

Using sentiment and thematic analysis of open text to capture the 2020 Census user experience

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Disclaimer: Any views expressed are those of the authors and not necessarily those of the U.S. Census Bureau.

Background: 2020 Census online

- In 2020, the public had the option to respond to the decennial Census online
 - Letter with URL and Census ID
 - Device of choice (e.g., PC, mobile phone)
- Over 79 million online responses received
- What was this experience like for respondents?
- Online survey to measure respondent satisfaction and experience with 2020 Census online questionnaire

2020 Census User Experience Survey

- Recruitment
 - Sampled addresses where respondent answered the census online and provided a cell phone number (approximately 153,000)
 - Sent text invitations and reminders to complete the user experience survey
 - Developed and fielded using Qualtrics platform
- 6,613 respondents completed the entire survey
- Questions:
 - Overall satisfaction (How satisfied were you with the experience of filling out your 2020 Census questionnaire online)
 - Reasons why satisfied or dissatisfied

2020 Census User Experience Survey: Open text question

- Is there anything else about filling out the 2020 Census that you would like to share with us?
 - If R selected yes, they were asked “what else would you like to tell us?”
- 570 (8.6%) Rs included a response to this final question
- This talk focuses on:
 - Qualtrics sentiment analysis (Text iQ)
 - Manual coding
 - Findings
 - Comparison to Qualtrics
 - Satisfaction
 - Are respondents who were less satisfied with their online experience more likely to provide a comment?

Qualtrics Sentiment Analysis

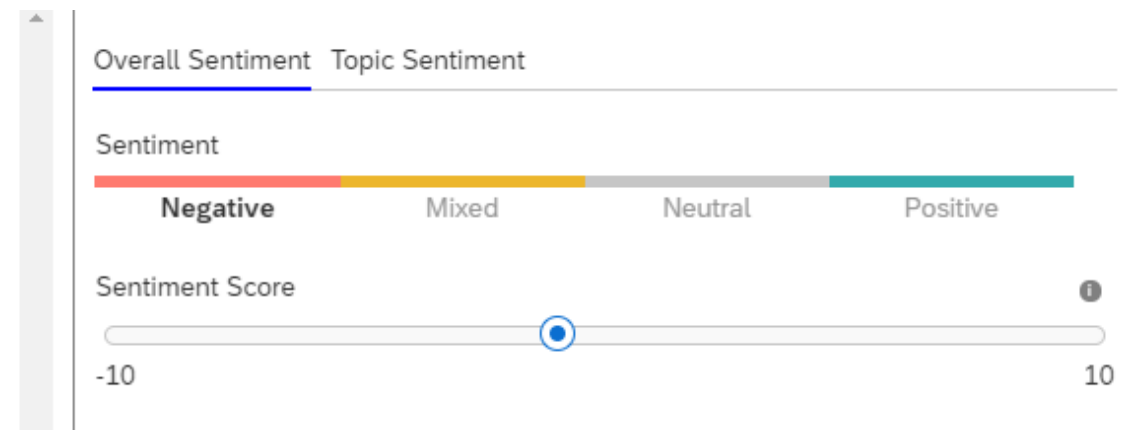
- Sentiment analysis uses natural language processing to categorize feedback
 - “Sentiment analysis is the process of determining the opinion, judgment or emotion behind natural language.” (Qualtrics)
- Sentiment
 - Positive, negative, neutral, mixed
- Sentiment score
 - -10 to 10



