
NETFLIX

The missing MatPlotLib for Scala/Spark

@NetflixResearch
@aishfenton @datamusing

NETFLIX

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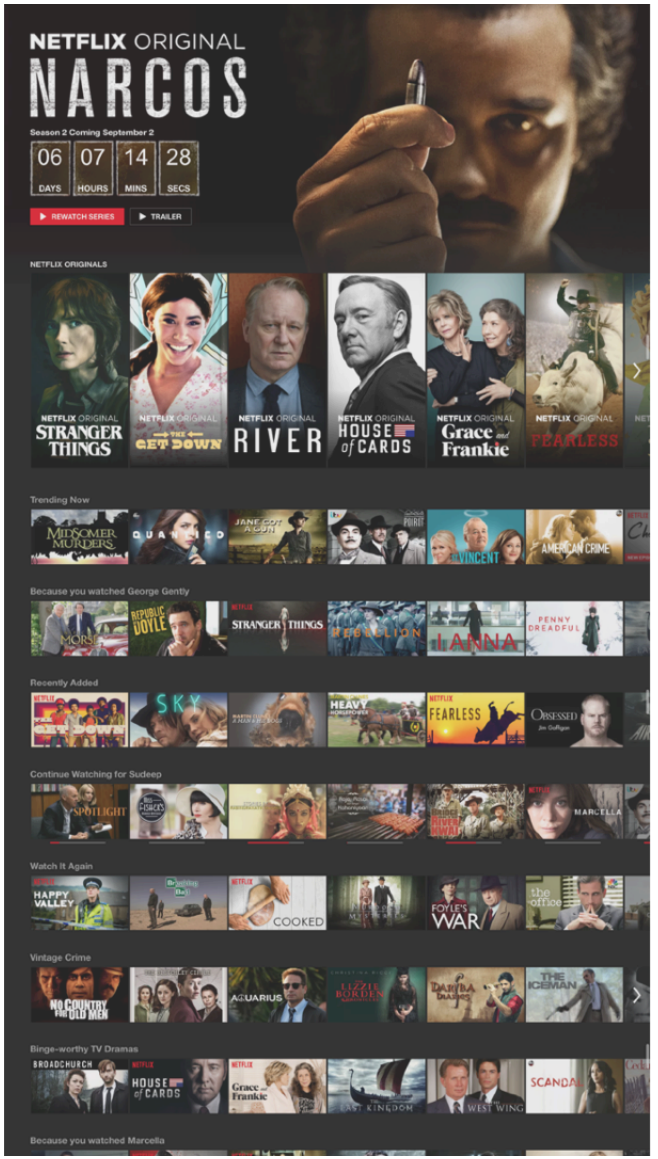
AT NETFLIX, WE USE ML EVERYWHERE



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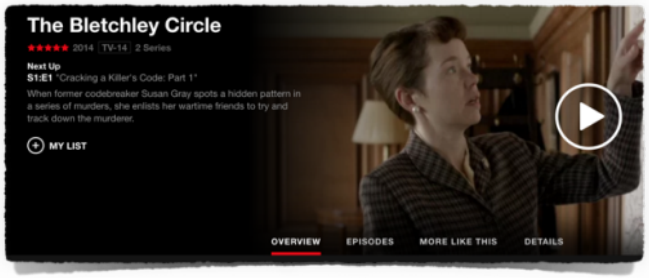
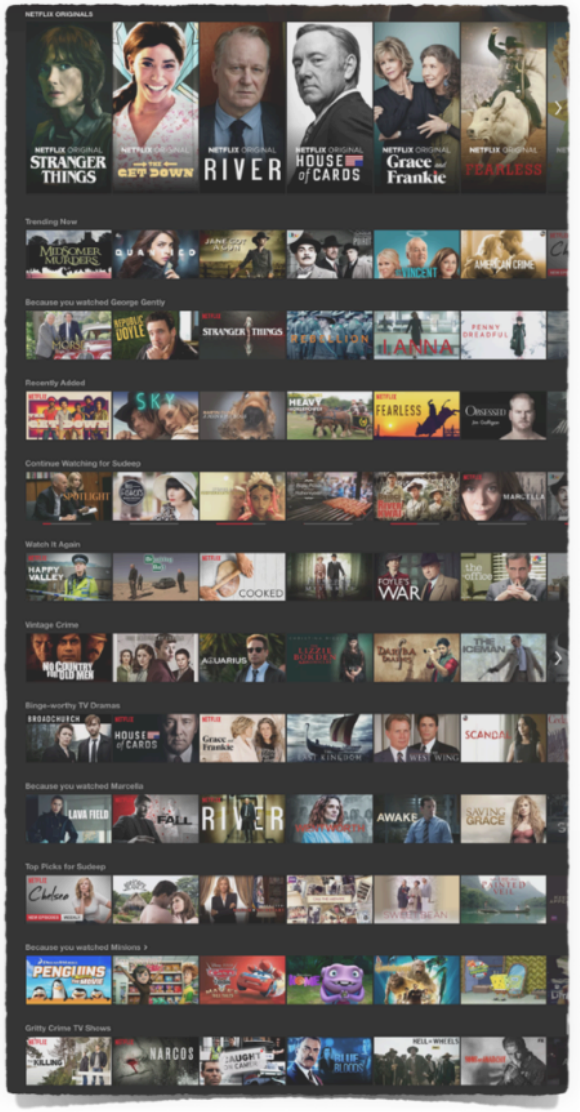
NETFLIX ORIGINAL
NARCOS
Season 2 Coming September 2
06 DAYS
07 HOURS
14 MINS
28 SECS
REWATCH SERIES
TRAILER


