General goal: The ABA would like to anticipate the sorts of legal questions that arise so that they can prepare volunteers to address those questions, better know how and when to recruit lawyers with specific expertise, and know how to advise state partners on general trends they're seeing.

Specific Listed Goals:

- Provide a better way for attorneys to better connect with their clients
    - Match similar demographic attorneys to their clients?
        - Based on race, historical background
    - Provide a listed background synopsis of the client to better

- Information on ABA Video
    - Largest professional membership for lawyers
    - Provide pro bono services to low income people
    - Encourage lawyers to provide service to them
    - Lets people have legal questions and volunteer attorney will answer
    - Provides help to those who cannot get in-person services
    - Client population, demographics, and personal information on why and how they came across the service would better train and recruit attorneys
    - Goals:
        - Want to reach out to people who need it
        - Provide a way to balance attorney resources
        - Advertise better to the right demographic
        - LIMITED RESOURCES, want to better provide services

- **DATA IMPORTANT NOTES:**
    - Closed conversation
        - Requested by client, attorney, or admin **OR** no communication for 10 days

- **Plan**
    - analyze/clean data sets
        - Possible Questions:
            - Is there a correlation between number of clients and attorneys in a state
            - Correlation between clients and attorneys in each county?
            - Correlation between clients and attorneys in postal code?
            - Correlation between states' financial well-being and client OR attorney
            - Correlation between question amount and client proportion to the state population?
            - Correlation between question amount and state financial well-being
            - Correlation between gender and question type

- Correlation between number of unsolved interactions and some other factor?

- 1: Attorneys, AttorneyTimeEntries (Luke)
  - Attorneys
    - ID is indexing of each observation
    - 11544 attorneys
    - First attorney joined program: 2011-04-08
    - Last attorney joined program: 2022-01-24
    - 42 States only included for attorneys (40 *actual* states, 1 territory, and one federal)
      - Used state.abb as basis for state data
      - states that aren't considered as a "state"
        - VI, US
          - Virgin islands and US in general
      - States with no attorneys
        - "CO" "DE" "KY" "MN" "MT" "NV" "OH" "OR" "RI" "WA"
    - 742 unique counties
    - 2275 unique cities
    - NO NAs in any column
    - Chicago has the most attorneys
  - AttorneyTimeEntries
    - Texas has the most logged hours

Attorney Sum per State

	state	sum
1	TX	1140
2	FL	1103
3	TN	1036
4	IL	997
5	NC	629
6	MA	533
7	VA	517
8	IN	484
9	NY	476
10	WI	385
11	MO	315
12	GA	308
13	NE	266
14	MD	262
15	SC	260
16	LA	246
17	CA	245
18	ME	193

19 AR 192
20 WV 175
21 OK 167
22 AL 138
23 MS 138
24 HI 125
25 NH 123
26 AK 110
27 AZ 104
28 CT 103
29 PA 98
30 UT 97
31 NM 94
32 MI 77
33 NJ 74
34 IA 67
35 WY 62
36 VT 54
37 KS 30
38 SD 26
39 VI 3
40 ID 2
41 ND 1

- 2: Categories, Subcategories (Zhou)
- 3: Questions, QuestionPosts (Shawn)
    - QuestionPosts: 505564 entities, but only 164735 QuestionUno's
- 4: Clients (Kevin)
- 5: StateSites (Tian)

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

Weird Client: 90D7EB25-FAAE-415E-9878-FB8655EE672F

Clients Who Asked Questions

AnnualIncome	Number of Clients	Proportion of Clients
Below 5k	19343	0.1168
5k-10k	16625	0.1004
10k-20k	44819	0.2707
20k-30k	40277	0.2433
30k-40k	22769	0.1375
40k-50k	12093	0.0730
50k-100k	9357	0.0565
100k-300k	254	0.0015
Above 300k	16	0.0001