-1 Aug 25, 2020 4:41 PM

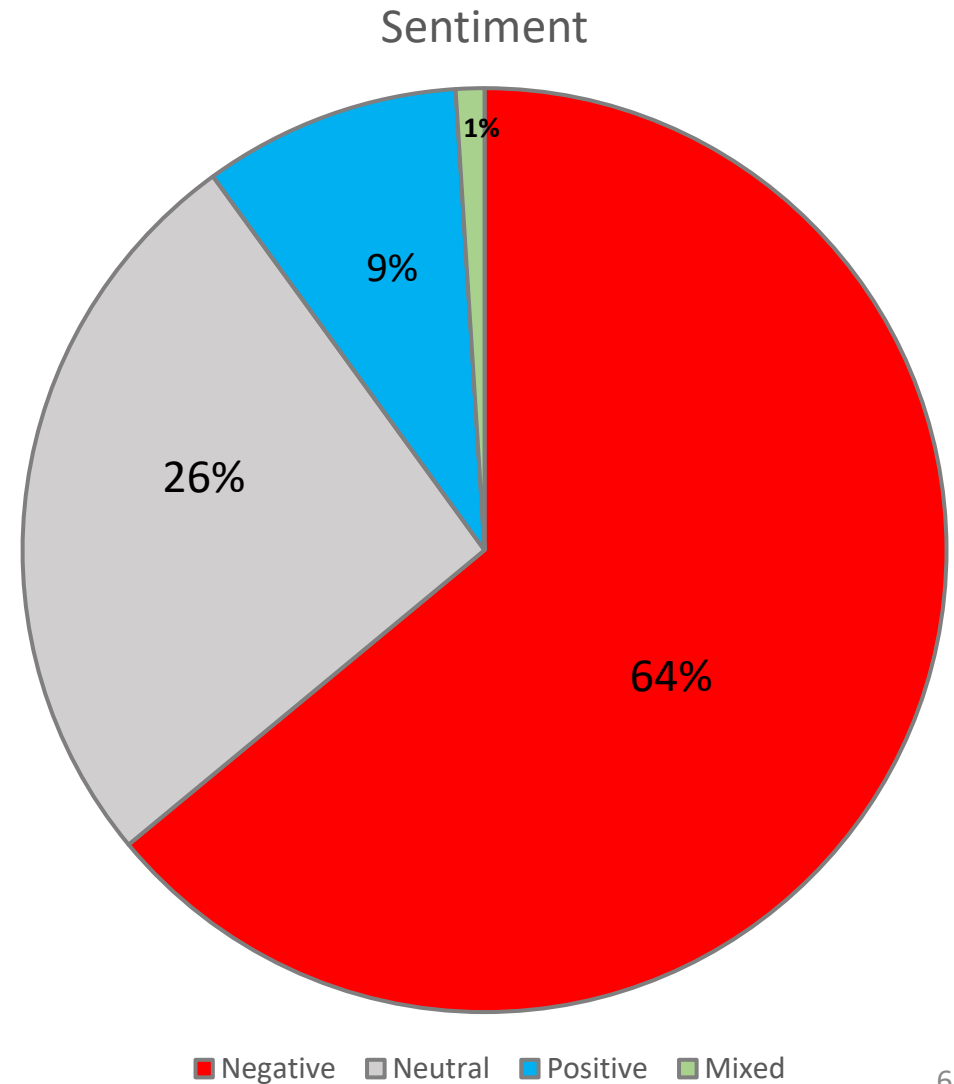
I have a vacation home. It took me a while to figure out what to do. Was not able to report online. Sent in paper questionnaire .

add
vacat



Sentiment Analysis: Results

- Sentiment score, $M = -1.1$ ($SD = 3.8$)



Qualtrics sentiment analysis: Limitations

- Language is grammatically complex, context-dependent, and varies between people
- How language is interpreted is subjective
 - What sounds positive to one person might sound neutral or negative to someone else
- Designing algorithms for sentiment analysis requires creativity in order to build useful and reliable tools

6

Aug 25, 2020 7:43 PM

Would be great to be able to share link with other housemate to fill out on their own

-1

Aug 26, 2020 6:54 AM

Having an email confirmation on receipt of census response would be great

5

Aug 18, 2020 1:02 PM

Loved it. I am not tech savy but you made it very easy considering no one knew what the people will be inflicted with the Virus.

-1

Aug 21, 2020 2:07 PM

I appreciate that no one knocked at my door. Loved filling out online

Qualtrics topics

- Qualtrics recommends topics based on terms that frequently appear in feedback you receive
- Can create your own topics
 - Qualtrics provides topic sentiment label, score
- Lemmatized results
 - breaks, broke, broken, breaking → break
 - better → good

