Analysis of wage and hour case data from US state labor agencies

Data import and preparation

Data completeness

The data states provided in response to my public records requests was wildly inconsistent. I requested a long list of fields -- case statuses, start, end and paid dates, amounts claimed, assessed by the agency and paid -- but not all states possessed that data. Many states exported data directly from their case management systems, so lots of those fields were missing. This section will examine the completeness of various data points and explain how I am handling missing data.

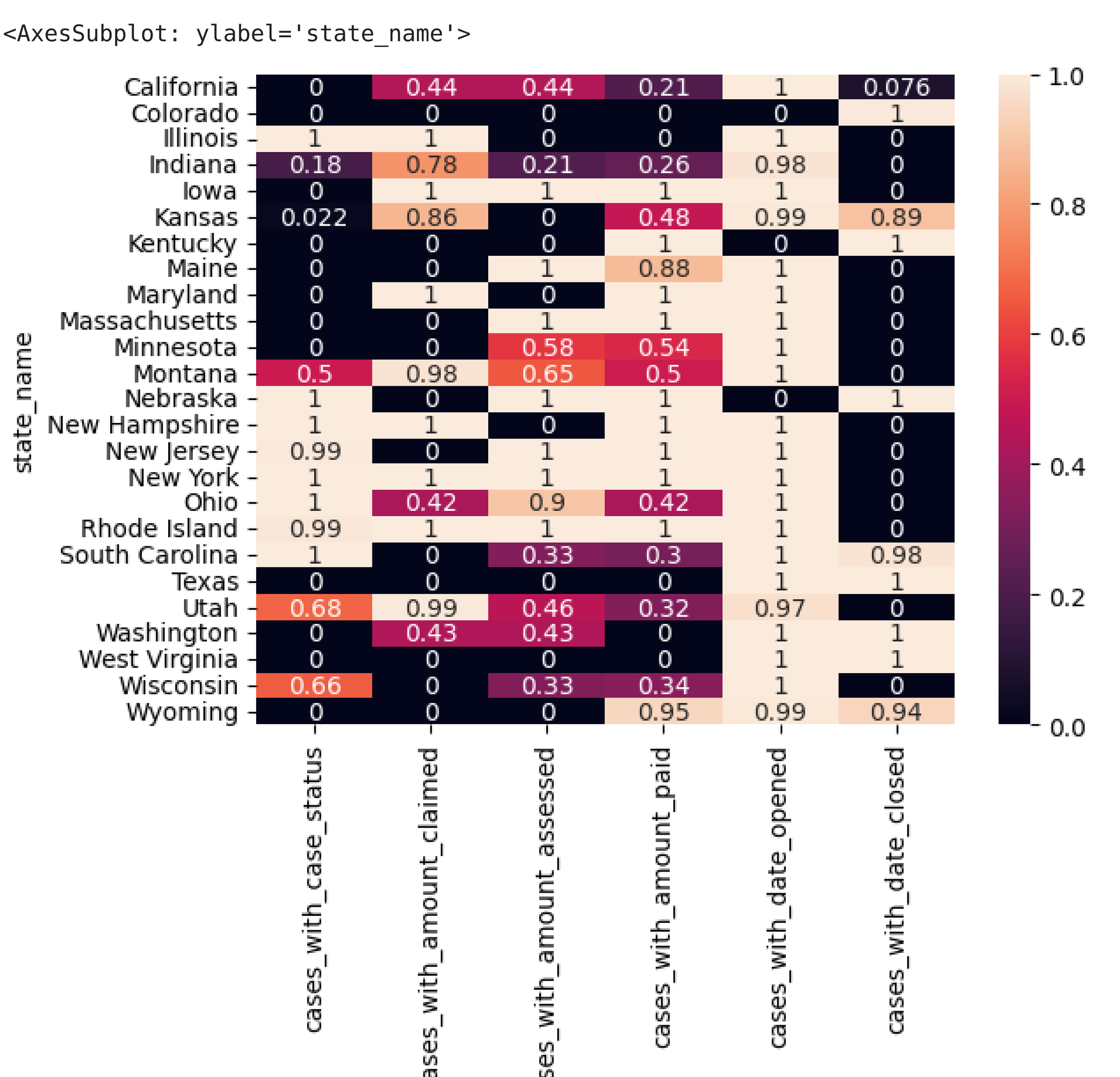
NOTE: the `get_coverage_df` function outputs the completeness (% non-null) of key columns in the analysis. You can find it at `shared/src/shared_functions.py`.