Clients Who Had Their Question Answered

AnnualIncome	Number of Clients	Proportion of Clients
Below 5k	13444	0.1115
5k-10k	11781	0.0977
10k-20k	32324	0.2681
20k-30k	29659	0.2460
30k-40k	17004	0.1411
40k-50k	9099	0.0755
50k-100k	7034	0.0584
100k-300k	186	0.0015
Above 300k	14	0.0001

Total Clients

AnnualIncome	Number of Clients	Proportion of Clients
Below 5k	27929	0.1118
5k-10k	22133	0.0886
10k-20k	57969	0.2320
20k-30k	52239	0.2091
30k-40k	33191	0.1328
40k-50k	21271	0.0851
50k-100k	29727	0.1190
100k-300k	4705	0.0188
Above 300k	716	0.0029

Mean Hours Worked By Attorney Per State

StateAbbr	Hours
SD	92.02
HI	22.74
NJ	20.07
MO	19.69
TX	17.70
CA	15.41
WI	14.51
NM	14.44
VA	13.45
SC	13.02
FL	12.30
NY	12.22
MA	11.74
LA	11.72
OK	10.69
WV	10.47
IN	10.42
ME	10.18
CT	9.83
VT	9.43
NC	8.77
TN	8.75
IL	8.74
AZ	8.04
WY	7.40
NE	6.80
IA	6.71
UT	6.41
MI	6.18
AR	6.03
NH	5.79
MD	5.77
AK	5.27
GA	4.88
PA	4.61
AL	3.79
MS	3.54
US	3.00
KS	0.83

Mean Hours Worked Per Attorney Per Session By State

StateAbbr	Hours
MI	1.3600
CA	1.3011
SD	0.9895
TX	0.6214
MA	0.5385
US	0.5376
PA	0.4987
VA	0.4935
MS	0.4735
NE	0.4293
IL	0.4190
MD	0.4112
IN	0.4054
AZ	0.4027
WY	0.3933
GA	0.3909
CT	0.3731
ME	0.3713
KS	0.3667
SC	0.3635
TN	0.3572
HI	0.3541
NJ	0.3534
LA	0.3439
WV	0.3380
NH	0.3305
AK	0.3222
NY	0.3170
VT	0.3145
WI	0.3094
NC	0.3086
OK	0.2960
AL	0.2871
NM	0.2805
FL	0.2765
MO	0.2758
UT	0.2724
AR	0.2642
IA	0.2392

Total Hours Worked By All Attorneys By State

StateAbbr	Hours
TX	5998.70
FL	3689.84
IL	3680.30
TN	2826.86
VA	2286.60
IN	2228.92
MO	2145.80
MA	2043.25
WI	1929.20
NC	1816.05
NY	1760.10
SD	1748.40
SC	1705.97
CA	1310.20
LA	1077.85
HI	886.90
ME	844.80
WV	733.10
MD	611.50
NE	604.90
OK	577.00
AR	530.50
GA	497.60
NM	433.10
CT	402.90
NH	364.50
NJ	361.20
WY	281.20
AZ	265.40
VT	217.00
AK	184.60
IA	167.70
MS	166.20
AL	163.10
UT	141.10
PA	78.30
MI	68.00
US	62.90
KS	6.60

All Clients

Gender	Number of Clients	Proportion of Clients
Female	185433	0.66
Male	87517	0.31
I'd rather not answer	6257	0.02
Other	796	0.00

Individual Households

Gender	Number of Clients	Proportion of Clients
Female	39963	0.58
Male	26426	0.39
I'd rather not answer	1779	0.03
Other	282	0.00

Family Households

Gender	Number of Clients	Proportion of Clients`
Female	130929	0.70
Male	53058	0.28
I'd rather not answer	3526	0.02
Other	456	0.00

MUST SHOW THAT FAMILY HOUSEHOLDS HAVE HIGHER FEMALE PROPORTION OF CLIENTS/FEMALES MORE LIKELY TO REPRESENT THEIR HOUSEHOLD/PROPORTION OF FEMALES IN FAMILY HOUSEHOLD IS GREATER THAN FEMALE PROPORTION OF INDIVIDUAL CLIENTS

