

# STAT157 HW 3

Jan 31, 2023

Due Tuesday, February 7 at 11:59pm

## Deliberate Practice: Zeroth and First Order Forecasting

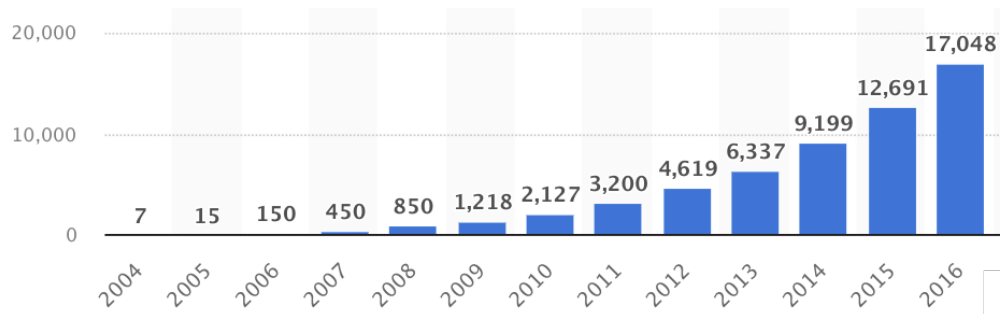
*Expected completion time: 60 minutes*

For each of the following time series, estimate the value of the next few points without looking things up, then look at your answers and report your relative errors. Try to be accurate, even if you don't use a zeroth/first order forecast for each question. Just write down your answer and relative error for each question (no need to show work). When you have answered all the questions, write 1-2 paragraphs summarizing which strategies worked well and which strategies worked poorly.

### 1. Energy usage until January 30, 2023

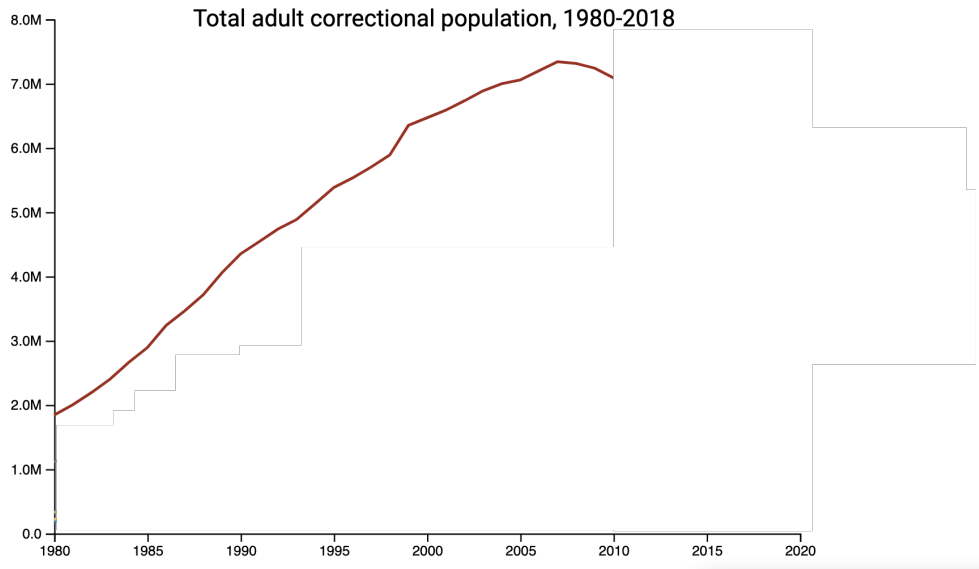
- To find the graph, go to [this link](#), in “Chart options” and “Date Range Type” select “Custom”, and in “Date Range” enter “01/01/2023 - 01/31/2023”.
- Predict energy usage on Feb 6 at 11am SF time.

### 2. Number of full-time Facebook employees until 2016



- Predict the number of full-time employees in 2018, and 2020.

### 3. Total adult correctional population until 2010

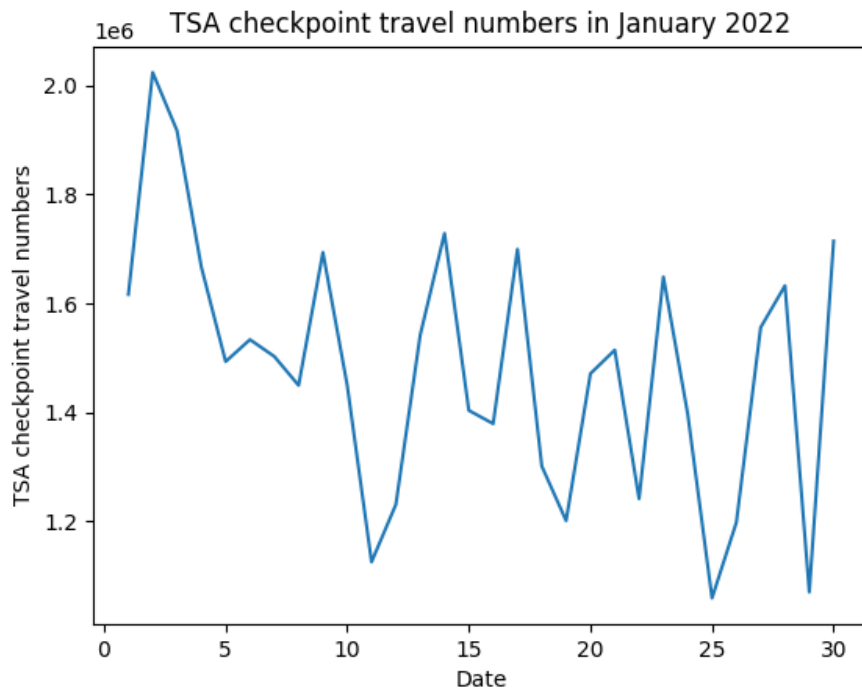


- Predict the adult correctional population in 2014 and 2018.

