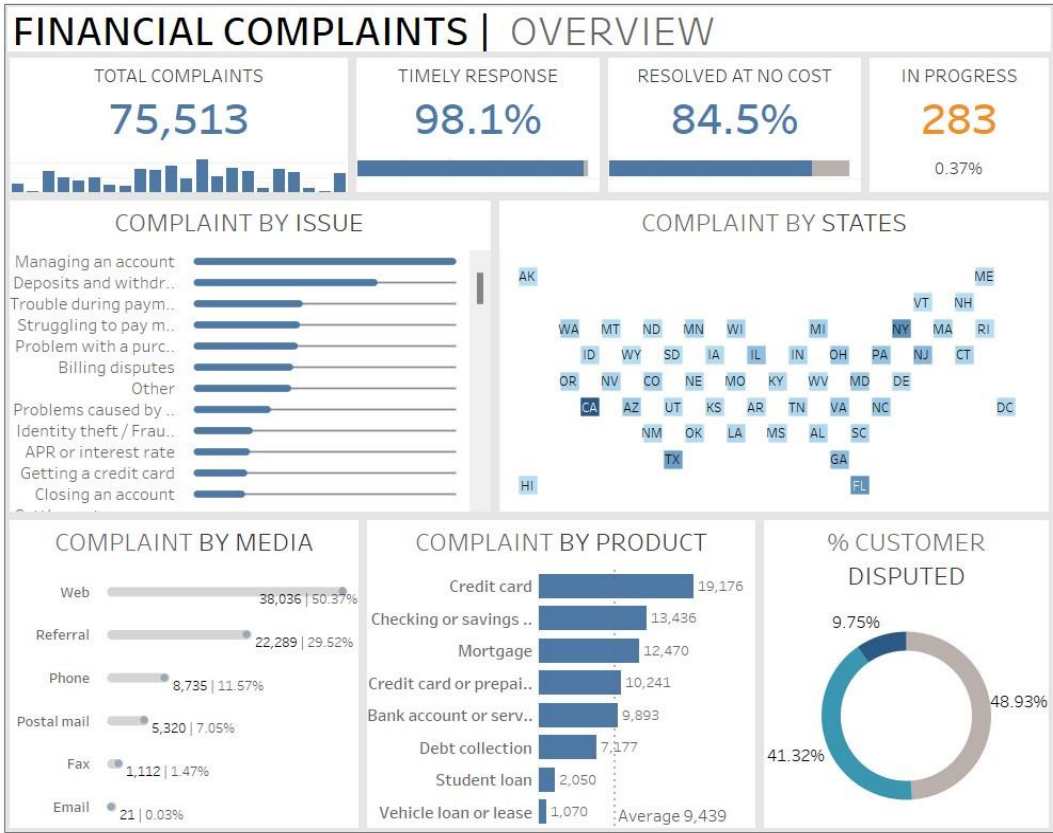
Foundations Of Data Science

(UCS548)
ODD Semester 2022-2023
B.E. Third Year

Submitted By:

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3COE11

Submitted to:

Ms Archana Singh

DASHBOARD:

FINANCIAL COMPLAINTS | OVERVIEW

TOTAL COMPLAINTS	TIMELY RESPONSE	RESOLVED AT NO COST	IN PROGRESS
75,513	98.1%	84.5%	283
			0.37%

COMPLAINT BY ISSUE
- Managing an account
- Deposits and withdr..
- Trouble during paym..
- Struggling to pay m..
- Problem with a purc..
- Billing disputes
- Other
- Problems caused by ..
- Identity theft / Frau..
- APR or interest rate
- Getting a credit card
- Closing an account

COMPLAINT BY STATES

AK ME
VT NH
WA MT ND MN WI MI NY MA RI
ID WY SD IA IL IN OH PA NJ CT
OR NV CO NE MO KY WV MD DE
CA AZ UT KS AR TN VA NC DC
NM OK LA MS AL SC
TX GA
HI FL

COMPLAINT BY MEDIA
- Web — 38,036 | 50.37%
- Referral — 22,289 | 29.52%
- Phone — 8,735 | 11.57%
- Postal mail — 5,320 | 7.05%
- Fax — 1,112 | 1.47%
- Email — 21 | 0.03%

COMPLAINT BY PRODUCT
- Credit card — 19,176
- Checking or savings .. — 13,436
- Mortgage — 12,470
- Credit card or prepai.. — 10,241
- Bank account or serv.. — 9,893
- Debt collection — 7,177
- Student loan — 2,050
- Vehicle loan or lease — 1,070

Average 9,439

% CUSTOMER DISPUTED
- 9.75%
- 48.93%
- 41.32%

DATASET :
Table1:

Complaint ID	Sub-issue	Company public response	Company	State	ZIP code	
2824926	Company closed your account		Cumulus Financial	FL	33179	
1515991	Contacted employer after asked not to		Cumulus Financial	CA	93561	
1145261	""		Cumulus Financial	CA	91792	
2573763	""	Company has responded to the co	Cumulus Financial	CA	92629	
2573113	""		Cumulus Financial	NY	10016	
2406037	""		Cumulus Financial	AZ	85323	
2395777	Debt resulted from identity th	Company has responded to the co	Cumulus Financial	GA	30519	
2850771	Deposits and withdrawals	Company has responded to the co	Cumulus Financial	NV	89048	
2376685	""	Company has responded to the co	Cumulus Financial	AZ	85254	
2825857	Company closed your accoun	Company has responded to the co	Cumulus Financial	PA	16066	
96200	""		Cumulus Financial	NY	11419	
2569972	Deposits and withdrawals	Company has responded to the co	Cumulus Financial	CA	91780	
2825946	Banking errors	Company has responded to the co	Cumulus Financial	FL	33409	
2396405	Attempted to collect wrong a	Company has responded to the co	Cumulus Financial	LA	71457	
2358491	""	Company has responded to the co	Cumulus Financial	CA	94061	
474588			Cumulus Financial	NY	10467	
2373079	""	Company has responded to the co	Cumulus Financial	FL	32966	
2827951	Problem using a debit or ATM card		Cumulus Financial	GA	30067	
2472847	""	Company has responded to the co	Cumulus Financial	TX	76109	
2667860	""		Cumulus Financial	NJ	8880	
2828272	""	Company has responded to the co	Cumulus Financial	CA	906XX	
2826336	""		Cumulus Financial	CT	6410	
2717586	Company closed your account		Cumulus Financial	CA	92101	
1877360	""	Company has responded to the co	Cumulus Financial	RI	2909	
2390283	""	Company has responded to the co	Cumulus Financial	KY	40222	
2345691	""	Company has responded to the co	Cumulus Financial	MD	21221	
2828296	""	Company has responded to the co	Cumulus Financial	AZ	85383	
2397673	""	Company has responded to the co	Cumulus Financial	PA	17236	
2792224	Unable to open an account	Company has responded to the co	Cumulus Financial	OR	97754	
2827360	Threatened to arrest you or t	Company has responded to the co	Cumulus Financial	SC	29483	

▶ ▶ | **Data_1** / Data_2 / Data_3 / Sheet1 /

TABLE2:

Complaint ID	Date Sumbited	Product	Sub-product	Issue	F
2824926	2/24/18	Credit card or prepaid card	General-purpose credit card or charge	Closing your account	
1515991	08-12-2015	Debt collection	Credit card	Improper contact or sharing of info	
1145261	12-05-2014	Bank account or service	Checking account	Deposits and withdrawals	
2573763	7/13/17	Mortgage	Conventional home mortgage	Trouble during payment process	
2573113	7/13/17	Mortgage	Conventional home mortgage	Struggling to pay mortgage	
2406037	3/27/17	Credit card	""	Billing disputes	
2395777	3/20/17	Debt collection	Mortgage	Cont'd attempts collect debt not owed	
2850771	3/19/18	Checking or savings account	Checking account	Managing an account	
2376685	03-07-2017	Mortgage	Other mortgage	Settlement process and costs	
2825857	2/26/18	Credit card or prepaid card	Store credit card	Closing your account	
96200	06-06-2012	Credit card	""	Billing disputes	
2569972	07-10-2017	Checking or savings account	Checking account	Managing an account	
2825946	2/26/18	Checking or savings account	Checking account	Managing an account	
2396405	3/21/17	Debt collection	Mortgage	False statements or representation	
2358491	2/24/17	Credit card	""	Other fee	
474588	08-05-2013	Student loan	Non-federal student loan	Problems when you are unable to pay	
2373079	03-06-2017	Credit card	""	Transaction issue	
2827951	2/27/18	Checking or savings account	Checking account	Managing an account	
2472847	05-01-2017	Mortgage	Other type of mortgage	Trouble during payment process	
2667860	09-09-2017	Mortgage	Other type of mortgage	Struggling to pay mortgage	
2828272	2/28/18	Mortgage	Conventional home mortgage	Closing on a mortgage	
2826336	2/26/18	Mortgage	FHA mortgage	Trouble during payment process	
2717586	10/31/17	Checking or savings account	Checking account	Closing an account	
1877360	4/13/16	Mortgage	Conventional fixed mortgage	Credit decision / Underwriting	
2390283	3/16/17	Credit card	""	Credit determination	
2345691	2/15/17	Credit card	""	Other fee	
2828296	2/28/18	Mortgage	Conventional home mortgage	Trouble during payment process	
2397673	3/21/17	Mortgage	Other mortgage	Other	
2792224	1/23/18	Checking or savings account	Savings account	Opening an account	
2827360	2/28/18	Debt collection	Other debt	Took or threatened to take negative or legal action	

▶ ▶ | Data_1 / **Data_2** / Data_3 / Sheet1 /

TABLE3:

Complaint ID	Tags	Consumer consent provided?	Submitted via	Date Received	Company response to con	Timely res	Consumer disputed?
2824926		Consent not provided	Web	2/24/18	Closed with explanation	Yes	N/A
1515991		Consent not provided	Web	08-12-2015	Closed with explanation	Yes	No
1145261		N/A	Referral	12-08-2014	Closed with explanation	Yes	No
2573763		Consent not provided	Web	7/13/17	Closed with explanation	Yes	N/A
2573113		Consent not provided	Web	7/13/17	Closed with explanation	Yes	N/A
2406037		N/A	Referral	3/27/17	Closed with explanation	Yes	No
2395777		N/A	Referral	3/21/17	Closed with explanation	Yes	No
2850771		N/A	Referral	3/21/18	Closed with monetary reli	Yes	N/A
2376685	Older American	Consent not provided	Web	03-07-2017	Closed with explanation	Yes	No
2825857		Consent not provided	Web	2/26/18	Closed with non-monetar	Yes	N/A
96200		N/A	Referral	6/13/12	Closed with monetary reli	Yes	No
2569972		N/A	Phone	07-10-2017	Closed with explanation	Yes	N/A
2825946		Consent not provided	Web	2/26/18	Closed with explanation	Yes	N/A
2396405		Consent not provided	Web	3/21/17	Closed with explanation	Yes	No
2358491		N/A	Phone	2/28/17	Closed with explanation	Yes	No
474588		N/A	Phone	08-08-2013	Closed with explanation	Yes	No
2373079	Older American	N/A	Phone	03-09-2017	Closed with explanation	Yes	No
2827951		N/A	Postal mail	2/27/18	Closed with explanation	Yes	N/A
2472847		N/A	Referral	05-04-2017	Closed with explanation	Yes	N/A
2667860		N/A	Referral	9/15/17	Closed with explanation	Yes	N/A
2828272		Consent provided	Web	2/28/18	Closed with explanation	Yes	N/A
2826336		Consent withdrawn	Web	2/26/18	Closed with explanation	Yes	N/A
2717586		N/A	Referral	11-02-2017	Closed with explanation	Yes	N/A
1877360		Consent not provided	Web	4/13/16	Closed with explanation	Yes	Yes
2390283		Consent not provided	Web	3/16/17	Closed with monetary reli	No	No
2345691		N/A	Referral	4/19/17	Closed with monetary reli	Yes	No
2828296		Consent not provided	Web	2/28/18	Closed with explanation	Yes	N/A
2397673		N/A	Fax	3/22/17	Closed with explanation	Yes	No
2792224		N/A	Referral	1/24/18	Closed with explanation	Yes	N/A
2827360		Consent provided	Web	2/28/18	Closed with explanation	Yes	N/A

Data_1 / Data_2 / **Data_3** / Sheet1

WHOLE DATASET:

	Complaint ID	Date Sumbited	Product	Sub-product	Issue	Sub-issue	Company	Company	State	ZIP code	Tags	Consumer	Submitted	Date Received	Company r	Timely res	Consumer disputed?
2	2824926	2/24/18	Credit card or pre	General-purpose cr	Closing your accou	Company closed your	Cumulus Fi	FL	33179		Consent n	Web	2/24/18	Closed wit	Yes	N/A
3	1515991	08-12-2015	Debt collection	Credit card	Improper contact	Contacted employer	Cumulus Fi	CA	93561		Consent n	Web	08-12-2015	Closed wit	Yes	No
4	1145261	12-05-2014	Bank account or s	Checking account	Deposits and withe	""	Cumulus Fi	CA	91792	N/A	Referral		12-08-2014	Closed wit	Yes	No
5	2573763	7/13/17	Mortgage	Conventional home	Trouble during pay	""	Company	Cumulus Fi	CA	92629	Consent n	Web	7/13/17	Closed wit	Yes	N/A
6	2573113	7/13/17	Mortgage	Conventional home	Struggling to pay m	""		Cumulus Fi	NY	10016	Consent n	Web	7/13/17	Closed wit	Yes	N/A
7	2406037	3/27/17	Credit card	""	Billing disputes	""		Cumulus Fi	AZ	85323	N/A	Referral	3/27/17	Closed wit	Yes	No
8	2395777	3/20/17	Debt collection	Mortgage	Cont'd attempts co	Debt result	Company	Cumulus Fi	GA	30519	N/A	Referral	3/21/17	Closed wit	Yes	No
9	2850771	3/19/18	Checking or saving	Checking account	Managing an acco	Deposits a	Company	Cumulus Fi	NV	89048	N/A	Referral	3/21/18	Closed wit	Yes	N/A
10	2376685	03-07-2017	Mortgage	Other mortgage	Settlement proces	""		Cumulus Fi	AZ	85254	Older Ame	Consent n	Web	03-07-2017	Closed wit	Yes	No
11	2825857	2/26/18	Credit card or pre	Store credit card	Closing your accou	Company	Company	Cumulus Fi	PA	16066		Consent n	Web	2/26/18	Closed wit	Yes	N/A
12	96200	06-06-2012	Credit card	""	Billing disputes	""		Cumulus Fi	NY	11419	N/A	Referral	6/13/12	Closed wit	Yes	No
13	2569972	07-10-2017	Checking or saving	Checking account	Managing an acco	Deposits a	Company	Cumulus Fi	CA	91780	N/A	Phone		07-10-2017	Closed wit	Yes	N/A
14	2825946	2/26/18	Checking or saving	Checking account	Managing an acco	Banking er	Company	Cumulus Fi	FL	33409	Consent n	Web	2/26/18	Closed wit	Yes	N/A
15	2396405	3/21/17	Debt collection	Mortgage	False statements o	Attempted	Company	Cumulus Fi	LA	71457	Consent n	Web	3/21/17	Closed wit	Yes	No
16	2358491	2/24/17	Credit card	""	Other fee	""		Cumulus Fi	CA	94061	N/A	Phone	2/28/17	Closed wit	Yes	No
17	474588	08-05-2013	Student loan	Non-federal studen	Problems when you	are unable to pay	Cumulus Fi	NY	10467	N/A	Phone		08-08-2013	Closed wit	Yes	No
18	2373079	03-06-2017	Credit card	""	Transaction issue	""		Cumulus Fi	FL	32966	Older Ame	N/A	Phone	03-09-2017	Closed wit	Yes	No
19	2827951	2/27/18	Checking or saving	Checking account	Managing an acco	Problem using a debit	Cumulus Fi	GA	30067	N/A	Postal mai	2/27/18	Closed wit	Yes	N/A
20	2472847	05-01-2017	Mortgage	Other type of mort	Trouble during pay	""	Company	Cumulus Fi	TX	76109	N/A	Referral	05-04-2017	Closed wit	Yes	N/A
21	2667860	09-09-2017	Mortgage	Other type of mort	Struggling to pay m	""		Cumulus Fi	NJ	8880	N/A	Referral	9/15/17	Closed wit	Yes	N/A
22	2828272	2/28/18	Mortgage	Conventional home	Trouble during pay	""	Company	Cumulus Fi	CA	906XX		Consent p	Web	2/28/18	Closed wit	Yes	N/A
23	2826336	2/26/18	Mortgage	FHA mortgage	Trouble during pay	""		Cumulus Fi	CT	6410	Consent w	Web	2/26/18	Closed wit	Yes	N/A
24	2717586	10/31/17	Checking or saving	Checking account	Closing an account	Company closed your	Cumulus Fi	CA	92101	N/A	Referral		11-02-2017	Closed wit	Yes	N/A
25	1877360	4/13/16	Mortgage	Conventional fixed	Credit decision / U	""		Cumulus Fi	RI	2909	Consent n	Web	4/13/16	Closed wit	Yes	Yes
26	2390283	3/16/17	Credit card	""	Credit determinati	""		Cumulus Fi	KY	40222	Consent n	Web	3/16/17	Closed wit	No	No
27	2345691	2/15/17	Credit card	""	Other fee	""		Cumulus Fi	MD	21221	N/A	Referral	4/19/17	Closed wit	Yes	No
28	2828296	2/28/18	Mortgage	Conventional home	Trouble during pay	""		Cumulus Fi	AZ	85383	Consent n	Web	2/28/18	Closed wit	Yes	N/A
29	2397673	3/21/17	Mortgage	Other mortgage	Other	""		Cumulus Fi	PA	17236	N/A	Fax	3/22/17	Closed wit	Yes	No
30	2792224	1/23/18	Checking or saving	Savings account	Opening an accou	Unable to	Company	Cumulus Fi	OR	97754	N/A	Referral	1/24/18	Closed wit	Yes	N/A
31	2827360	2/28/18	Debt collection	Other debt	Took or threatene	Threatene	Company	Cumulus Fi	SC	29483		Consent p	Web	2/28/18	Closed wit	Yes	N/A

DATA REFINING STEPS:

```r
1   install.packages("dplyr")
2   library(dplyr)
3
4   #check working directory
5   getwd()
6
7   #changing it
8   setwd("D:/OneDrive/Documents/data_science_project")
9   getwd()
10
11  #load the dataset
12  data<-read.csv(file.choose(),header=T)
13  data
14
15  #viewing first few entries of the dataframe
16  head(data)
17  |
18  #size of the dataset
19  dim(data)
20
21  #name of the columns of data
22  names(data)
23
24  #DATA PRE PRCOESSING STARTS HERE
25
26  #CHECK FOR DUPLICATE VALUES
27  table(colnames(data))
28
29  #changes the data into data frame
30  new_data=as.data.frame.matrix(data)
31  new_data
32
```

```r
32  dim(new_data)
33
34  #as there are no duplicate columns, hence we will now move to check null values
35  lapply(new_data,function(x) { length(which(is.na(x)))})
36
37  #handling null values
38  #HANDLING null values
39
40  data$Complaint.ID[is.na(data$Complaint.ID)]<-mean(data$Complaint.ID,na.rm=TRUE) #REPLACING WITH MEAN
41  data$Complaint.ID
42  sum(is.na(data$Complaint.ID))
43
44  data$ZIP.code[is.na(data$ZIP.code)]<- '76200' #REPLACING WITH value
45  data$ZIP.code
46  sum(is.na(data$ZIP.code))
47
48  #PERFORMING encoding
49  data$Timely.response. = factor(data$Timely.response.,
50                           levels = c('Yes','No'),
51                           labels = c(1, 0 ))
52  data$Timely.response.
53
54  data$Consumer.disputed.= factor(data$Consumer.disputed.,
55                              levels = c('Yes','No' ,'N/A'),
56                              labels = c(1, 0 ,2))
57  data$Consumer.disputed.
58
59  #adding a new column for indexing
60  no=nrow(data)
61  order=seq(1,no)
62  final_file <- cbind(order,data)
63
```

```r
62  final_file <- cbind(order,data)
63  final_file
64  dim(final_file)
65  colnames(final_file)
66
67  #diving the whole dataset into different
68  Data1<-final_file[,1:6]
69  Data1
70  colnames(Data1)
71  dim(Data1)
72
73  Data_2<-final_file[,7:11]
74  #as we have to join these columns, hence we must have one column common in them,
75  #hence we have to add complaint id in this also
76  Data2<-cbind(final_file$Complaint.ID,Data_2)
77  colnames(Data2)
78  colnames(Data2)[1]<-"Complaint.ID"
79  colnames(Data2)
80  dim(Data2)
81
82  #same with 3
83  Data_3<-final_file[,12:18]
84  #as we have to join these columns, hence we must have one column common in them,
85  #hence we have to add complaint id in this also
86  Data3<-cbind(final_file$Complaint.ID,Data_3)
87  colnames(Data3)
88  colnames(Data3)[1]<-"Complaint.ID"
89  colnames(Data3)
90  dim(Data3)
91
92
93
```

```r
88   colnames(Data3)[1]<-"Complaint.ID"
89   colnames(Data3)
90   dim(Data3)
91
92
93   #now performing data cleaning on individual tables
94   lapply(Data1,function(x) { length(which(is.na(x)))})
95   lapply(Data2,function(x) { length(which(is.na(x)))})
96   lapply(Data3,function(x) { length(which(is.na(x)))})
97
98   #as there are no null values, hence we will continue further
99
100  #as for plotting the graphs in the tableau we need the joined data in one file only,
101  # but containing multiple tables, hence we will join the data to get one file
102
103  #first we will perform outer join between data1 and data2 because Outer Join in  R
104  #combines the results of both left and right outer joins. The joined table will contain
105  #all records from both the tables
106
107  # outer join in R using outer_join() function
108  library(dplyr)
109  Data1= Data1 %>% full_join(Data2,by="Complaint.ID")
110  Data1
111  dim(Data1)
112
113  #as we know that data1 already contains whole data, hence now we will have to take the values from data3
114  #and add it to data1 to get full dataset
115  library(dplyr)
116
117  Data1= Data1 %>% right_join(Data3,by="Complaint.ID")
118  Data1
119  dim(Data1)
```