Null (No answer) Households

Gender	Number of Clients	Proportion of Clients
NaN	27224	0.54
Female	14541	0.29
Male	8033	0.16
I'd rather not answer	952	0.02
Other	58	0.00

Gender Data For Marriage Status

	Female	Male
# of Married Clients	47239	28466
Married Clients Proportions	0.62	0.37
# of Single Clients	75783	37791
Single Clients Proportions	0.67	0.33
# of Divorced/Separated Clients	55438	18286
Divorced/Separated Clients Proportions	0.75	0.25

Female Most Common Question Categories

Category	Number of Clients	Proportion of Clients
Family and Children	47959	0.47
Housing and Homelessness	18159	0.18
Other	16559	0.16
Consumer Financial Questions	7907	0.08
Work, Employment and Unemployment	4644	0.05
Individual Rights	3464	0.03
Health and Disability	1254	0.01
Income Maintenance	1179	0.01
Education	411	0.00
Juvenile	167	0.00

Male Most Common Question Categories

Category	Number of Clients	Proportion of Clients
Family and Children	15821	0.36
Other	9371	0.21
Housing and Homelessness	7429	0.17
Consumer Financial Questions	4547	0.10
Work, Employment and Unemployment	2970	0.07
Individual Rights	2357	0.05
Income Maintenance	680	0.02
Health and Disability	616	0.01
Education	135	0.00
Juvenile	55	0.00

No Gender Given Most Common Question Categories

Category	Number of Clients	Proportion of Clients
Family and Children	12465	0.47
Other	4711	0.18
Housing and Homelessness	4379	0.16
Consumer Financial Questions	2362	0.09
Work, Employment and Unemployment	1157	0.04
Individual Rights	827	0.03
Health and Disability	346	0.01
Income Maintenance	316	0.01
Education	136	0.01
Juvenile	74	0.00

Gender Proportion Among All Clients

	Gender	Number of Clients	Proportion of Clients
0	Female	185433	0.6617
1	Male	87517	0.3123
2	Nonconforming	7277	0.0260

Categories & Subcategories

Categories

- There are 41 states and 2 regions (US, VI)
    - Missing states:
        - CO: Colorado
        - DE: Delaware
        - KY: Kentucky
        - MN: Minnesota
        - MT: Montana
        - NV: Nevada
        - OH: Ohio
        - OR: Oregon
        - RI: Rhode Island
- There are 10 categories in each state/region:
    - Consumer Financial Questions
    - Education
    - Work
    - Employment and Unemployment

- Family and Children
- Health and Disability
- Juvenile
- Housing and Homelessness
- Income Maintenance
- Individual Rights
- Other

Subcategories

- There are 365 unique subcategories
- Number of subcategories in each state
  - Top 10:

StateAbbr <chr>	num_sub <int>
IN	47
NE	47
NC	36
TX	32
MO	30
OK	29
GA	26
WI	26
LA	25
AK	24

  - Bottom 10

StateAbbr <chr>	num_sub <int>
WV	11
MA	16
AZ	18
CA	18
IA	18
ID	18
MD	18
MS	18
ND	18
NJ	18

- Frequencies
  - Top 10 most frequently subcategories

```
                          Immigration                                 Other                        Personal Injury 
                                   38                                    36                                     36 
Medicaid/Medicare/Affordable Care Act          Emancipation and Delinquency                            Expungement 
                                   35                                    34                                     34 
                          Health Care                    School Discipline                    Special Education 
                                   33                                    33                                     33 
                    Worker's Comp 
                                   33 
```

  - Least frequently

2019 Flood -Consumer	1
2019 Flood -Housing	1
2019 Flood -Insurance	1
2019 Flood -Lost Documents	1
2019 Flood -Other	1
2019 Flood -Wills/Probate	1
Adult Guardian/Conservatorship	1
Adult/Minor Guardianship	1
Advanced Directives & Powers of Attorneys	1
Alimony	1
Animal Law	1
Appellate	1
Auto or Property Insurance	1
Bankruptcy	1
Bankruptcy or Debtor Relief Cases	1
Bankruptcy, Debts & Purchases	1
Bankruptcy/Debtor Relief	1
Business	1
Business or Tax	1
Business/Contracts	1

