DAT565/DIT407 Assignment 2

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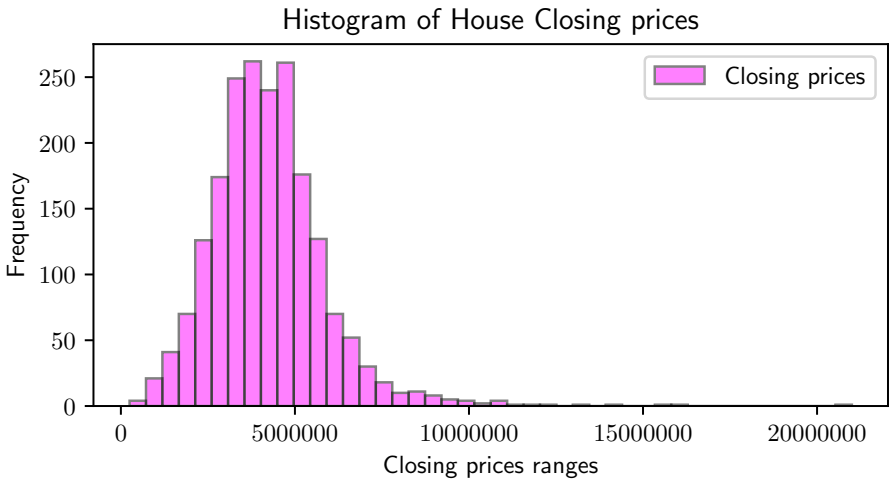
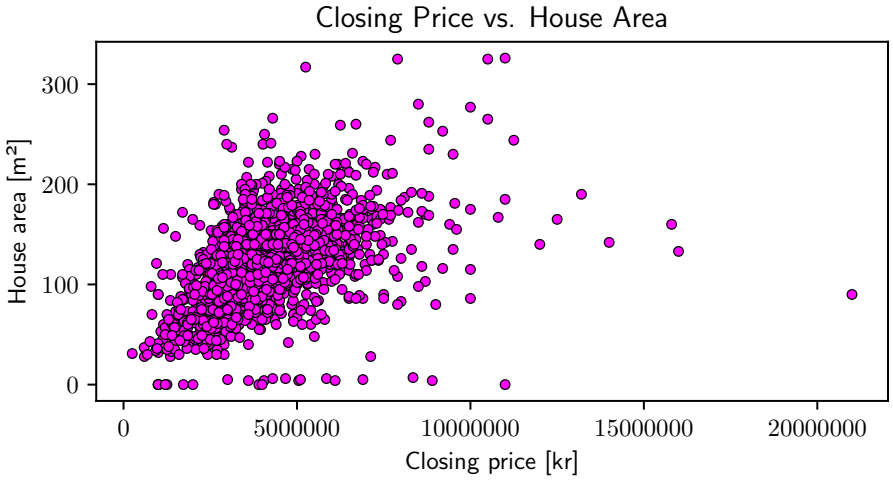
This paper is addressing the assignment 2 study queries within the *Introduction to Data Science & AI* course, DIT407 at the University of Gothenburg and DAT565 at Chalmers. The main source of information for this project is derived from the lectures and Skiena [1].