TABLEAU WORK:
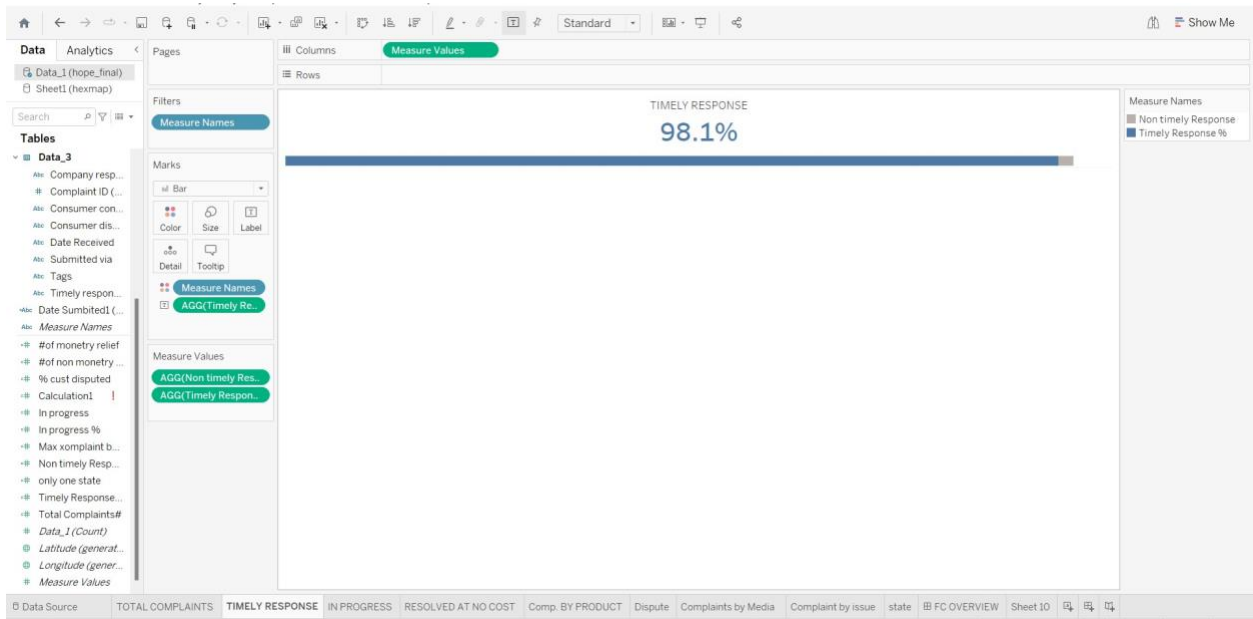## UPLOADING DATASET AND JOIN IN
DATA:

SHEET1 (TOTAL COMPLAINTS KPI):
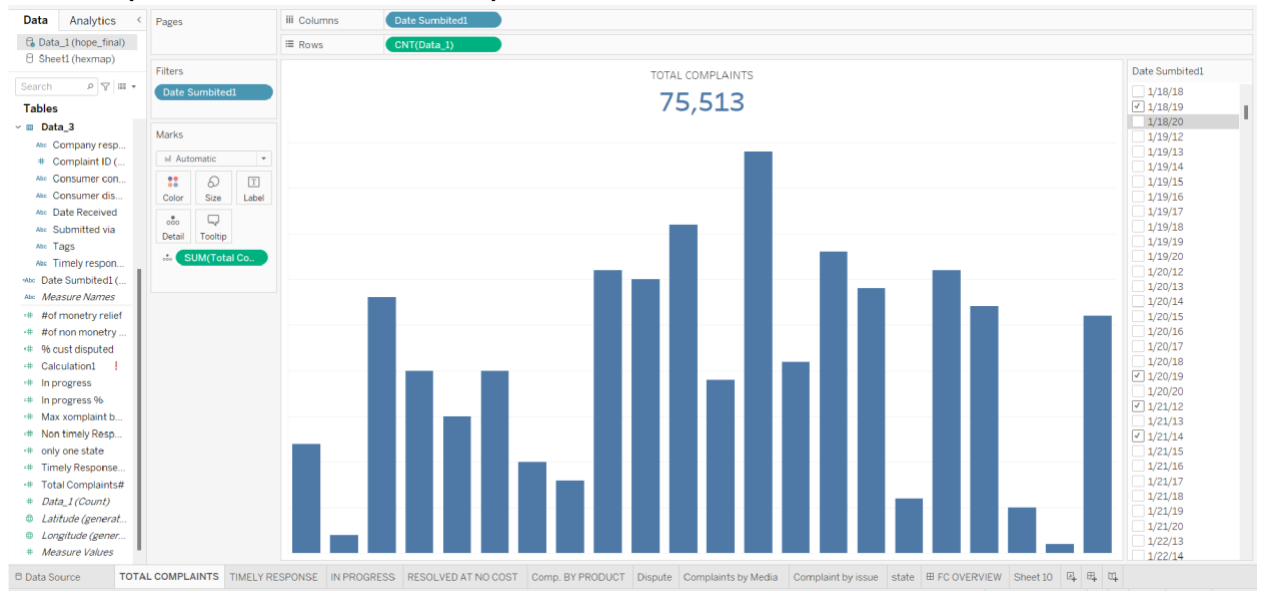
Total Complaints #

{FIXED : COUNT([Complaint ID])}

QUERY USED FOR THIS:
SHEET2 (TIMELY RESPONSE QUERY):

QUERY USED FOR THIS:

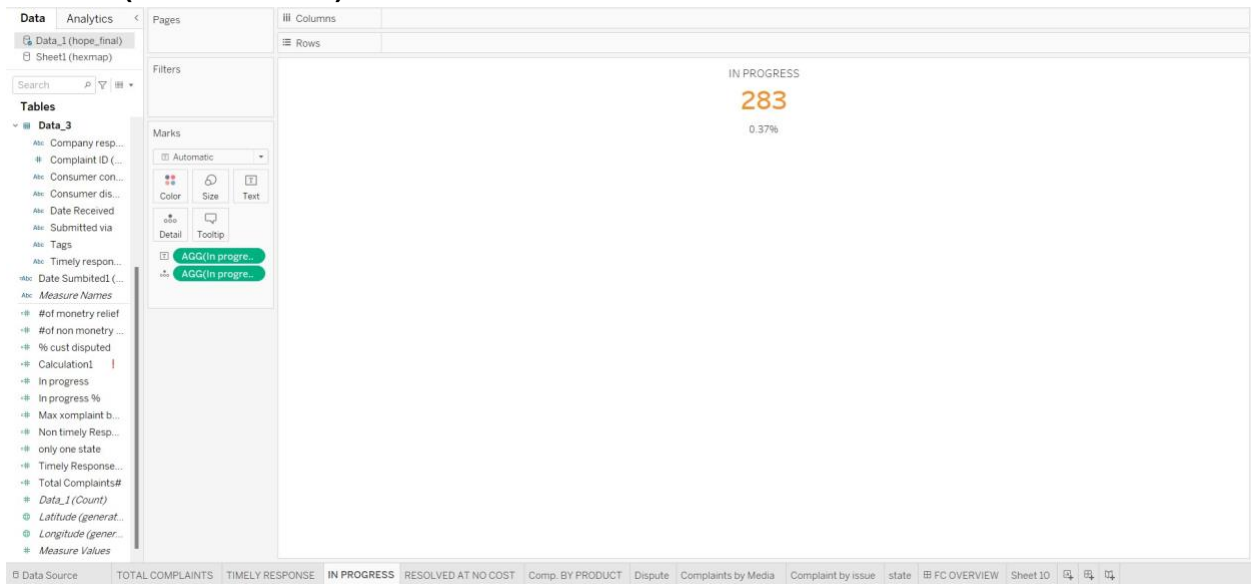Timely Response %

Count(IF [Timely response?] = "Yes" THEN [Complaint ID] END)
                                  COUNT ([Complaint ID])