-

Both

- Number of subcategories in each category

Other	216
Family and Children	118
Consumer Financial Questions	116
Individual Rights	90
Income Maintenance	89
Health and Disability	88
Education	80
Housing and Homelessness	70
Work, Employment and Unemployment	58
Juvenile	41

-

Potential Directions

- Most frequently asked categories/subcategories
  - Relationship between the category of questions and financial status of individuals?
- No. of subcategories
  - (under the same category), correlation between no. of subcategories, no. of attorney, and no. of questions asked
- Gender ratio in clients who asked questions
  - Is gender correlated to…
    - Specific categories of questions?
    - Financial status?
    - Tone of questions asked?
- Unanswered questions
  - Related to the attorney number in that state?
  - Concentrated in specific states?
  - Concentrated in specific categories?
- Where does the silent majority go?
- Correlation of total logged hours per state vs. client amount

- Sentiment analysis
    - Correlation between tones and categories/subcategories
- 3 Types of Interactions
    - Clients who do not ask
    - Clients who ask but do not receive response
    - Clients who have at least interacted with
- Time related
    - Do gender

Questions to solve

- Attorney
    - Recruit more
    - Allocation to their specialized field
- Client
    - Convert more silent clients into asking questions
    -
- Service
    - Reduce more unsolved conversations
- Trends
    - General patterns observed

Plan

- Why is there a gender imbalance in the client amount?
    - Does gender have a correlation to the type of questions being asked?
    - External factors to why there is a skew in amount of woman clients and men clients
    -
- Places that need special attention:
    - Rank the subcategory difficulties (categories)
        - Convo length, question number, emotional intensity
    - Sentiments, time-spans, frequencies of each sub-category
      -> property of each sub-category
      -> suggestions on human resources allocation and how to connect to the clients better

Rubric

Ratio

> # p checking: more female proportion clients in family households
> # vs individual households

```
> prop.test(x = c(39963, 130929), n = c(68450, 187969), alternative = "l")

        2-sample test for equality of proportions with continuity
        correction

data:  c(39963, 130929) out of c(68450, 187969)
X-squared = 2867.4, df = 1, p-value < 2.2e-16
alternative hypothesis: less
95 percent confidence interval:
 -1.000000 -0.109152
sample estimates:
   prop 1    prop 2
0.5838276 0.6965457

> # p checking: more female prop clients in divorced/sep than married/single
> # female divorced/sep: 55438, total divorced/sep: 73724
> # female married/single: 75783, total married/single: 113574
> prop.test(x = c(55438,75783), n = c(73724, 113574), alternative = "g")

        2-sample test for equality of proportions with continuity
        correction

data:  c(55438, 75783) out of c(73724, 113574)
X-squared = 1528.9, df = 1, p-value < 2.2e-16
alternative hypothesis: greater
95 percent confidence interval:
 0.08121567 1.00000000
sample estimates:
   prop 1    prop 2
0.7519668 0.6672566
```