The data overall is very incomplete and has a ton of missing values. This is largely because many of the cases sent from case management systems are not completed.

```
case_status       0.346
amount_claimed    0.483
amount_assessed   0.443
amount_paid       0.371
date_opened       0.983
date_closed       0.265
dtype: float64
```

This state breakdown heatmap shows which states have which data.

```
<AxesSubplot: ylabel='state_name'>
```



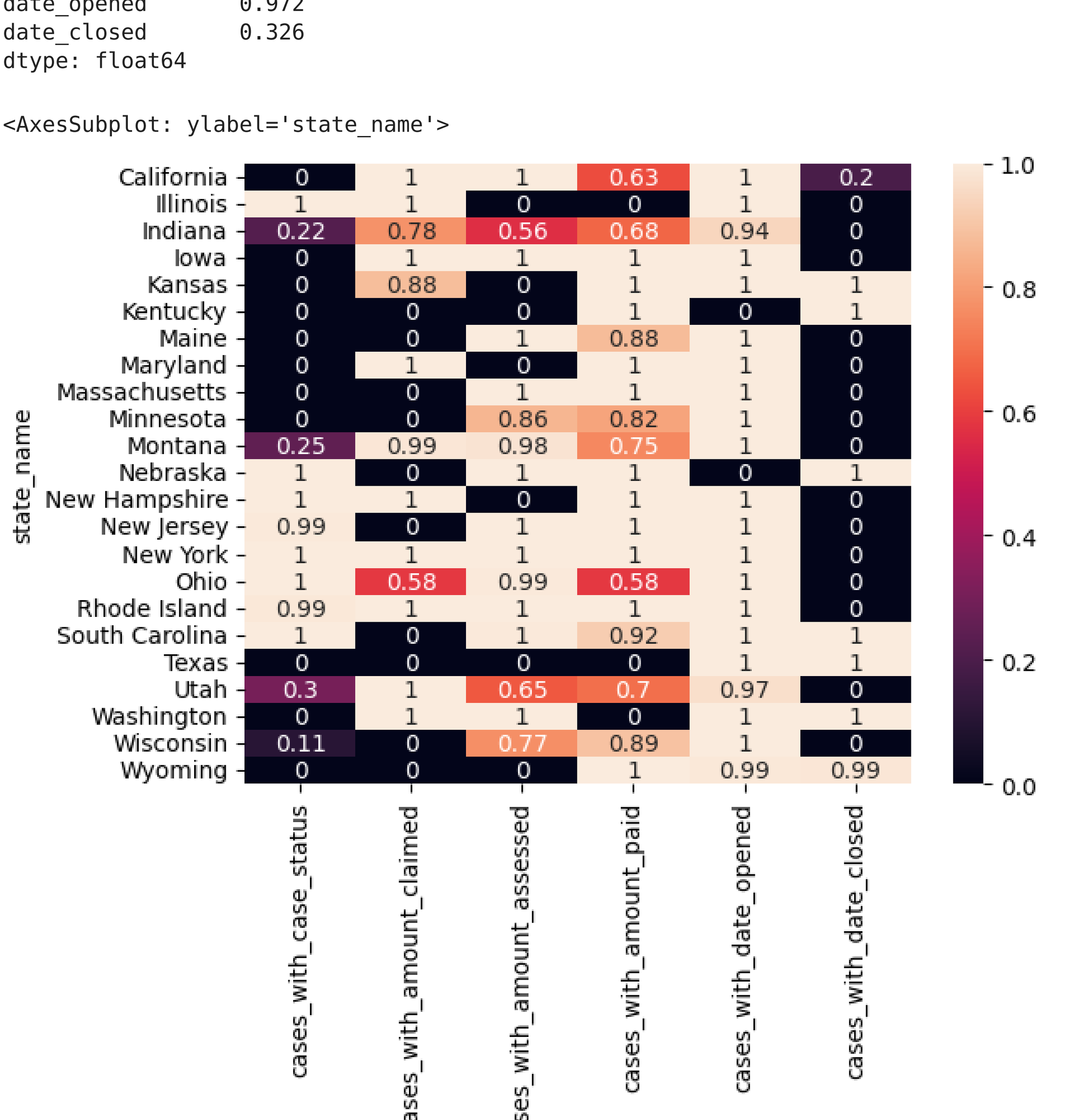
The `determine_case_outcome` task of this repo assigns a `case_decided_in_favor_of_claimant` column to the dataframe, as well as the reason why that task determined the case outcome.

case_decided_in_favor_of_claimant	case_decided_in_favor_of_claimant_reason	rows
True	has amount paid	198939
False	has no assessed amount, but state provided assessed amount	181894
True	state only provided closed cases	60683
	has assessed amount greater than 0	41040
False	has assessed amount less than or equal to 0	37868
	has open or incomplete case status	28684
True	has final case status	2947

When you select only cases marked completed, you get much better completeness.

```
case_status       0.368
amount_claimed    0.596
amount_assessed   0.664
amount_paid       0.656
date_opened       0.972
date_closed       0.326
dtype: float64
```

```
<AxesSubplot: ylabel='state_name'>
```



Those amount fields still contain missing data, but most cases contain at least one non-null amount.

```
61079 rows (%20.11765132127177) have no amounts
```

There are also indeterminate cases, in which I couldn't determine whether the case was completed

```
(15373, 16)
```

They contain very incomplete data, but all for one single reason: they are closed cases with no assessed amount and no paid amount in a state that didn't provide either.

