Parallel organization

The project has been (again) restructured. Now, most analysis is launched from the main directory via `analyze.py`. Other scripts are in the `build` and `maps` directories.

There is some in progress stuff like `simulate`.

The rest is utilities, in `myutil`, and `test`.

The database is at main level, and it comes in in two sizes, one for as many days back as there are files at main level in the source, and the other with previous files stashed by month.

The average script starts like this:

```
import sys, os, subprocess
base = os.environ.get('covid_base')
sys.path.insert(0,base)
```

Thus, you must set `covid_base` correctly. Everything is specified as a path from `covid_base`.

Command line arguments

These can be viewed with `-h` or `--help` with any script.

Features that are currently supported are given by the `--help` flag:

```
> p3 analyze.py -h

flags
-h  --help     help
-n    <int>    display the last -n values, default: 7
-N    <int>    display -N rows of data, default: 50
-c    <int>    --delta, change from x days ago, default: 1
-L    <int>    depth of search for keys and subkeys, default: 0

-a  --all      use the complete db, starting 2020-03-22
-d  --deaths   display deaths rather than cases (default)
-f  --csv      format output as csv
-g  --graph    plot a graph of the data (not yet)
-m  --map      make a choropleth map (not yet)
-o  --only     do not descend from say, US to states
-p  --pop      normalize to population (this disables totals)
-q  --quiet    silence output (for tests)
-r  --rate     compute statistics (over last 7 days)
-s  --sort
-t  --totals   (only)
-v  --verbose  debugging mode

to do:
-u   <int>    data slice ends this many days before yesterday

example:
python analyze.py -h -n 10 -sdr



>
```

I did not use the built-in Python module for parsing the command line arguments, but rolled my own, see `uinit.py`

The statistic is the slope of a linear regression, divided by the mean of the values.

So, for example, if a 10-day series goes smoothly from 100 to 110, then the slope is about 10/10 = 1 and the statistic is a bit less than 0.01. If the series goes from 1000 to 1100, then the slope is about 100/10 = 10, but the statistic is still approximately 0.01.

Approach

The idea is to use the main part of the script to assemble the correct keys in order. This list is passed to `ucalc` and then to `ufmt` along with the `conf` dictionary.

All the trimming, sorting and stats happens in `ucalc`, and all the output formatting happens in `ufmt`.

The code about keys does not know which database we're using. I found that too complicated to maintain since I added the option of building a `max` database.

So now the database is passed to `ukeys` functions as an argument.

Examples (as of 2020-07-09)

Let's go through the flags one by one.

```
> p3 analyze.py -N 2
             07/03 07/04 07/05 07/06 07/07 07/08 07/09
Afghanistan  32022 32324 32672 32951 33190 33384 33594
Albania       2662  2752  2819  2893  2964  3038  3106
```

The `-N` flag takes an integer modifier, and it cuts the number of rows to that value. Since we did not provide a search term, we get the world.

```
> p3 analyze.py SC -N 4 -n 4
           07/06 07/07 07/08 07/09
Abbeville    124   135   134   137
Aiken        507   516   530   545
Allendale     61    64    64    64
Anderson     777   798   824   886
>
```

We search for `SC` (South Carolina), and we change the default number of columns from 7 to 4.

```
> p3 analyze.py SC -N 4 -n 4 -f
,07/06,07/07,07/08,07/09
Abbeville,124,135,134,137
Aiken,507,516,530,545
Allendale,61,64,64,64
Anderson,777,798,824,886
>
```

The `-f` flag asks to format as csv. This is most useful for plotting programs.