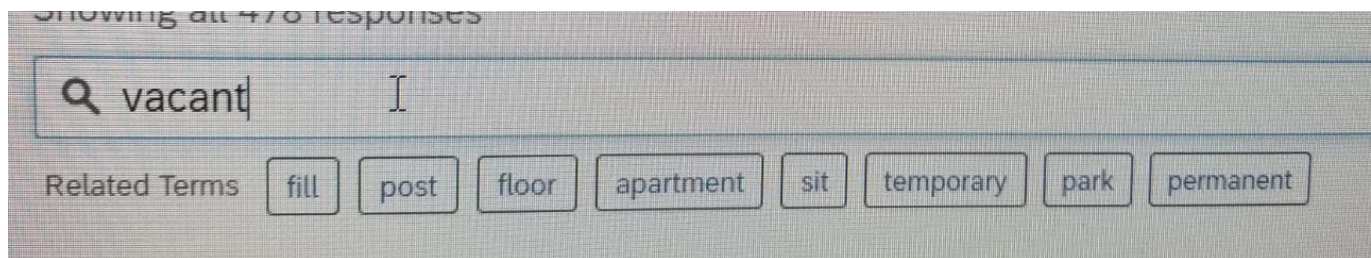
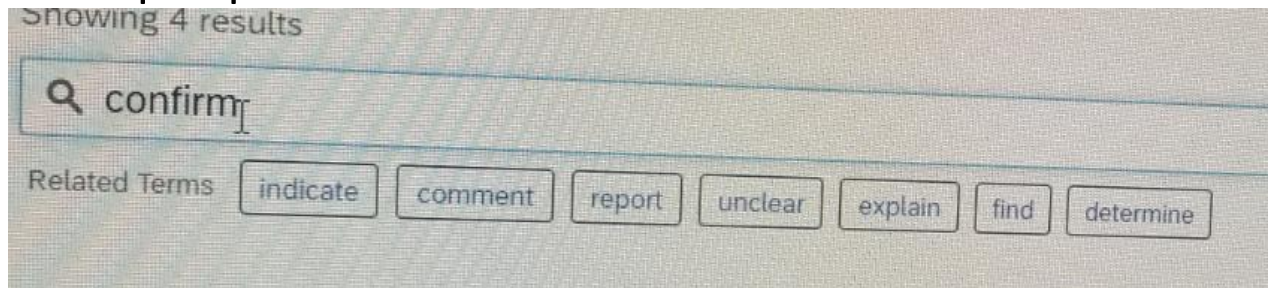


Topic Recommendations

	Count	Percent
census	156	33%
cencus	156	33%
fill	82	17%
count	67	14%
mail	23	5%
questionnaire	22	5%
trump	11	2%
covid	8	2%
taker	8	2%
illegals	8	2%
politicize	4	1%
redo	4	1%
undocumented	4	1%
enumerator	3	1%
pandemic	3	1%
genealogist	2	0%
misspell	1	0%
wasn	0	0%
didn	0	0%
couldn	0	0%

Qualtrics topics: Queries

- Building queries: Qualtrics recognizes complex logical strings built using a few simple commands
 - E.g., and (ID and mail); or (vacant or empty); not (citizenship not illegal)
 - Parentheses
 - Exact and near operators
- Topic queries: Offers related terms



Qualtrics Topics: Limitations

- Lemmatization
 - Variants
 - count → counted
 - confirm ≠ confirmation
- Misspellings and typos
 - Recognizes some but not all misspellings and typos
 - census → cencus
 - internet ≠ intenet
- Synonyms, semantic networks, pragmatics
 - Provides list of related terms to select based on co-occurrence but does not provide (or return) synonyms
 - vacant → apartment, permanent
 - vacant ≠ empty, unoccupied
 - What about seasonal and vacation homes?
 - “How do I count my summer house?”
 - “Most snowbirds are still at their winter residence on April 1 so the question should ask where you are living on June 1”
 - “I have a vacation home. It took me a while to figure out what to do. Was not able to report online.”

Next step: Manual coding

- Manual coding of the text responses with a more thematic approach
- What are some of the recurring themes that people mention?
- Thematic analysis
 - more nuanced
 - more actionable than sentiment analysis alone and Qualtrics Text iQ

Methods

- Developed numerous categories (themes) for two independent coders to mark as present or absent in each comment
- Inductive and deductive approaches to coding
- Inductive
 - Some categories were data-driven (i.e., the authors conducted a preliminary review of the responses)
- Deductive
 - Some categories covered issues identified in other research and operations
- Sentiment label (positive, negative, neutral, mixed) and sentiment score (-10 to 10)

Methods

- Themes addressed
 - usability issues observed throughout the decade (e.g., separating race and Hispanic origin) (Olmsted-Hawala & Nichols, 2020)
 - feedback from other 2020 Census operations (e.g., duplicate enumeration; difficulty reporting vacancies)
 - the 2020 Census in the news (e.g., citizenship question)
 - the 2020 climate (e.g., COVID-19; politics)

Categories: Instrument/Usability

- User Interface (UI) Design/User Experience: a survey design or technical issue, e.g., could not go back to change answer
- Sex/Gender Question: e.g., want more gender inclusive response options
- Race Question: e.g., issue with race categories
- Race Origin: e.g., confusion about what origin means
- Hispanic Origin: e.g., confusion or concern about why it is separate from race question
- Age/DOB: e.g., why does age matter
- Suggestions: ideas for how to improve the survey in the future, e.g., user interface or question improvements