4. World GDP until 1950

- [Link](#) to the graph.
- Predict World GDP in 1960, 1970, and 1990.

5. TSA passenger throughput numbers until Jan 30, 2022



- This graph uses the January 2022 numbers from [here](#).

- Predict the passenger throughput number for Feb 7.
6. Per capita CO<sub>2</sub> emissions in US until 2010
    - [Link](#) to the graph.
    - Predict the US per capita CO<sub>2</sub> emissions in 2015, 2025, and 2030.
  7. Military expenditure as a percent of GDP until 2012
    - [Link](#) to the graph.
    - Predict military expenditure as a percent of GDP in 2015, 2018, and 2019.
  8. Worldwide total fertility rate until 1978
    - [Link](#) to the graph.
    - Predict the worldwide total fertility rate in 1988, 1998, and 2003.
  9. US Child mortality rate until 1955
    - [Link](#) to the graph.
    - Predict the child mortality rate in 1960, 1990, and 2010.

On Gradescope, for each of the **9 questions**, submit your estimates, relative errors. Then, include 1-2 paragraphs of reasoning on which strategies worked well and which strategies didn't. Please also submit the time it took to complete this exercise.

## Deliberate Practice: Estimation and Calibration

*Expected completion time: 45 minutes*

For each of the following questions, estimate an inclusive 80% confidence interval for the answer without looking things up. For each quantity, we provided one link with a reasonable-seeming answer. We recommend spending around 5-10 minutes on each estimation question. Write down your reasoning for one of the questions.

1. How many employment-based Green Card applications did US Citizenship and Immigration Services process in 2021? Note that the question is about the number of applications *processed*, not *approved*. [Link to Answer](#)
2. How many acres of US land were burnt by wildfires in 2020? [Link to Answer](#)
3. How many records have the Beatles sold, in terms of worldwide certified (not claimed) sales, as reported by Wikipedia? Records include singles and full-length albums. [Link to Answer](#)
4. How many metric tons of crude oil were produced worldwide in 2020? [Link to Answer](#)

On Gradescope, submit your estimate for each of the **4 questions**, with your reasoning for one of the questions. Please also submit the time it took to complete this exercise.

## Deliberate Practice: Reference Classes

*Expected completion time: 60 minutes*

For the following questions, describe 3 reference classes you would use to answer it. To do this, you can look up information about the reference classes, but not the answer itself. For at least 1 and at most 2 of the 4 questions below, use a large language model (such as ChatGPT) to help you brainstorm ideas for reference classes. You can find links to different large language models below:

- [ChatGPT](#)
- [Other GPT models](#) (for example, you can try `text-davinci-003` or `davinci`)
- [GPT-J 6B and GPT-NeoX 20B](#) (smaller, open-source models)

Once you have come up with reference classes for all of the questions, look up the answers, and discuss which types of reference classes tended to work well, which worked poorly, and modifications you would make in the future.

1. How much did the movie *Harry Potter and the Deathly Hallows - Part 2* gross worldwide? [Link to Answer](#)
2. A diplomatic boycott of a competition is when a country does not send high-ranking officials to attend the competition as official representatives, but still sends athletes. How many countries issued a diplomatic boycott of the 2022 Winter Olympics in China by January 31? [Link to Answer](#)
3. What was Delta Air Lines' [operating revenue](#) in 2020? [Link to Answer](#)
4. How many years were there between the beginning and end of the construction of the [Sydney Opera House](#)? [Link to Answer](#)

On Gradescope, submit your reference classes for each of the **4 questions**. Then, also include 1-2 paragraphs total of discussion on which kinds of reference classes worked and which didn't. Please also submit the time it took to complete this exercise.

## Predictions

*Expected completion time: 60 minutes*

Register the following predictions. You can submit them by going to <https://docs.google.com/forms/d/1Gja6hcs9jyDEE1sg1Z11eNskyIDaCpiW7w09BouB4DM/edit> and following the form's instructions. For these predictions, (and all predictions about the future throughout this class), we encourage you to use external sources – by googling things, reading news articles, talking to friends who follow politics or music stats, etc.

0. Pick the same website, application, or software you chose last week, and predict how much time you will spend on it between 12:00am Tuesday February 7th and 11:59pm Sunday February 12th., as measured by your time-tracking app.
1. Will *You* be among the Top 5 Netflix Shows for the week of February 6 - February 12, according to the [Top Ten Netflix TV Shows ranking](#) (English category)?
2. How many three-pointers will Steph Curry *attempt* in the February 11th NBA game between the Golden State Warriors and the Los Angeles Lakers?
3. In the January 2023 [Monthly Treasury Statement](#), what will be the total value of gross outlays going to the Department of Defense - Military Programs?

For each question, submit an inclusive 80% confidence interval (or a probability for question 1), as well as an explanation of your reasoning ( 1-2 paragraphs). **Please include a copy of your google form responses with your Gradescope submission.** On Gradescope, please also submit the time it took to complete this exercise.