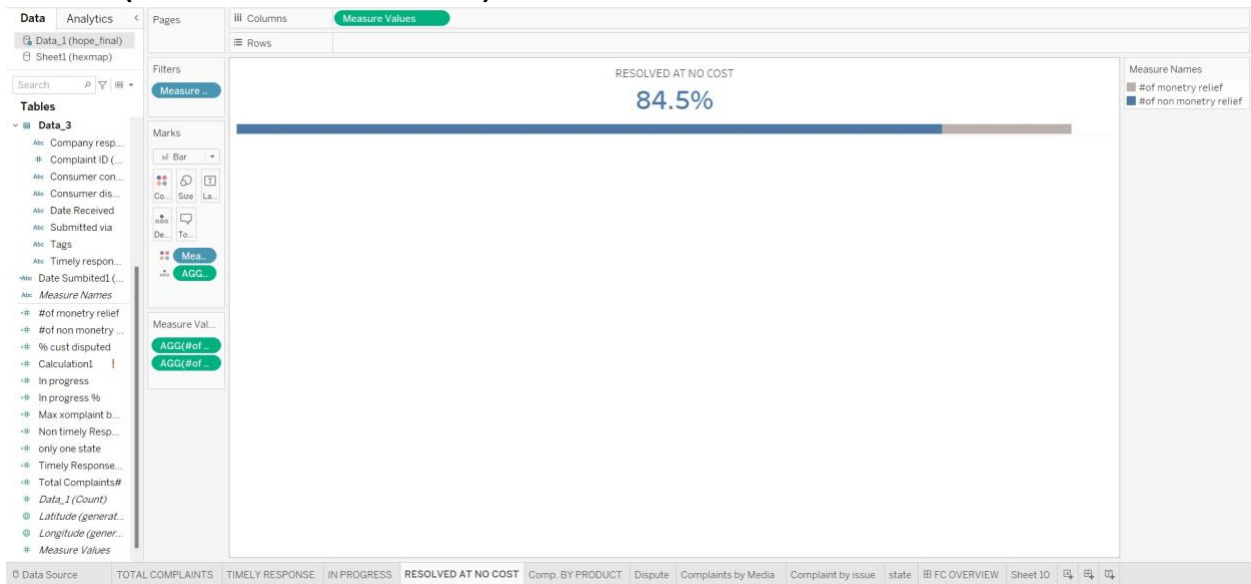The calculation is valid.   Apply   OK

SHEET3 (IN PROGRESS):

QUERY USED FOR THIS:


```
In progress                                    ✕

COUNT(IF [Company response to consumer] = "In progress"
  THEN [Complaint ID] END)




The calculation is valid.              Apply        OK
```
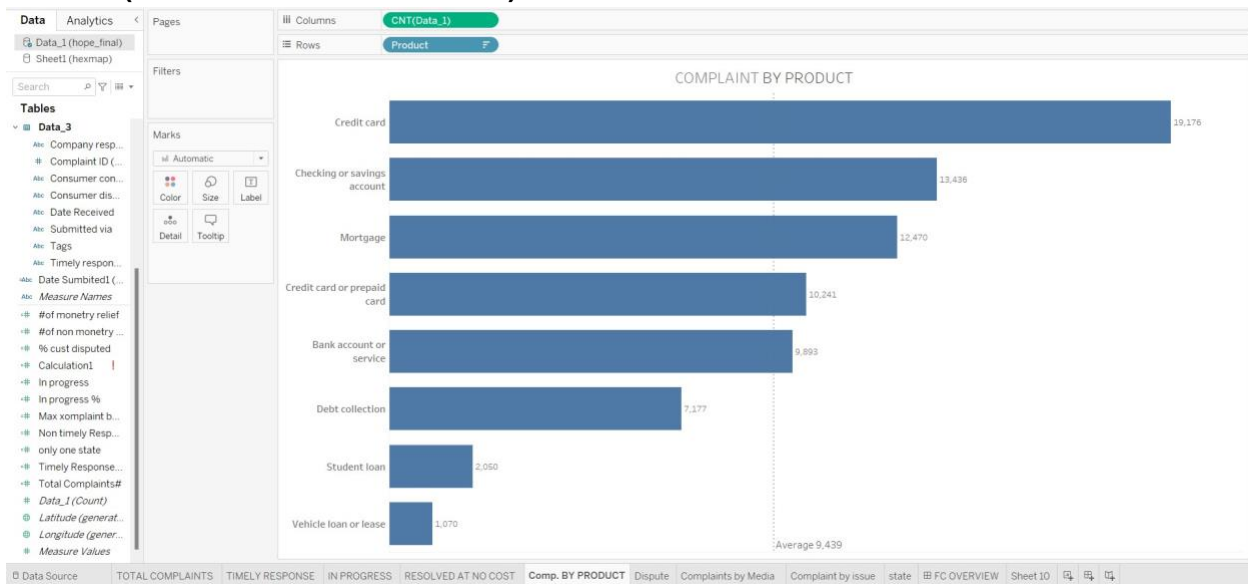
SHEET4 (RESOLVED AT NO COST):