Problem 1: Scrapping house prices

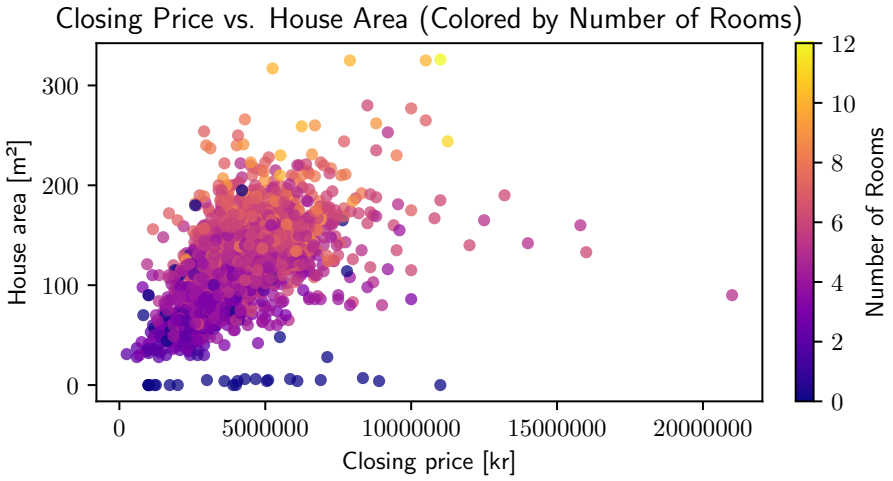
Problem 2: Analyzing 2022 house sales



(a) Closing price of houses



(b) Closing price vs house area



(c) Closing price vs house area with color

Figure 1: Plots of house prices

Discussion

References

[1] Steven S Skiena. *The Data Science Design Manual*. Retrieved 2024-01-20. 2024. URL: https://ebookcentral.proquest.com/lib/gu/detail.action?docID=6312797.

