

Historical Production Results (Eagle Ford, TX)

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Data Clean

Year 1993 has only two rows, which could be a mistake. These two rows are to be removed. Also, there exists some missing values in the column *index* though I don't think this column plays any role in the analysis. Also, the oil production varies from zero to 3.33475×10^5 , highly skewed. There could be some outliers. However, I'm not going to delete those points due to the lack of oil rig background.

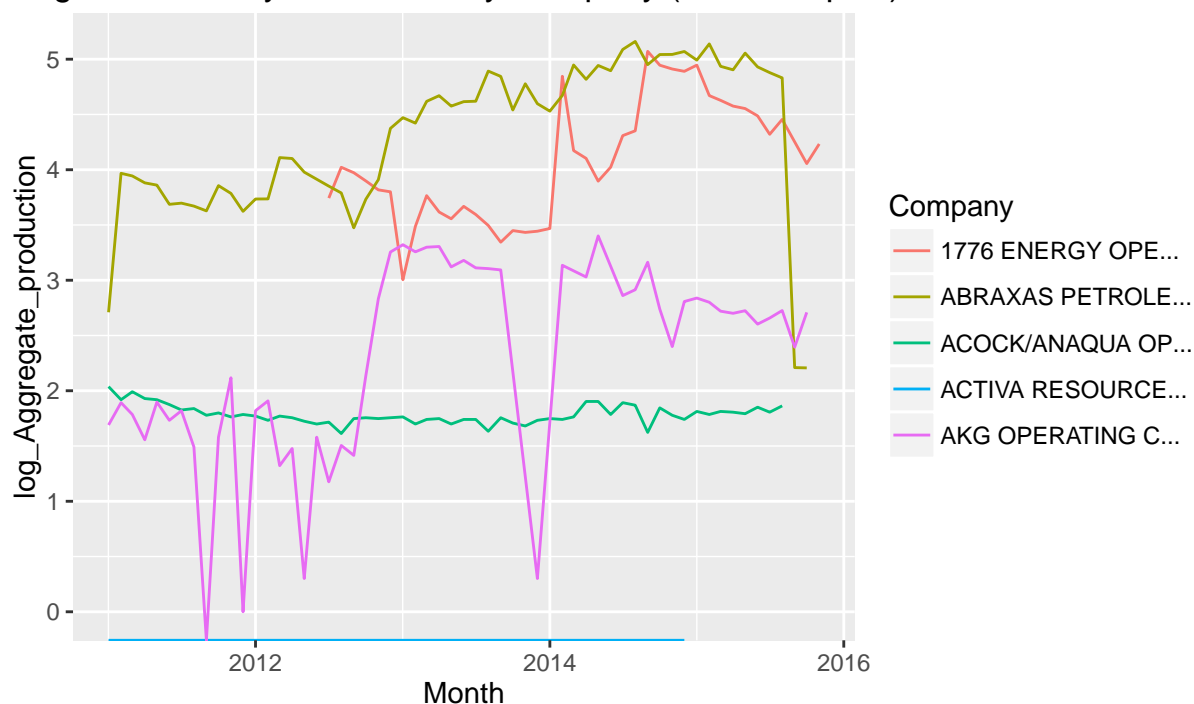
Problem 1: Determine and summarize historical aggregate oil production by company over time

See [Oil Production] Monthly Aggregate by Company.csv (Monthly total), or [Oil Production] Annual Aggregate by Company.csv (Annual summation) for details, here's visualization result.

Data Description:

- Company: Operator
- Month/Year: Timestamp
- Oil_Production_Aggregate: Total oil production during that month/year
- Active_Wells: Number of wells that has **non-zero production**

log10 of Monthly Production by Company (Five Samples)



I choose the first 15 companies and plot their log of oil production from 2011 to as-of-date. I use log (base = 10) here to keep them in the same graph.