Here's the US states:

```
> p3 analyze.py US -N 5 -n 5
             07/05  07/06  07/07  07/08  07/09
Alabama      42359  43450  44375  45263  46424
Alaska        1107   1134   1162   1180   1222
Arizona      94567  98103 101455 105094 108614
Arkansas     22322  22907  23288  23598  24301
California  252895 264681 271035 284012 292560
```

We can add totals (for the whole US) with `-t` :

```
> p3 analyze.py US -N 5 -n 5 -t
              07/05   07/06   07/07   07/08   07/09
Alabama       42359   43450   44375   45263   46424
Alaska         1107    1134    1162    1180    1222
Arizona       94567   98103  101455  105094  108614
Arkansas      22322   22907   23288   23598   24301
California   252895  264681  271035  284012  292560
total       2820368 2868846 2916232 2974609 3032316
>
```

The `-o` flag limits the output to just the US

```
> p3 analyze.py US -N 5 -n 5 -o
      07/05   07/06   07/07   07/08   07/09
US  2820368 2868846 2916232 2974609 3032316
>
```

The `-p` flag normalizes to population. Not all locations have the population entered so this may fail.

```
> p3 analyze.py US -N 5 -n 5 -p
            07/05 07/06 07/07 07/08 07/09
Alabama       863   886   905   923   946
Alaska        151   155   158   161   167
Arizona      1299  1347  1393  1443  1492
Arkansas      739   759   771   781   805
California    640   669   685   718   740
>
```

The `-r` flag computes a statistic and is most useful combined with `-s` for sort:

```
> p3 analyze.py US -N 5 -n 5 -rs
             07/05  07/06  07/07  07/08  07/09   stat
Idaho          7369   7732   8051   8538   8968  0.049
Texas        192153 194932 205642 216026 224929  0.042
Montana        1167   1212   1249   1327   1371  0.041
Florida      189851 199885 206217 213563 223532  0.039
California   252895 264681 271035 284012 292560  0.036
>
```

But sort will work without `-r`

```
> p3 analyze.py US -N 5 -n 5 -s
             07/05  07/06  07/07  07/08  07/09
New York     396598 397131 397649 398237 398929
California   252895 264681 271035 284012 292560
Texas        192153 194932 205642 216026 224929
Florida      189851 199885 206217 213563 223532
New Jersey   172354 172717 172916 173196 173383
>
```

We can use the `-c` flag to show the change from a previous time. Most often, we would show the day-over-day change, but `-c 10` can give an estimate of active cases.

```
> p3 analyze.py US -N 5 -n 5 -s -c 10
            07/05 07/06 07/07 07/08 07/09
Florida     80967 85997 83391 81157 82600
California  56970 63569 64191 73428 77264
Texas       64021 60374 65469 70132 74777
Arizona     34377 34822 34796 34972 34695
Georgia     21230 21651 21705 23054 24958
>
```

And then finally, we might choose to look at deaths:

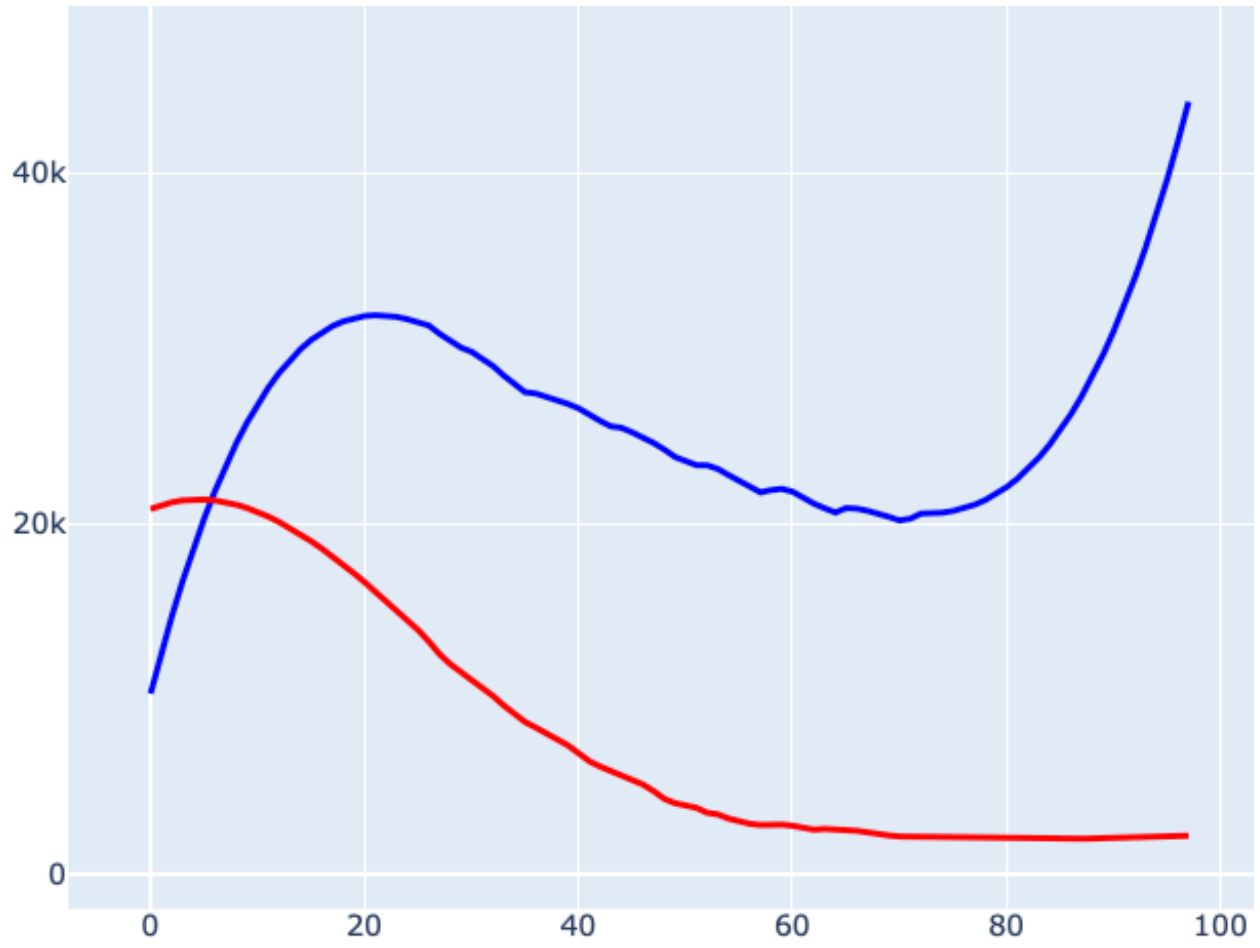
```
> p3 analyze.py US -o -dc
    07/03 07/04 07/05 07/06 07/07 07/08 07/09
US    676   697   242   268   345   959   824
>
```

There's more. You can look at counties by running `us_by_counties.py`. Maybe I will fold that into the main script soon.