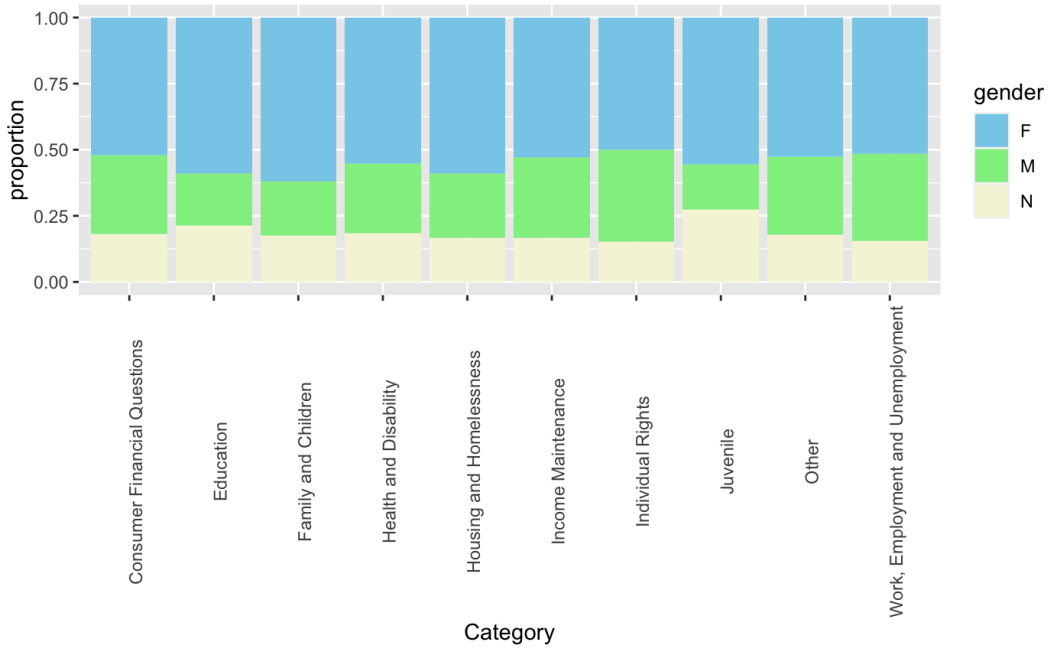
- More female clients
  - 57.8% female clients
  - 2.3-to-1 female-male ratio

```
     F      M      N
101703  43981  30184
```

```
         F         M         N
0.5782884 0.2500782 0.1716277
```

    - Potential explanations…
      - Women face more legal issues
      - Women more likely to seek legal assistance
        - Gender role and societal expectation

        - Households - higher proportion of female clients
    - Genders - categories of questions



        -
        - Top three categories females ask about

Category <chr>	F <dbl>
Family and Children	0.6197424
Education	0.5919395
Housing and Homelessness	0.5913394

        - Top three categories males ask about

Category <chr>	M <dbl>
Individual Rights	0.3478104
Work, Employment and Unemployment	0.3279670
Income Maintenance	0.3046875

        - Top three categories non-conforming genders ask about

Category <chr>	N <dbl>
Juvenile	0.2745098
Education	0.2128463
Health and Disability	0.1839675