If the state provided either an assessed or paid amount, I can use those to determine the case outcome. But if the state provided only claim amounts or no amounts at all AND no clear case disposition other than "closed," I can't be confident that those cases are all decided in favor of the claimants.

```
closed case with no assessed amount and no paid amount in a state that provided neither    15373
Name: case_decided_in_favor_of_claimant_reason, dtype: int64
case_status       0.724
amount_claimed    0.725
amount_assessed   0.000
amount_paid       0.000
date_opened       0.970
date_closed       0.275
dtype: float64
```

```
Illinois         11141
West Virginia     3778
Colorado           454
Name: state_name, dtype: int64
```

Texas provided data separately. Unless the AG sides with me (I'm still awaiting a decision), they determined that the amounts were private personal financial information. They did, however, provide me a file containing only the amounts that cannot be linked to the case data. For analyses of amounts, I'll add that data separately and remove the other Texas case information.

	amount_claimed	amount_assessed	amount_paid	state_name
1	0.000	2229.410	2229.410	Texas
2	0.000	408.070	0.000	Texas
3	0.000	1358.150	0.000	Texas
4	0.000	360.000	0.000	Texas
7	0.000	728.200	507.570	Texas
...	...	...	...	...
152889	314000.000	16666.660	0.000	Texas
152893	324614.980	5976.940	0.000	Texas
152895	343000.000	987.000	987.000	Texas
152896	346666.670	36666.670	0.000	Texas
152923	643547.060	329427.040	329427.040	Texas

63158 rows × 4 columns

Analysis

Below you will find basic descriptive statistics and state breakdowns. I will expand on this in the coming days, including by making comparisons to average household income and consumer expenses. 1

I will focus on the following data points:

1. overall amount assessed and the impacts that can have
2. amount claimed or assessed by the state vs. the amount paid by the company
3. the amount of time these cases take to resolve

All cases used in this analysis are decided in favor of the claimant unless otherwise specified.

Overall case amounts

```
count    304365.000
mean       5622.369
std       33972.356
min           0.000
25%         321.440
50%         960.000
75%        3195.000
max     5912348.830
Name: overall_case_amount, dtype: float64
```

overall_case_amount	total_cases	pct_of_total_cases
0−100	21269	0.072
100−500	74638	0.253
500−1,000	51667	0.175
1,000−2,500	59068	0.200
2,500−5,000	34707	0.118
5,000−10,000	24373	0.083
10,000−50,000	24096	0.082
50,000−100,000	2975	0.010
100,000−500,000	2165	0.007
500,000−1,000,000	114	0.000
$1,000,000+	45	0.000

state_name	count	mean	std	min	25%	50%	75%	max
California	63442.000	10692.895	46977.871	0.010	924.820	3401.950	8658.000	5912348.830
Illinois	769.000	5479.789	11667.095	0.000	882.260	2300.000	5804.840	156500.000
Indiana	7832.000	5031.187	51612.102	0.000	245.642	590.550	1524.862	2297378.000
Iowa	7370.000	1174.898	1593.859	0.000	260.000	660.000	1500.000	45416.000
Kansas	4931.000	2131.209	29528.906	0.440	250.000	560.000	1280.500	2019015.000
Kentucky	7020.000	3395.740	16168.527	25.380	207.765	398.645	1164.223	125810.820
Maine	792.000	2496.591	8276.580	2.750	222.040	585.750	1551.312	153993.440
Maryland	8290.000	2429.502	6628.096	0.000	384.000	934.470	2200.000	287701.580
Massachusetts	2408.000	20130.521	75635.165	50.000	874.562	2596.640	9919.257	1325287.250
Minnesota	743.000	8836.480	47384.888	2.000	298.000	900.000	4313.100	1115426.880
Montana	5361.000	2133.470	5969.388	0.230	280.000	720.000	1767.870	167750.180
Nebraska	563.000	903.941	2406.379	50.000	500.000	500.000	500.000	51000.000
New Hampshire	8200.000	5217.947	26228.588	0.000	342.000	920.000	2631.500	658292.000
New Jersey	25725.000	5676.761	25955.542	0.200	393.750	1101.190	3515.000	1083752.300
New York	52662.000	7895.793	45394.639	0.000	238.000	900.000	3502.043	4130507.510
Ohio	9567.000	4321.408	23184.341	0.000	0.000	415.250	1910.330	1225315.440
Rhode Island	2292.000	5943.196	31963.695	2.910	297.803	823.190	2381.997	703623.260
South Carolina	4804.000	1740.089	21510.529	4.000	200.000	498.575	1176.612	1424044.000
Texas	63158.000	1896.542	7704.863	0.980	300.000	710.500	1602.105	628000.000
Utah	10103.000	2038.912	3261.794	0.010	309.985	855.000	2259.655	30411.000
Washington	6365.000	2146.731	6924.469	0.010	280.000	723.000	1716.660	233785.980
Wisconsin	11004.000	3095.354	41166.491	1.000	215.220	554.630	1397.485	2031142.800
Wyoming	964.000	1125.615	1629.319	3.360	252.750	578.025	1216.500	13703.660