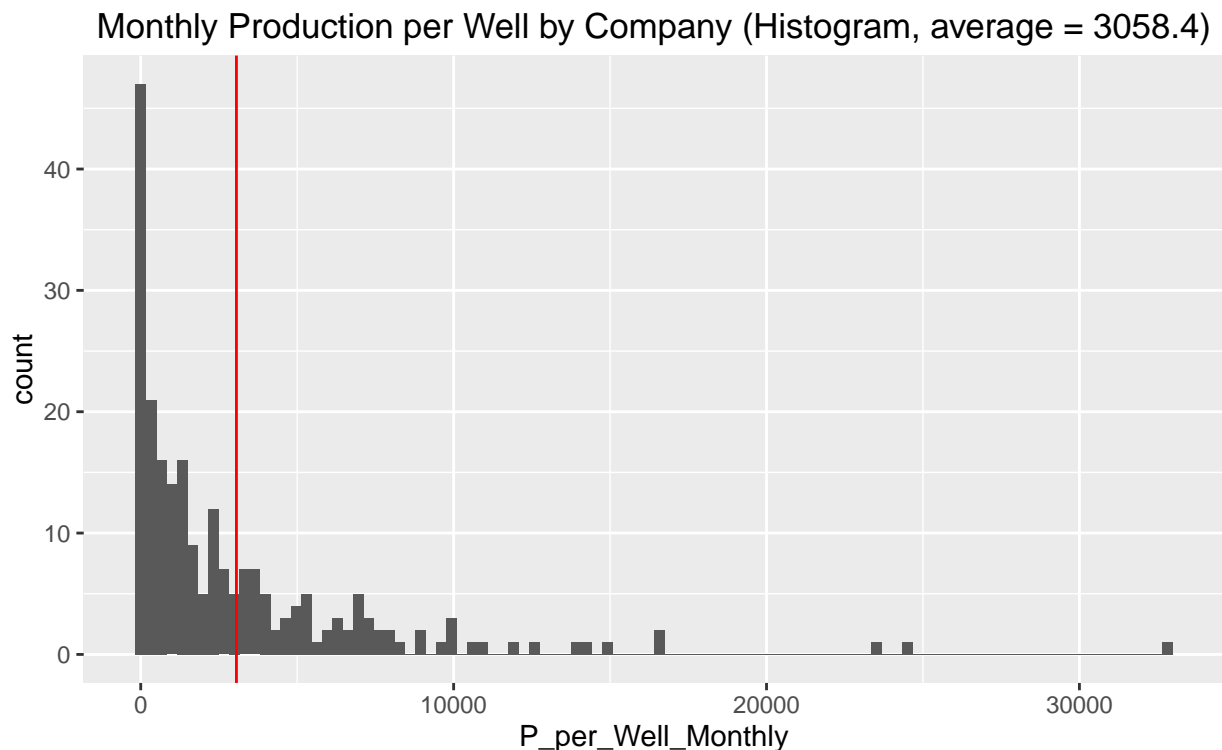
Problem 2: Determine and summarize historical average oil production per well by company

See [Oil Production] **Production by Well X Company.csv** for average production per well by company by API.

See [Oil Production] **Production per Well by Company.csv** for monthly weighted average production per well by Company, here's visualization result.

Output Description:

- Company: Operator
- API: Api number
- sum_per_Well: For this api, what's the total oil production
- Total_Months: How many months in the data for certain api
- P_per_Month: Average (monthly) oil production for this well



Histogram of monthly production per well (All wells, including zero-production wells) among these companies. The average is 3058.4249206.

Problem 3: Based on their history, which company or companies are likely to drill the most productive wells going forward?