- ‘difficulty index’ for categories
    - Sentiment

- Must test the general idea that categories' means reflect their true sentimental mean

```
> greaterTTest(juv_sent$sentiment, fam_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 1.3992, df = 69820, p-value = 0.08088
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.009916489          Inf
sample estimates:
mean of x mean of y
0.4767442 0.4202749


        Welch Two Sample t-test

data:  v1 and v2
t = 1.3343, df = 258.74, p-value = 0.09164
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.01339293         Inf
sample estimates:
mean of x mean of y
0.4767442 0.4202749

> ## special case needed to check
> greaterTTest(juv_sent$sentiment, other_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 2.1469, df = 31131, p-value = 0.0159
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.0198469       Inf
sample estimates:
mean of x mean of y
0.4767442 0.3918704


        Welch Two Sample t-test

data:  v1 and v2
t = 2.0016, df = 260.74, p-value = 0.02318
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.01487862        Inf
sample estimates:
mean of x mean of y
0.4767442 0.3918704

> greaterTTest(fam_sent$sentiment,other_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 6.4661, df = 100437, p-value = 5.051e-11
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
```

```
 0.02117881        Inf
sample estimates:
mean of x mean of y
0.4202749 0.3918704


        Welch Two Sample t-test

data:  v1 and v2
t = 6.5248, df = 60470, p-value = 3.432e-11
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.02124375        Inf
sample estimates:
mean of x mean of y
0.4202749 0.3918704

> greaterTTest(other_sent$sentiment,individual_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 1.9942, df = 37994, p-value = 0.02307
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.002890737         Inf
sample estimates:
mean of x mean of y
0.3918704 0.3753686


        Welch Two Sample t-test

data:  v1 and v2
t = 2.0212, df = 10817, p-value = 0.02164
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.003071795         Inf
sample estimates:
mean of x mean of y
0.3918704 0.3753686

> # HIGH P VALUE
> greaterTTest(individual_sent$sentiment,income_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 0.12115, df = 9389, p-value = 0.4518
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.02264506         Inf
sample estimates:
mean of x mean of y
0.3753686 0.3735683


        Welch Two Sample t-test

data:  v1 and v2
t = 0.12199, df = 3865.7, p-value = 0.4515
alternative hypothesis: true difference in means is greater than 0
```

```
95 percent confidence interval:
 -0.02248132         Inf
sample estimates:
mean of x mean of y
0.3753686 0.3735683

> greaterTTest(income_sent$sentiment, consumer_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 4.62, df = 15997, p-value = 1.933e-06
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.03948041        Inf
sample estimates:
mean of x mean of y
0.3735683 0.3122587


        Welch Two Sample t-test

data:  v1 and v2
t = 4.4628, df = 2990.1, p-value = 4.194e-06
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.03870567        Inf
sample estimates:
mean of x mean of y
0.3735683 0.3122587

> # HIGH P VALUE
> greaterTTest(consumer_sent$sentiment, health_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 0.15185, df = 16025, p-value = 0.4397
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.01955719         Inf
sample estimates:
mean of x mean of y
0.3122587 0.3102698


        Welch Two Sample t-test

data:  v1 and v2
t = 0.15234, df = 3123.6, p-value = 0.4395
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.01949296         Inf
sample estimates:
mean of x mean of y
0.3122587 0.3102698

> greaterTTest(health_sent$sentiment, work_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
```

```
t = 3.3957, df = 11026, p-value = 0.0003435
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.02271645        Inf
sample estimates:
mean of x mean of y
0.3102698 0.2662085


        Welch Two Sample t-test

data:  v1 and v2
t = 3.2837, df = 3451.3, p-value = 0.0005174
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.02198446        Inf
sample estimates:
mean of x mean of y
0.3102698 0.2662085

> greaterTTest(work_sent$sentiment, house_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 7.4707, df = 37971, p-value = 4.074e-14
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.03681992        Inf
sample estimates:
mean of x mean of y
0.2662085 0.2189926


        Welch Two Sample t-test

data:  v1 and v2
t = 7.1928, df = 13572, p-value = 3.34e-13
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.03641779        Inf
sample estimates:
mean of x mean of y
0.2662085 0.2189926

> # HIGH P VALUE
> greaterTTest(house_sent$sentiment,edu_sent$sentiment)

        Two Sample t-test

data:  v1 and v2
t = 0.13848, df = 29861, p-value = 0.4449
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.03115161         Inf
sample estimates:
mean of x mean of y
0.2189926 0.2161290


        Welch Two Sample t-test
```

data: v1 and v2
t = 0.1375, df = 645.13, p-value = 0.4453
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -0.03144051   Inf
sample estimates:
mean of x mean of y
0.2189926 0.2161290

- Question quantity (tied to states?)
- Quantity of unsolved cases
- Timespan median
- Timespan sd

Category <chr>	proportion <dbl>	negative_proportion <dbl>	unsolved_proportion <dbl>	median <dbl>	std <dbl>
Consumer Financial Questions	0.083348513	0.7493990	0.3746665	223.7272	729.9697
Education	0.003764557	0.8306452	0.3634361	117.5775	419.3162
Family and Children	0.422359042	0.6671794	0.3527132	167.7289	921.5463
Health and Disability	0.013947078	0.7501088	0.3404441	192.6417	685.6970
Housing and Homelessness	0.177559595	0.8252573	0.3370968	239.7319	644.3791
Income Maintenance	0.013783137	0.6955947	0.3123198	220.2917	621.2893
Individual Rights	0.043237762	0.6986378	0.2605109	215.9308	1107.4752
Juvenile	0.001566542	0.6279070	0.2474411	216.4144	1688.7500
Other	0.187432450	0.6887168	0.2150506	143.2296	1105.9420
Work, Employment and Unemployment	0.053001324	0.7855424	0.2062716	216.5140	582.9851