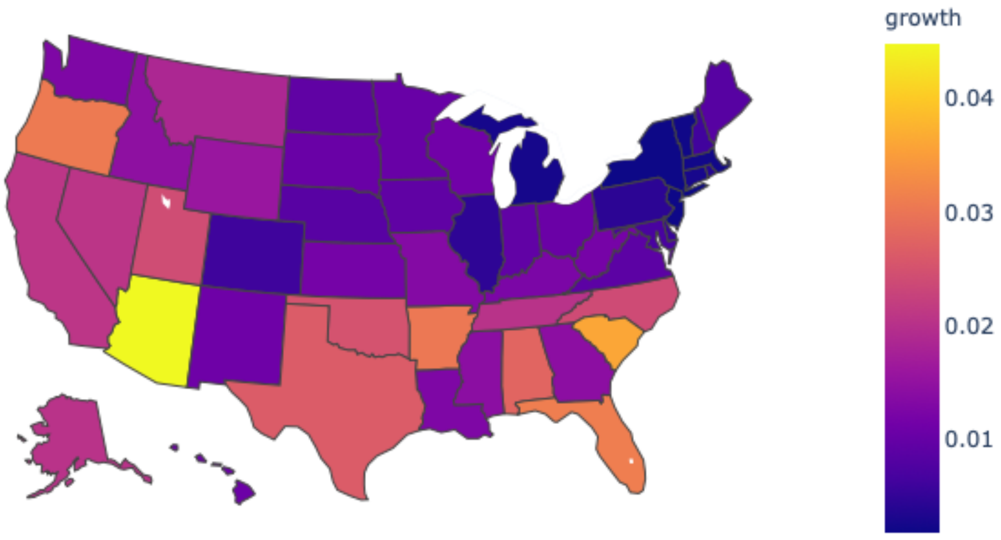
Plots and maps

Results from `plot_eu_us.py`

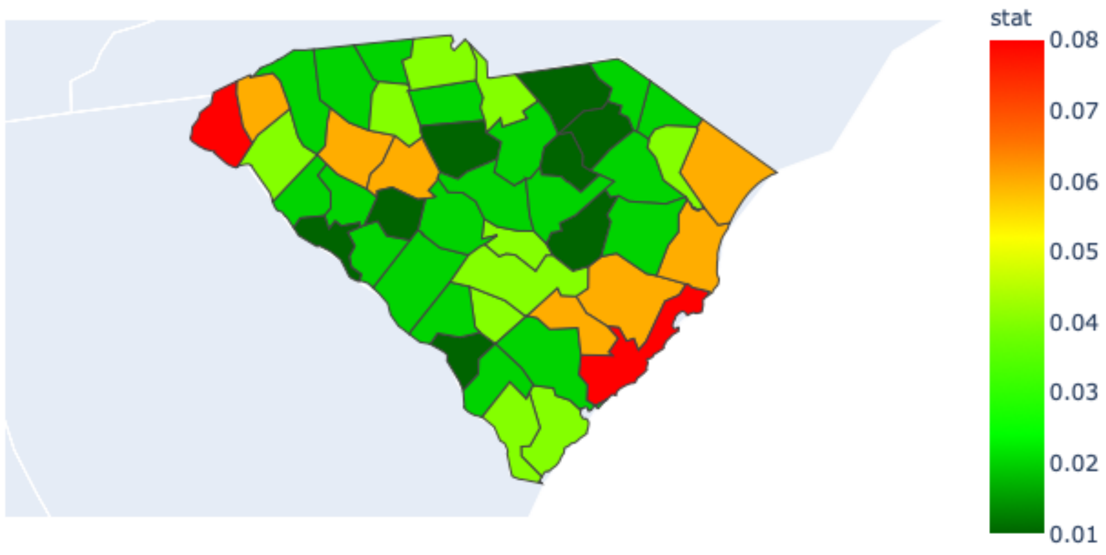
US v. EU new cases:



Choropleth 2020-06-19

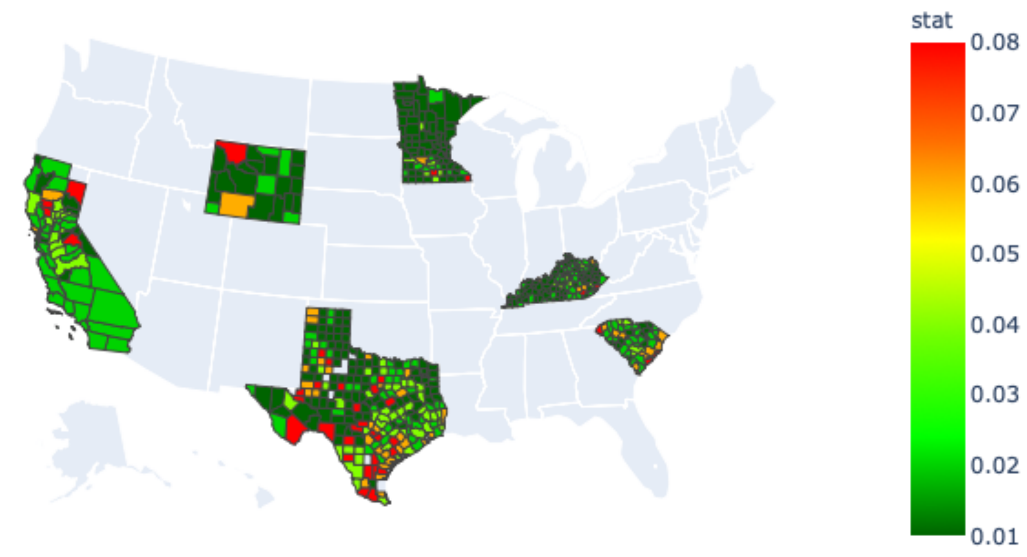


and 2020-06-27



China new cases 2020-06-27.

```
python3 geo/one_state_map.py CA MN SC TX WY KY
```


stat
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01