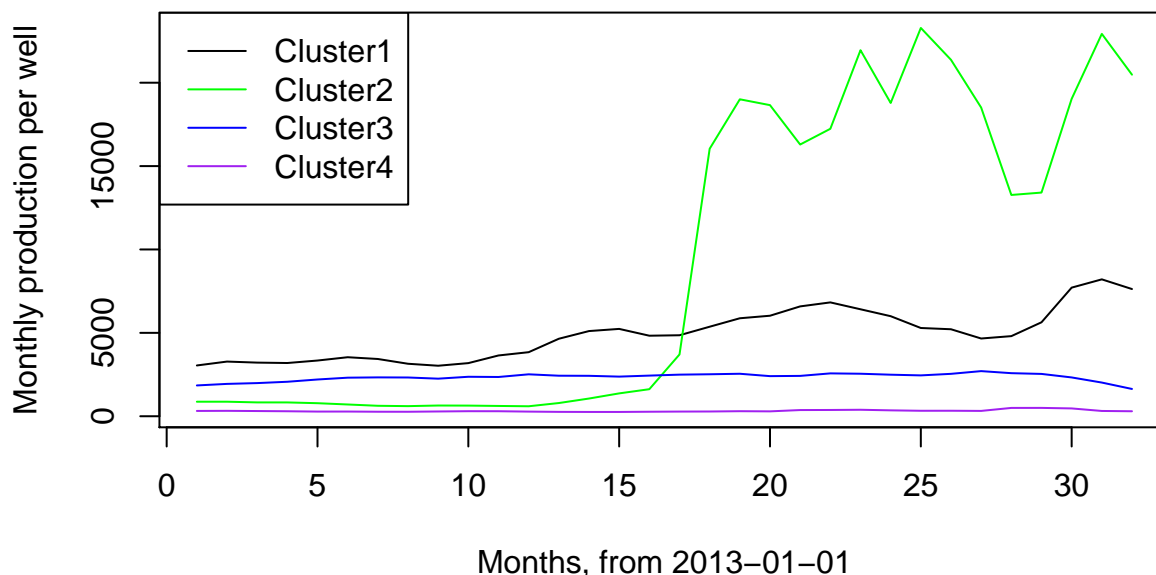
Top 3 Companies:

1. BLACKBRUSH O & G, LLC
2. GULFTEX ENERGY III, LP
3. BHP BILLITON PET(TXLA OP) CO

Reason: They have upward-trend production per well for the last 3 years and good production per well rate for the lastest 6 months.

See [Oil Production] Monthly Production per Well by Company.csv for monthly production per well by company

3-Month moving average clusters (Kmeans)



The production per well varies too much from month to month. Therefore I calculate the 3 month moving average and use kmeans learning method to classify these production curve. From the plot above, we might want those in cluster 1, 2

	Q25.25%	Median	Mean	Q75.75%	Max	Company
1	5418.17	17787.24	19884.71	34122.12	38023.00	BLACKBRUSH O & G, LLC
2	16785.85	17624.70	20888.57	31605.25	37310.33	GULFTEX ENERGY III, LP
3	12314.13	14649.97	16631.37	20530.69	24248.77	BHP BILLITON PET(TXLA OP) CO
4	2528.83	10950.33	8490.89	12888.83	15788.00	MODERN EXPLORATION, INC.
5	7916.31	9848.73	13319.18	15508.85	30555.38	HALCON OPERATING CO., INC.
6	4995.60	8541.95	10222.40	13286.21	20866.42	EP ENERGY E&P COMPANY, L.P.
7	5214.46	7878.95	9176.86	12180.26	16336.75	CARRIZO (EAGLE FORD) LLC
8	6284.74	7613.62	8228.03	10093.64	11945.70	BURLINGTON RESOURCES O & G CO LP
9	4998.84	6982.66	8208.69	8569.17	17322.83	MARATHON OIL EF LLC
10	3812.66	6786.71	9389.29	13117.08	21149.44	EOG RESOURCES, INC.
11	1392.91	5992.43	12148.65	6673.60	54146.67	EXCO OPERATING COMPANY, LP
12	3244.27	5370.66	5616.10	7783.63	8883.17	GEOSOUTHERN ENERGY CORPORATION
13	4850.14	5345.77	5164.47	5647.36	9862.45	FASKEN OIL AND RANCH, LTD.
14	3506.94	5050.86	4623.76	5636.60	6216.35	PENN VIRGINIA OIL & GAS, L.P.
15	3802.58	4933.58	6969.61	9804.33	17097.00	1776 ENERGY OPERATORS, LLC
16	740.75	4662.71	4844.70	7997.39	11200.38	PMO
17	3638.06	4614.19	5772.46	7470.26	10282.39	PIONEER NATURAL RES. USA, INC.
18	2783.34	4562.19	5038.11	5761.20	12753.00	PLAINS EXPLORATION & PROD. CO.
19	2891.33	4315.43	6768.98	6660.40	22124.33	LONESTAR OPERATING, LLC
20	3152.41	4161.17	4494.89	4724.32	10918.83	STATOIL TEXAS ONSHORE PROP LLC

There are only 29 companies in these cluster. Therefore I list their last half-year production summaries by calculating 25%, 50%, 75% quantiles as well as average and maximum, sorted by **Median** in decreasing order.

(Only select top 20 companies)

