

Can Chicago teachers afford to live where they teach?

Analyzing teacher salaries and nearby property values for Chicago Public Schools

0. Group Members (CNET IDs)

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1. Overview of Final Project Application

Our application asks the user to enter a six-digit school code for a school in Chicago Public Schools and enter a distance to search around that school. Based on the user input, the application analyzes salary information for that school and property sales information within `<d>` miles of the school, `<d>` representing the user-input value for distance in miles.¹

Prompt	Behind the Scenes	Displays to User
Enter the six-digit school code of interest:	Verifies user input is six numerical digits and school code is in data frame	Error and redirection OR School name and request for confirmation
How many miles around the school would you like to search?	Verifies user input is numerical Creates instance of the School class with attributes summarizing property sales information within <code><d></code> miles of the school and salary information for teachers at the school	Error and redirection OR Summary of property data within <code><d></code> miles of the school, salary data for teachers at the school, and the ratio of median property value to median salary, compared to the medians for all of Chicago
Would you like to view another school or distance?		Restart prompts OR Quitting application message

2. Overall Structure of Software

After installing **Python3.7**, run **install.sh** to set up the virtual environment and install packages. To run our application from the terminal, enter **python3.7 main.py** in the terminal with the option to add **-a**, which will use archived dataframes instead of generating new requests. (See README.txt for more details.)

Our project submission includes the following files:

- **README.txt**
Provides information for the user about the application: including instructions for setting up the virtual environment and installing required packages, and a description of which group member(s) contributed to each portion
- **requirements.txt**
Lists packages to be installed in the virtual environment
- **install.sh**
Sets up virtual environment and installs packages from requirements.txt (shell script)
- **socrata_request.py**
Retrieves and converts a Socrata request to a pandas dataframe
- **assessors_request.py**
Requests and processes property assessment data from the Cook County Assessor's Office API *Residential Sales Data* dataset²
- **cps_request.py**
Requests and processes school data from the Chicago Data Portal API's *Chicago Public Schools – School Profile Information* dataset and processes the Employee Position Roster Excel file downloaded from the Chicago Public Schools' website³
- **school_class.py**
Sets attributes and methods for creating a school object
- **main.py**
Wraps components from other files
- **/data**
Contains the following resources:
 - **assessor.pk1**
Pickled dataframe returned from assessors_request.py, used for -a
 - **salaries.pk1**
Pickled dataframe of salary data returned from cps_request.py, used for -a
 - **schools.pk1**
Pickled dataframe of school information returned from cps_request.py, used for -a
 - **school_codes.csv**
List of school names, codes, and networks (identifies charter schools that may not report salary data)
 - **teacher_salaries_20191231.csv**
Employee Position Roster file downloaded from Chicago Public Schools

3. Project Goals and Accomplishments

Our project set out to answer the question: *Can Chicago Public Schools teachers afford to buy homes near the schools where they teach?*

The impetus for this work was the October 2019 Chicago Teachers Union strike, particularly the Union's ask for **teacher and staff raises in response to the rising cost of living**.⁴ Much of the existing research on property values and schools is directed at parents looking at school attendance zones. We wanted to reframe property analyses from a teacher perspective, considering locations close to the school, but irrespective of attendance boundaries.

As the teacher workforce continues to become younger and less experienced nationwide, we wanted to look specifically at **home-buying opportunities within a certain distance of a school**.⁵ Home ownership, rather than renting, would signal stability and community investment.

Real estate and budgeting websites cite a rule of thumb that buyers can afford a house priced at about **2 – 2.5 times their household income**.⁶

Our project addresses this question by providing an **interactive tool** that allows users to select a school and set a distance to see how teacher salaries at that school and sale prices around that school compare to those of all Chicago Public Schools teachers and all Cook County homes.

Sources, Notes, and Data Selection

1. Kirvan, Anthony P. "Latitude and Longitude." *Unit 014 - Latitude and Longitude*, University of Texas - Austin, 1997, www.ncgia.ucsb.edu/units/u014/u014.html.

Rosenberg, Matt. "What's the Distance Between Degrees of Latitude and Longitude?" *ThoughtCo*, DotDash, 25 Jan. 2020, www.thoughtco.com/degree-of-latitude-and-longitude-distance-4070616.

Our application forms a bounding square of size d (the user's input) around the school's latitude and longitude, so the analysis includes properties ranging from at most d miles in the due north, south, east, and west directions to at most $d\sqrt{2}$ in the northeast, southeast, northwest, and southwest directions.

2. We keep property sales observations that meet the following specifications:
 1. Sale price \geq \$10,000
 2. No "NaN" values in apartments and number of units
 3. Not duplicate (kept most recent sale)
 4. Single family home or condominium (no apartments), indicated by a residential regression class between 202 and 210 (inclusive) or 299 and a number of apartments not greater than 1 (https://prodassets.cookcountyassessor.com/s3fs-public/form_documents/classcode.pdf)
3. We keep teacher salary observations that meet the following specifications:
 1. Full-time employee
 2. Linked to a specific school
 3. Job title includes "teacher" and does NOT include "assistant", "asst", "specialist", "analyst", "recruitment", or "part-time"
4. FitzPatrick, Lauren, et al. "Here Are the Highlights of CPS-CTU Deal." *Chicago Sun-Times*, 31 Oct. 2019, chicago.suntimes.com/2019/10/31/20940988/heres-whats-tentative-agreement-cps-ctu-teachers-strike-special-ed.
5. Ingersoll, Richard, et al. "Seven Trends: The Transformation of the Teaching Force." 2013.
6. McWhinney, James. "How Much Mortgage Can You Afford?" *Investopedia*, Investopedia, 5 Feb. 2020, www.investopedia.com/articles/pf/05/030905.asp.