Appendix: Source Code

```
import numpy as np
import pandas as pd
import glob
import errno
import re
import locale
import datetime
import matplotlib as mpl
from matplotlib import pyplot
from bs4 import BeautifulSoup
locale.setlocale(locale.LC_TIME, "sv_SE") # For Swedish dates

date_obj = lambda dateText: datetime.datetime.strptime(dateText.
    ↪ replace('S  ld-','').strip(), '%d-%B-%Y')

def cleanLocation(locationText):
    locationText.span.decompose()
    stripped = locationText.text.strip().replace("\n", "")
    splitted = stripped.split(',')
    locationList = list(map(lambda x: x.strip(), splitted))
    return ",-".join(locationList)

def areaAndRoom(areaText):
    areaText.span.decompose() if areaText.span else areaText
    areaAndRoom = re.findall(r'\d+', areaText.text.strip())
    areaAndRoomList = list(map(lambda x: x.strip(), areaAndRoom))
    intList = [eval(i) for i in areaAndRoomList]
    area = 0
    room = 0
    errors = 0
    try:
        area = intList[0]
        room = intList[1]
    except IndexError:
        errors += 1
    #print('Errors ' + errors.__str__())
    return area, room

def cleanLandArea(landAreaText):
    landAreaText = landAreaText.replace('\u00a0','')
    return zeroIfNoNumber(landAreaText)

def cleanPrice(priceText):
    priceText = priceText.replace('Slutpris','')
    priceText = priceText.replace('kr','')
    priceText = priceText.replace('\u00a0','')
    return zeroIfNoNumber(priceText)

def zeroIfNoNumber(valueText):
    value = re.findall(r'\d+', valueText)
    if value.__len__() > 0:
        value = int(value[0])
```

```
52      else:
53          value = 0
54      return value
55
56  def parseObject(obj):
57          dateText = obj.find('span',attrs={'class':'hcl-label hcl-
                ↪ label--state hcl-label--sold-at'}).text
58          addressText = obj.find('h2',attrs={'class':'sold-property-
                ↪ listing__heading qa-selling-price-title hcl-
                ↪ card__title'}).text
59          locationText = obj.find('span',attrs={'class':'property-
                ↪ icon property-icon--result'}).parent
60          areaText = obj.find('div',attrs={'class':'sold-property-
                ↪ listing__subheading sold-property-listing__area'})
61          extraAreaText = obj.find('span',attrs={'class':'listing-
                ↪ card__attribute--normal-weight'}).text if obj.find('
                ↪ span',attrs={'class':'listing-card__attribute--
                ↪ normal-weight'}) else ''
62          landAreaText = obj.find('div',attrs={'class':'sold-property
                ↪ -listing__land-area'}).text if obj.find('div',attrs
                ↪ ={'class':'sold-property-listing__land-area'}) else
                ↪ ''
63          priceText = obj.find('span',attrs={'class':'hcl-text hcl-
                ↪ text--medium'}).text
64          area, room = areaAndRoom(areaText)
65          extraArea = zeroIfNoNumber(extraAreaText)
66          return [date_obj(dateText), addressText.strip(),
                ↪ cleanLocation(locationText), area, extraArea, area +
                ↪  extraArea , room, cleanLandArea(landAreaText),
                ↪ cleanPrice(priceText)]
67
68
69  dir_path = '../kungalv_slutpriser/*.html'
70  files = glob.glob(dir_path)
71  entities = pd.DataFrame(columns=['Date', 'Address', 'Location', '
        ↪ Area', 'ExtraArea', 'TotalArea', 'Rooms', 'LandArea', 'Price
        ↪ '])
72  for name in files:
73      try:
74          with open(name) as f:
75              soup = BeautifulSoup(f, "html.parser")
76              objects = soup.findAll('li',attrs={'class':'sold-
                    ↪ results__normal-hit'})
77              for obj in objects:
78                  entity = parseObject(obj)
79                  entities.loc[len(entities.index)] = entity
80      except IOError as exc:
81          if exc.errno != errno.EISDIR:
82              raise
83
84
85  entities.to_csv('entities.csv', index=False, encoding='utf-8')
86
87
88  pyplot.rcParams['text.usetex'] = True
89  entities = pd.read_csv('entities.csv')
90  #print(entities.head())
91  print(entities['Price'].describe())
92
93  # Plot histogram of closing prices
94  num_bins = int(len(entities['Price']) ** 0.5) # Determine the
        ↪ number of bins using the square root choice method
```

```
fig1, ax1 = pyplot.subplots(figsize=(5, 2.7), layout='constrained')
ax1.hist(entities['Price'], bins=num_bins, color='magenta',
    ↪ edgecolor='black', linewidth=1, alpha=0.5, label='Closing-
    ↪ prices')
ax1.set_xlabel('Closing-prices-ranges')  # Add an x-label to the
    ↪ axes.
ax1.set_ylabel('Frequency')  # Add a y-label to the axes.
ax1.set_title("Histogram-of-House-Closing-prices")  # Add a title
    ↪ to the axes.
ax1.legend(loc='upper-right')
ax1.ticklabel_format(useOffset=1, style='plain', axis='x')
fig1.savefig('histogram_closing_price.pdf', bbox_inches='tight')


# Plot Closing Price vs. House Area
fig2, ax2 = pyplot.subplots(figsize=(5, 2.7), layout='constrained')
ax2.scatter(entities['Price'], entities['Area'], s=15, color='
    ↪ magenta', edgecolor='black', linewidth=0.5)
ax2.set_xlabel('Closing-price-[kr]')  # Add an x-label to the axes.
ax2.set_ylabel('House-area-[m ]')  # Add a y-label to the axes.
ax2.set_title("Closing-Price-vs.-House-Area")  # Add a title to the
    ↪  axes.
ax2.ticklabel_format(useOffset=1, style='plain', axis='x')
fig2.savefig('closing_price_house_ares.pdf', bbox_inches='tight')


# Plot Closing Price vs. House Area (Colored by Number of Rooms)
fig3, ax3 = pyplot.subplots(figsize=(5, 2.7), layout='constrained')
ax3.scatter(entities['Price'], entities['Area'],  c=entities['Rooms
    ↪ '], cmap='plasma', s=15, alpha=0.75)
ax3.set_xlabel('Closing-price-[kr]')  # Add an x-label to the axes.
ax3.set_ylabel('House-area-[m ]')  # Add a y-label to the axes.
ax3.set_title("Closing-Price-vs.-House-Area-(Colored-by-Number-of-
    ↪ Rooms)")  # Add a title to the axes.
sm = pyplot.cm.ScalarMappable(cmap='plasma')
sm.set_array(entities['Rooms'])
fig3.colorbar(sm,  label='Number-of-Rooms', ax=pyplot.gca())
ax3.ticklabel_format(useOffset=1, style='plain', axis='x')
fig3.savefig('closing_price_house_ares_color.pdf', bbox_inches='
    ↪ tight')
```