Gender:

- Barplots
  - Female proportion vs. Marriage status
  - Female proportion in single vs. Female proportion in household
  - Female proportion in Categories
  - Female proportion in total client

Difficulties:

Consumer Financial Questions
Education
Work
Employment and Unemployment
Family and Children
Health and Disability
Juvenile
Housing and Homelessness
Income Maintenance
Individual Rights
Other

- Slide1
    - Initial thoughts on the data
        - Noticed gender imbalanced gender proportion in clients
        - Looked into other variables to see if other factors changed this claim
    - Observations on other factors based on gender within specific samples
        - Nonconforming consists of responses that were not Female, Male, or Null
        - All Null responses were excluded (clients who skipped the question without responding)
        - Initially, we looked to see the total client gender proportion. The pie chart provides the observed proportion.
        - The following variables were used to see the gender distribution, and see if the factors have a significant effect on gender proportion
        - LSC Categories
            - We observed differences in the proportion of female clients within each category. While we can tentatively put forth possible reasons for the difference such as a higher rate of women seeking divorce than men, there are too many possible confounding variables to confidently state a cause for the imbalanced ratio between genders.
        - Marital Status
            - There was a difference in female/non-female proportions based on marital status. Looking at the observed proportions, we decided to group together married & single, and divorced & separated for they had similar proportions. We executed a proportion test and the result implies that there is a higher probability to get a female client in the divorced/separated marital status rather than married/single.
        - Household
            - In addition, there was an observable difference in household status for the gender proportion. The proportion test concluded

that there is a higher chance to get a female client in a family household than an individual household.
- These two client demographics are some of the major factors that seem to have a direct effect on the gender distribution of clients.

- Slide2
  - We now switch gear to examine if it is harder for attorneys to answer questions from specific categories. As you may see in this 5-dimensional bubble chart, we gathered five variables as potential indicators of difficulty level, starting with total_proportion on the horizontal axis, which is the proportion of total questions asked under each category. **(17 seconds)**
    - Negative proportion - sentiment analysis **(30 seconds)**
      - **(Shown along one axis)**
      - We extracted the negative proportion feature with natural language processing techniques. In particular, we loaded a deberta-v3-large model fine-tuned on sentiment analysis dataset. Then we let the model to predict the sentiment of the clients' questions and obtain the proportion of negative posts. Questions labeled as negative often contains words that are emotionally strong or describing a severe scenario.
    - Unsolved proportion
      - **(Shown along one axis)**
      - Percentage of questions that were unanswered.
    - Median/STD of time span
      - Finally, we have Median and STD of the time spans of each case represented by the **size and color of the spheres** respectively
  - Observations **(50 seconds)**
    - Family and Children: significantly more questions asked under this category, 23% higher than the second highest (Other). Highest unsolved questions as well (37%). But it does have the lowest negative_proportion.
      - Potential response: allocate more attorneys or attorneys with specialized skills under this category.
    - Housing and Homelessness: highest time span of each question (240 hours).
      - Possibly by nature of this category and how it has the highest negative proportion, it takes longer time to resolve.
    - Juvenile: extreme variable on the other end. lowest in three axes. However, it does have the highest standard deviation of the time_span.
  - After ranking the sentimental values of the categories and testing the true difference between expected values, some p-values imply that some categories aren't statistically significantly different enough while some categories do.
    - This mixed result implies that there is some correlation between the type of category and the expected value of the sentiment value, and so this shows a high likelihood for a possible categorical algorithm that can aid with allocating specific questions to certain attorneys. **(26 seconds)**

    - We can use these features in two levels of granularity. Each separate feature could be used to facilitate a more efficient and empathetic client-attorney relationship, whereas examining all features together can help us identify more challenging categories with larger and darker spheres that are far from the origin.
    - if ABA would like to adjust its recruitment or resource allocation strategies, it could be valuable to pay more attention to

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- Future work
    - Do the same feature extraction for sub-categories

- https://drive.google.com/drive/folders/13Ecwt4DixkKIU8qNs_X9aO4xD6zcy6Sv