Categories: Feedback from census operations

- Multiple contacts at one address: e.g., multiple census IDs sent, multiple field visits, multiple reminder mailers
- Mover: Related to moving, e.g., a person has moved to or from address
- Vacancy: Home is vacant, e.g., a seasonal home, vacation home, or the occupant passed away
- Confirmation: Want a way to confirm response was received
- Who to count/where to count someone: confusion about who to count or where to count someone, e.g., a college student who was home because of COVID-19

2020

- Citizenship Question: opinion about including or excluding a citizenship question from decennial census
- “Illegal”/undocumented immigrants: mention of either term, may or may not be part of a comment about the citizenship question itself
- Political: Related to politics, e.g., the president, republicans, democrats
- COVID-19: Pandemic-related
- Data collection end-date: e.g., opinion about data collection end-date due to COVID-19

Coding

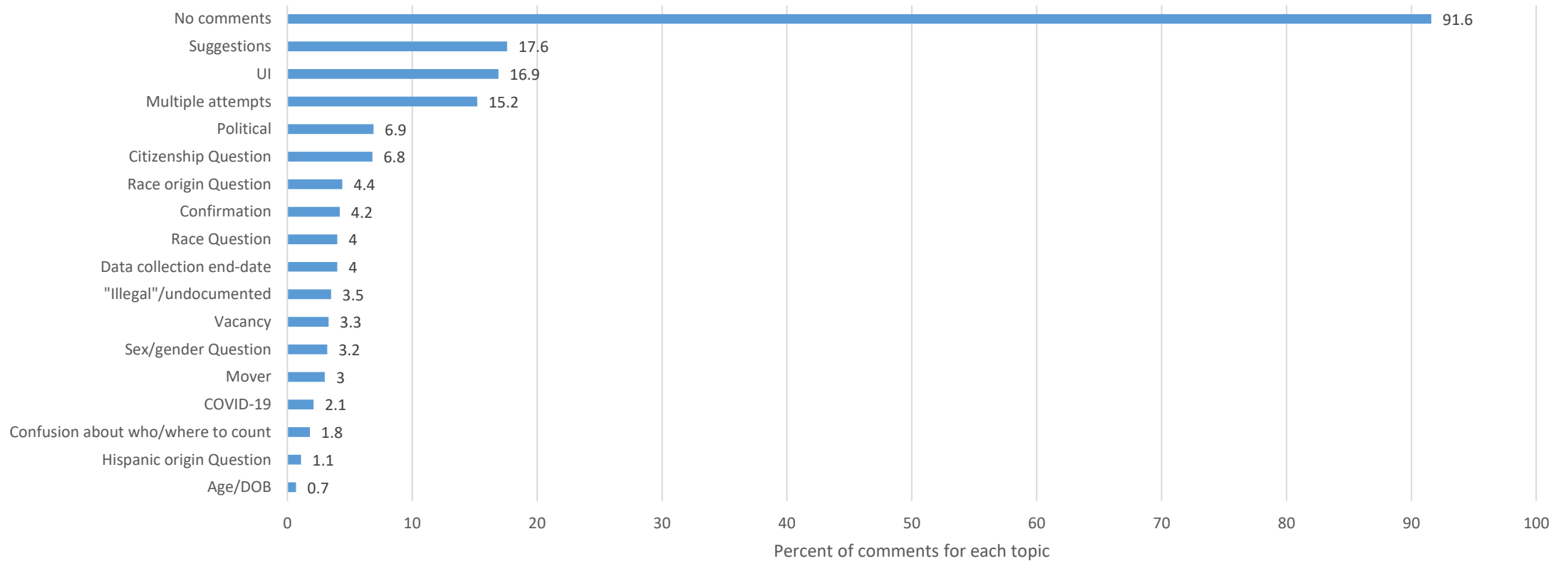
- Two independent coders from Census Bureau (CB), who did not work on the User Experience Survey, were given an explanation of each theme and shown examples of corresponding write-ins
- They could select multiple themes for one comment or not select any
 - If a comment did not fall into any category, the coder could propose a new one
- Cohen's Kappa for interrater reliability