QUERY USED FOR THIS:

```
#of monetry relief                                              ×

COUNT (IF [Company response to consumer] = "Closed with monetary relief"
Then [Complaint ID] END)+|
```
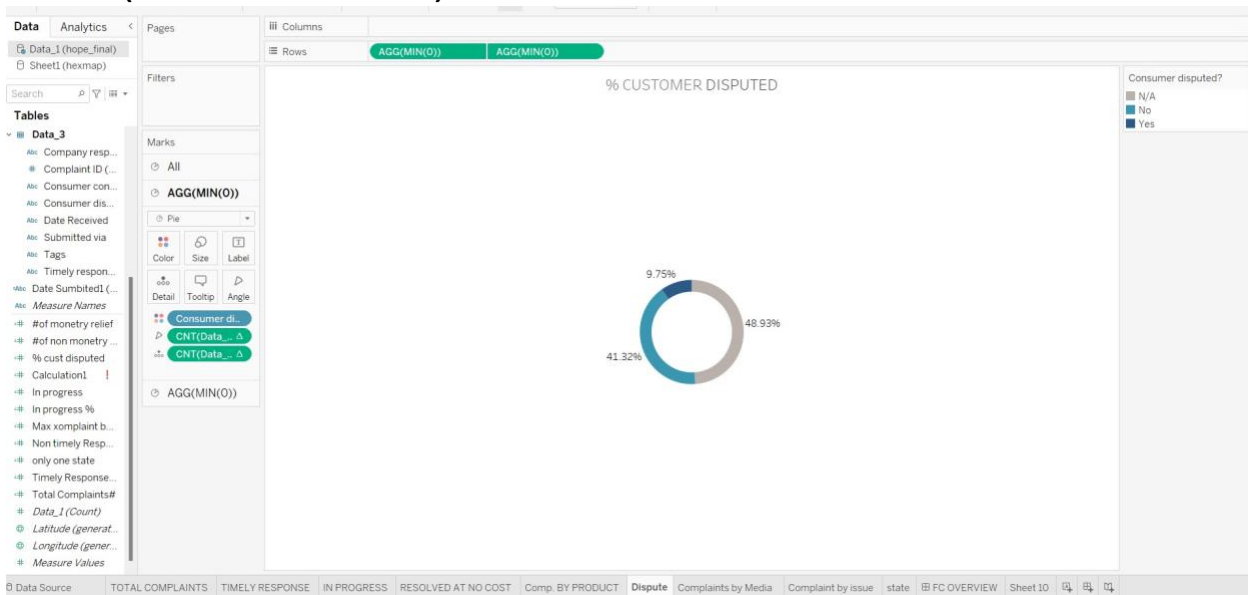
Apply   OK

SHEET5 (COMPLAINT BY PRODUCT):

SHEET6 (CUSTOMER DISPUTE):

QUERY USED FOR THIS:

```
% cust disputed                                                    ✕

COUNT ( IF [Consumer disputed?] = "Yes" THEN [Complaint ID] END) /
COUNT ([Complaint ID])
```
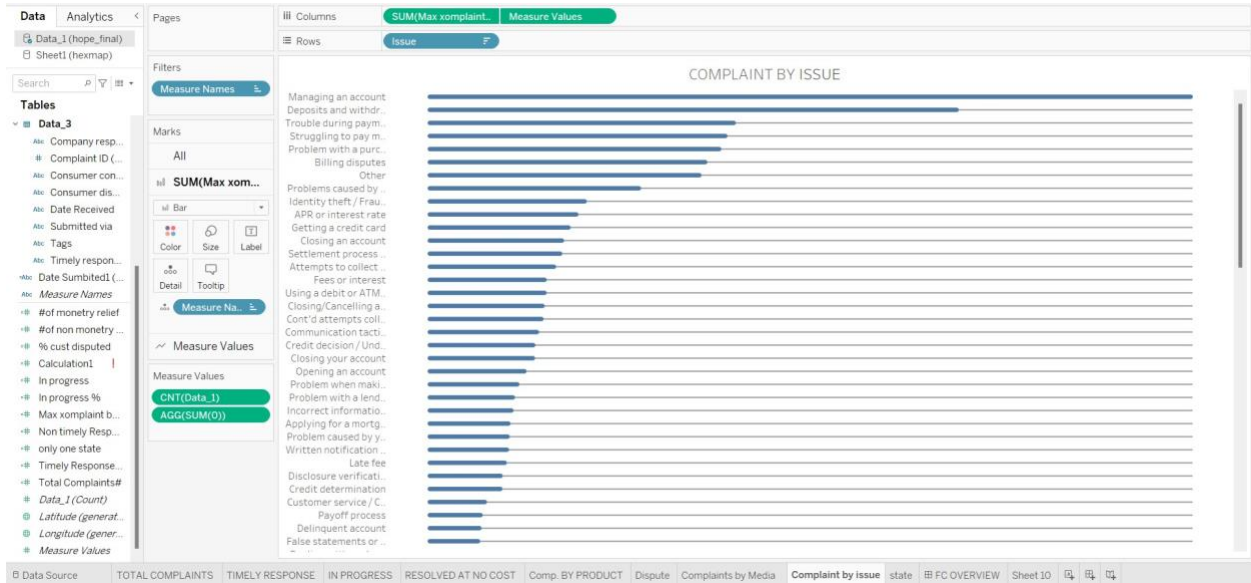
SHEET7 (COMPLAINTS BY MEDIA):

SHEET8 (COMPLAINTS BY ISSUE):

QUERY USED FOR THIS:

ax xomplaint by category   ✕

{FIXED : MAX({FIXED [Issue]: COUNT([Complaint ID])})}

SHEET9 (COMPLAINTS BY STATE):