Amounts recovered

	pct_of_claimed_or_assessed_paid	unpaid_amount
count	220007.000	306084.000
mean	inf	1693.059
std	NaN	19264.019
min	0.000	0.000
25%	0.000	0.000
50%	1.000	0.000
75%	1.000	290.967
max	inf	3767316.730

funds recovered	total_cases	pct_of_total_cases
False	188130	0.774
True	54796	0.226

state_name	sum	count	mean	std	min	25%	50%	75%	max
California	71104025.493	63442.000	1120.772	17926.635	0.000	0.000	0.000	0.000	3767316.730
Indiana	951550.794	8175.000	116.398	2594.808	0.000	0.000	0.000	29.830	231039.270
Iowa	596069.000	7370.000	80.878	524.621	0.000	0.000	0.000	0.000	7625.000
Kansas	4596031.530	4931.000	932.069	5669.344	0.000	0.000	0.000	173.725	145000.000
Maine	300382.560	792.000	379.271	5235.251	0.000	0.000	0.000	0.000	143126.310
Maryland	16176739.150	8290.000	1951.356	7979.102	0.000	0.000	296.580	1562.315	408010.100
Minnesota	988249.230	745.000	1326.509	13495.129	0.000	0.000	0.000	0.000	267256.140
Montana	1510725.360	5361.000	281.799	3299.363	0.000	0.000	0.000	0.000	167673.210
Nebraska	471595.000	563.000	837.647	2421.692	0.000	500.000	500.000	500.000	51000.000
New Hampshire	38291271.000	8200.000	4669.667	25789.510	0.000	0.000	532.500	2100.000	658292.000
New Jersey	55916049.610	25725.000	2173.607	20744.120	0.000	0.000	0.000	0.000	1083752.300
New York	183733408.220	52662.000	3488.918	33241.377	0.000	0.000	0.000	62.377	3257734.000
Ohio	19678929.430	9651.000	2039.056	20448.727	0.000	0.000	0.000	32.695	1225315.440
Rhode Island	6989232.550	2292.000	3049.403	28793.288	0.000	0.000	0.000	0.000	633503.260
South Carolina	7638860.460	4818.000	1585.484	21460.725	0.000	69.812	362.250	1009.523	1424044.000
Texas	96994415.180	63158.000	1535.742	7436.291	0.000	32.000	420.000	1246.378	628000.000
Utah	4509400.470	10103.000	446.343	1543.811	0.000	0.000	0.000	20.000	26205.580
Wisconsin	7771388.380	11011.000	705.784	22237.170	0.000	0.000	0.000	0.000	1987997.000

Case duration

```
count                          91217
mean     310 days 14:02:53.448449200
std      412 days 07:59:42.409025324
min                  0 days 00:00:00
25%                105 days 00:00:00
50%                195 days 00:00:00
75%                337 days 00:00:00
max               4585 days 00:00:00
Name: case_duration, dtype: object
```

duration_days	total_cases	pct_of_total_cases
0-30 days	4594	0.050
30-60 days	5102	0.056
60-90 days	8393	0.092
90-180 days	24256	0.266
180-360 days	28515	0.313
360-720 days	12934	0.142
720+ days	7323	0.080

state_name	count	mean	std	min	25%	50%	75%	max
California	12366.000	523.836	306.061	26.000	300.000	439.000	676.750	1951.000
Kansas	4917.000	158.355	306.790	0.000	47.000	99.000	168.000	3869.000
South Carolina	4807.000	65.342	48.877	0.000	35.000	57.000	84.000	826.000
Texas	60683.000	332.816	450.520	29.000	133.000	208.000	323.000	4585.000
Washington	6364.000	55.863	55.484	0.000	22.000	43.000	69.000	1197.000
Wyoming	2080.000	99.992	137.802	0.000	24.000	48.000	124.000	1114.000