Results: Interrater reliability

- The results show strong IRR between the coders
- Values of Kappa from 0.40 to 0.59 are considered moderate, 0.60 to 0.79 substantial, and 0.80 outstanding (Landis & Koch, 1977)
- All Kappas were greater than .6, indicating substantial agreement

Results (manual): Comments by topic

Open-ended comments by topic



Most frequent themes: Suggestions

- How to make the online questionnaire more user friendly
 - “You should have a bar code to scan with the phone then you get the link where to fill out your form for verification”
 - “I recall wanting confirmation that I was complete and my family was accounted for. It would be nice to receive an email confirmation stating that I had submitted an online census form”
- Opinions about questions that should or should not be included
 - “Please ask about sexual orientation”
 - “Don’t ask about birthdates.”
- Citizenship and race questions
 - “You should have a question about citizenship”
 - “The U.S. census needs to have more race options, as it was not inclusive.”

Most frequent themes: User interface

- Praise
 - “Doing the Census online was fast and efficient. I had no trouble entering my info and appreciated the design which made it very clear and easy to follow along”
 - “Easiest website. Better than banks, IRS, even slightly better than eBay.”
- Grievances
 - “As I was filling out my questionnaire towards the end I noticed my last name was misspelled I went back to change it and couldn’t change it...”
 - “The design was a bit glitchy - some of the webpage elements showed up twice, overlapping each other, which made the form difficult to read/complete”
- Suggestions
 - “Please make the text larger for the ‘I don’t have my ID’ next to the entry boxes on screen”

Most frequent themes: Address-related issues

- Multiple contact attempts and potential duplicate enumeration
 - “Please make sure that when you have filled out the census online you don’t then have a census taker come to your door. You guys sent me at least five letters...all with different census ID numbers. It was very clear that we were only supposed to fill it out one time which I did and yet I still got a census taker at my house telling me I had to allow them to interview me since I hadn’t completed my form when I already had...”
 - “A man came today with an ID for the Census to ask me to do the census with him. Why? If I submitted it online. I couldn’t find my confirmation number. But you know I filled it out. So I had to do it again.”

Results: Sentiment

Manual (CB)

- 52% negative
- 26% neutral
- 19% positive
- 3% as mixed
- Sentiment score, $M = -1.32$ ($SD = 3.9$)

Qualtrics

- 64% negative
- 26% neutral
- 9% positive
- 1% mixed
- Sentiment score, $M = -1.1$ ($SD = 3.8$)

Results: Sentiment scores and labels

“GOD BLESS AMERICA!!! Let’s Make America Great Again!!! Go Trump!!!!!!!!!!!!”

Manual

Positive

9

Qualtrics

Positive

8

“Doing the Census online was fast and efficient. I had no trouble entering my info and appreciated the design which made it very clear and easy to follow along”

Manual

Positive

7

Qualtrics

Positive

9

Results: Sentiment scores and label

“I don’t like being defined by race. I feel that the racial questioning was too discriminating. Why is my racial background so necessary? I’m intelligent and a human being and deserve equally rights. So why does race matter?”

Manual

Negative

-4

Qualtrics

Positive

1

“For families with split custody of children, the Census was a bit confusing. I had to contact my ex-spouse to discuss how/where to count our child. Perhaps an option for .5 of a person if the custody is split to eliminate confusion or inaccurate counting where both parents don't communicate well.”

Manual

Negative

-2

Qualtrics

Negative

-8

Satisfaction

- Does satisfaction predict reporting additional information?
- Yes, Rs who were satisfied with their online experience -- compared to those who were neutral or dissatisfied -- were less likely to provide a comment ($\chi^2(1)=189.3, p<.01$)

Limitations

- We are not experts in Qualtrics Text iQ tools
- Algorithms consistently updated based on user edits
 - Edits periodically analyzed across all Qualtrics users and used to improve the sentiment analysis model as a whole
- Many approaches to thematic analysis which could reveal different categories and frequencies

Conclusions

- Qualtrics Text iQ is a powerful text analysis tool which allows you to:
 - assign topics to feedback you've received
 - perform sentiment analysis
- Overlap between manual coding and Qualtrics re: sentiment and topics
 - Majority of comments about 2020 Census experience negative (though slightly)
 - Frequent topics include multiple contact attempts (“mail,” “taker”), politics, citizenship
- Less satisfied Rs more likely to respond to open-ended question
- Thematic analysis revealed more comprehensive picture of 2020 census user experience
 - Suggestions for improvement, user interface comments, and address-related issues
 - 2020 climate influence
- Thematic analysis can inform census design and process decisions going forward

Thank you!

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