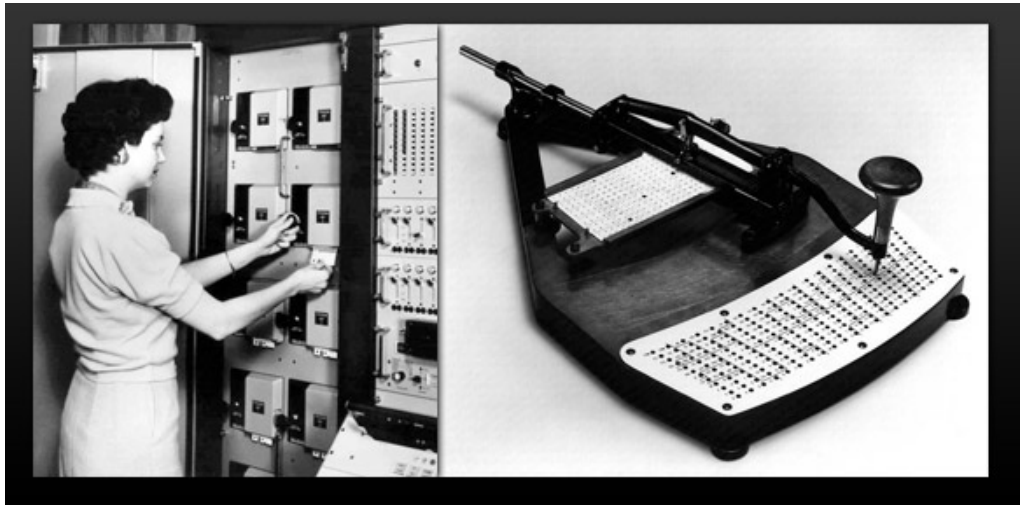
How to Load CSV, ASCII, and other data into Python

DS 6001: Practice and Applications of Data Science

Electronic Data Files

Through the 1970s, data was stored on punch cards and fed directly to a mainframe computer capable of regression analysis.



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- Text files. Messy, but we can deal with them.
- Designed to be as small and as universally portable as possible.
- Data points usually delimited by commas, spaces, or tabs. Might require a data dictionary to read.

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We will go over individual data files today, and databases soon.

Kinds of ASCII files

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A comma-separated values (CSV) file:

```
sex,race,region,happy,life,sibs,childs,age,educ,paeduc,maeduc,speduc,prestg80,
occcat80,tax,usintl,obey,popular,thnkself,workhard,helpoth,hlth1,hlth2,hlth3,
hlth4,hlth5,hlth6,hlth7,hlth8,hlth9,work1,work2,work3,work4,work5,work6,work7,
work8,work9,prob1,prob2,prob3,prob4
2,1,1,1,1,1,2,61,12,97,12,97,22,3,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0, , , ,
2,1,1,2,1,2,1,32,20,20,18,20,75,1,1,0,5,4,1,2,3,1,1,2,2,2,2,2,2,2,2,2,1,2,
2,1,2,1,1,2,4,5,
1,1,1,1,0,2,1,35,20,16,14,17,59,1,0,1,5,4,1,2,3,2,2,2,2,2,2,2,2,2,2,2,2,2,
2,2,2,2,2, , , ,
2,1,1,9,2,2,0,26,20,20,20,97,48,1,1,0,4,5,1,3,2,1,2,2,2,2,2,2,2,2,2,1,2,2,
2,2,2,2,2,2,2, ,
2,2,1,2,1,4,0,25,12,98,98,97,42,3,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
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```

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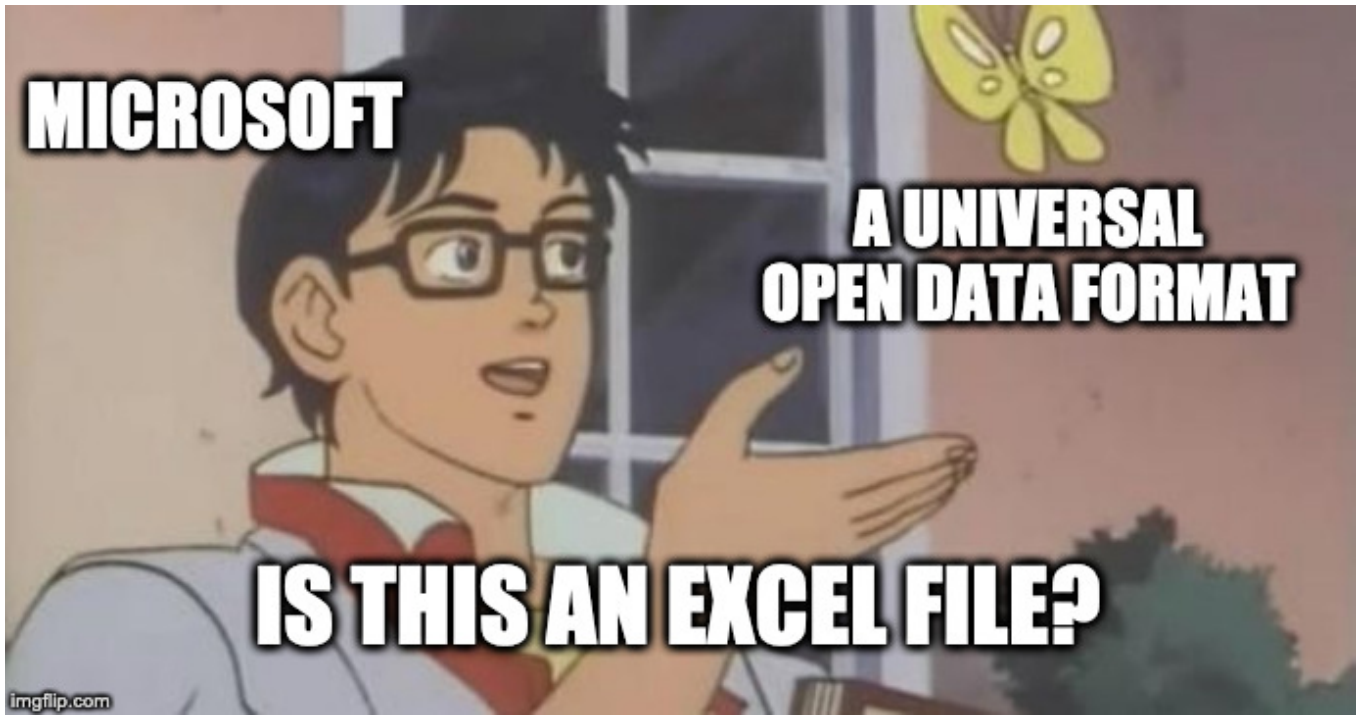

Kinds of ASCII files

A tab delimited file:

```
sex    race    region  happy   life    sibs    childs  age     educ
paeduc  maeduc  speduc  prestg80    occcat80    tax     usintl  obey
popular thnkself    workhard    helpoth hlth1   hlth2   hlth3
hlth4   hlth5   hlth6   hlth7   hlth8   hlth9   work1   work2
work3   work4   work5   work6   work7   work8   work9   prob1
prob2   prob3   prob4
2   1   1   1   1   1   2   61  12  97  12  97  22  3   1   1   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
0   0   0   0   0
2   1   1   2   1   2   1   32  20  20  18  20  75  1   1   0   5
4   1   2   3   1   1   2   2   2   2   2   2   2   2   2   1   2
2   1   2   1   1   2   4   5
1   1   1   1   0   2   1   35  20  16  14  17  59  1   0   1   5
4   1   2   3   2   2   2   2   2   2   2   2   2   2   2   2   2
2   2   2   2   2
2   1   1   9   2   2   0   26  20  20  20  97  48  1   1   0   4
5   1   3   2   1   2   2   2   2   2   2   2   2   2   1   2   2
2   2   2   2   2   2   2
2   2   1   2   1   4   0   25  12  98  98  97  42  3   1   1   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
0   0   0   0   0
```

Kinds of ASCII files

A fixed-width ASCII file with no delimination. Files like these minimize memory (no need to store a bunch of commas), but require a dictionary file to read them.

```
21111126112971297223110000000000000000000000...
21121213220201820751105412311222222222121211245
11110213520161417591015412322222222222222222...
21192202620202097481104513212222222221222222222.
22121402512989897423110000000000000000000000...
```

Dictionary:

- Variable 1: sex, column 1
- Variable 2: race, column 2
- ...
- Variable 8: age, columns 8-9

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1. The **full file address and file name** of the data file
2. Just the file name of the data file if you've already set the working directory to the folder where the file exist
3. The URL of a data file that's accessible online

Looking at the data to see if it loaded correctly

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There's an important set of functions in Python that let you quickly explore a dataframe. Please see the notebook for a list and discussion of these functions.

Loading messy CSV and other ASCII files

```
pd.read_csv(filepath_or_buffer, sep, header)
```

`sep` or `delimiter` – (string) The symbol that is used in the file to separate one datapoint from the next on the same row. By default, it looks for commas.

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- `header=j` uses the j_{th} row for variable names, and deletes all higher rows

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pd.read_csv(filepath_or_buffer, sep, header, usecols)
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In general, don't use this parameter unless the data file is too large to load in its entirety. You can delete columns later.

Loading messy CSV and other ASCII files

```
pd.read_csv(filepath_or_buffer, sep, header, usecols,
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`nrows` – (integer) only loads the first several rows, as specified by the user

Loading messy CSV and other ASCII files

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pd.read_csv(filepath_or_buffer, sep, header, usecols,
skiprows, skipfooter, nrows, na_values )
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To replace all these values with `NA` across the whole data frame, type `na_values = [-7, -8, -9, 998]` .

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Caution: Only specify missing codes in the `pd.read_csv()` function if the code ALWAYS means a missing value. If 998 is a valid datapoint for some variables, you can replace the missing codes for relevant variables later.

Loading messy CSV and other ASCII files

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pd.read_csv(filepath_or_buffer, sep, header, usecols,
skiprows, skipfooter, nrows, na_values, comment )
```

`comment` – (string) If there are comments in the data file itself (it shouldn't happen but it does!), what character to read as indicating a commented-out row.

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Careful: if the comment-symbol appears ANYWHERE on the row, the remainder of the row is not read. That's a problem if, for example, the data contain tweets and one tweet reads "UVA is #1!".

Writing CSV and ASCII files

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To save the `data` dataframe as a standard CSV file, type:

```
data.to_csv("data_cleaned.csv", sep=",")
```

Loading other electronic files

A **fixed-width file** contains no delimiters. Instead, it aligns all of the data for one variable in the same position on each row. These files generally do not store variable names, and might use less memory than CSV. But that makes the data impossible to parse without an external list of where each variable is stored.

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See the notebook for the code and examples for loading each of these file types into Python.