The Bletchley Circle
2014 | TV-14 | 2 Series
Next Up
S1:E1 "Cracking a Killer's Code: Part 1"
When former codebreaker Susan Gray spots a hidden pattern in a series of murders, she enlists her wartime friends to try and track down the murderer.
MY LIST
OVERVIEW
EPISODES
MORE LIKE THIS
DETAILS


NETFLIX
HOUSE of CARDS


Trending Now
MIDSOMER MURDERS
QUANTICO
JANE GOT A GUN
POIROT
VINCENT
AMERICAN CRIME


Vintage Crime ›
NO COUNTRY FOR OLD MEN
THE BLETCHLEY CIRCLE
AQUARIUS
CHRISTINA RICCI
THE LIZZIE BORDEN CHRONICLES
DARYBA DIARIES
THE ICEMAN

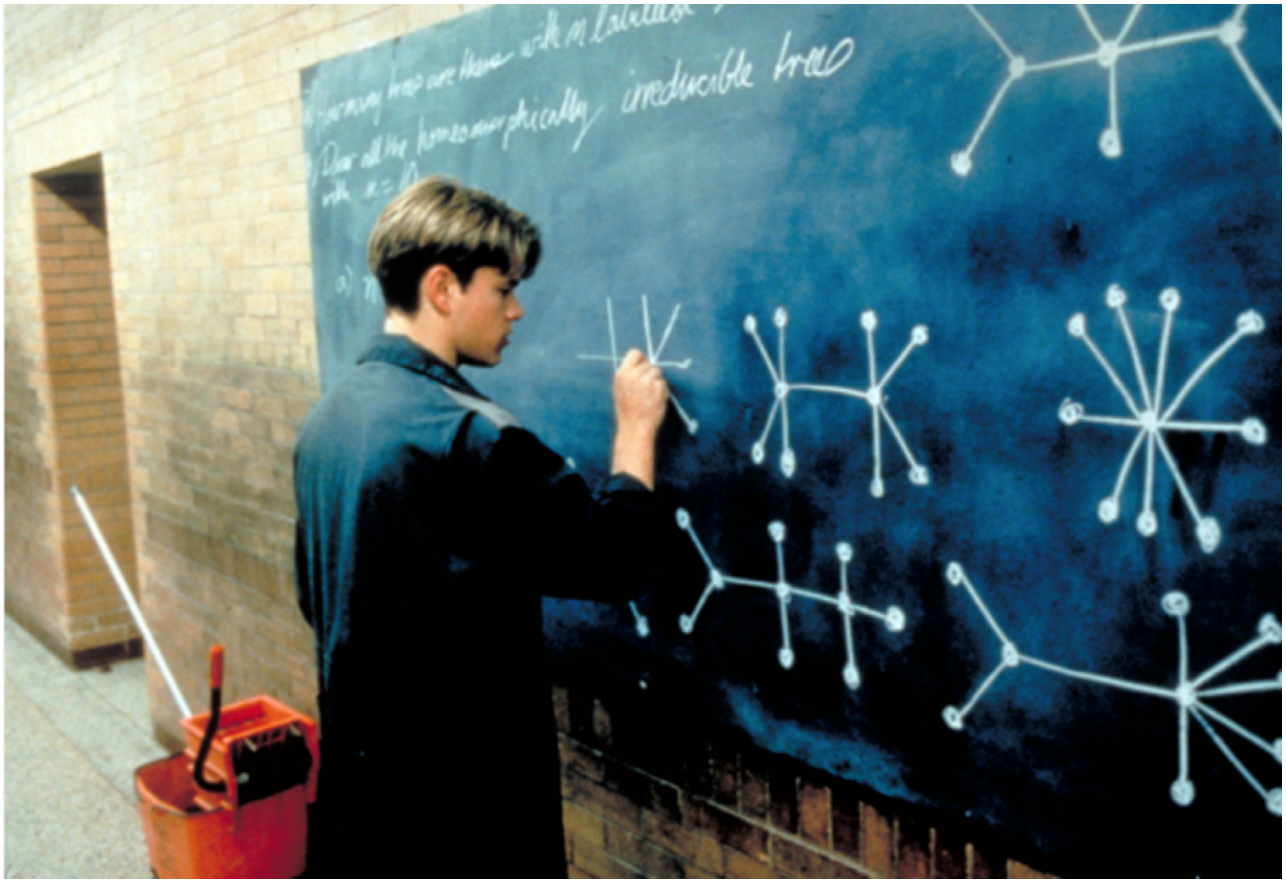

NETFLIX ORIGINALS
STRANGER THINGS
GET DOWN
RIVER
HOUSE of CARDS
Grace and Frankie
FEARLESS
Trending Now
Because you watched George Gently
Recently Added
Continue Watching for Sudeep
Watch It Again
Vintage Crime
Binge-worthy TV Dramas
Because you watched Marcella
Top Picks for Sudeep
Because you watched Minions ›
Gritty Crime TV Shows
NARCOS

Jan 6th, 2016

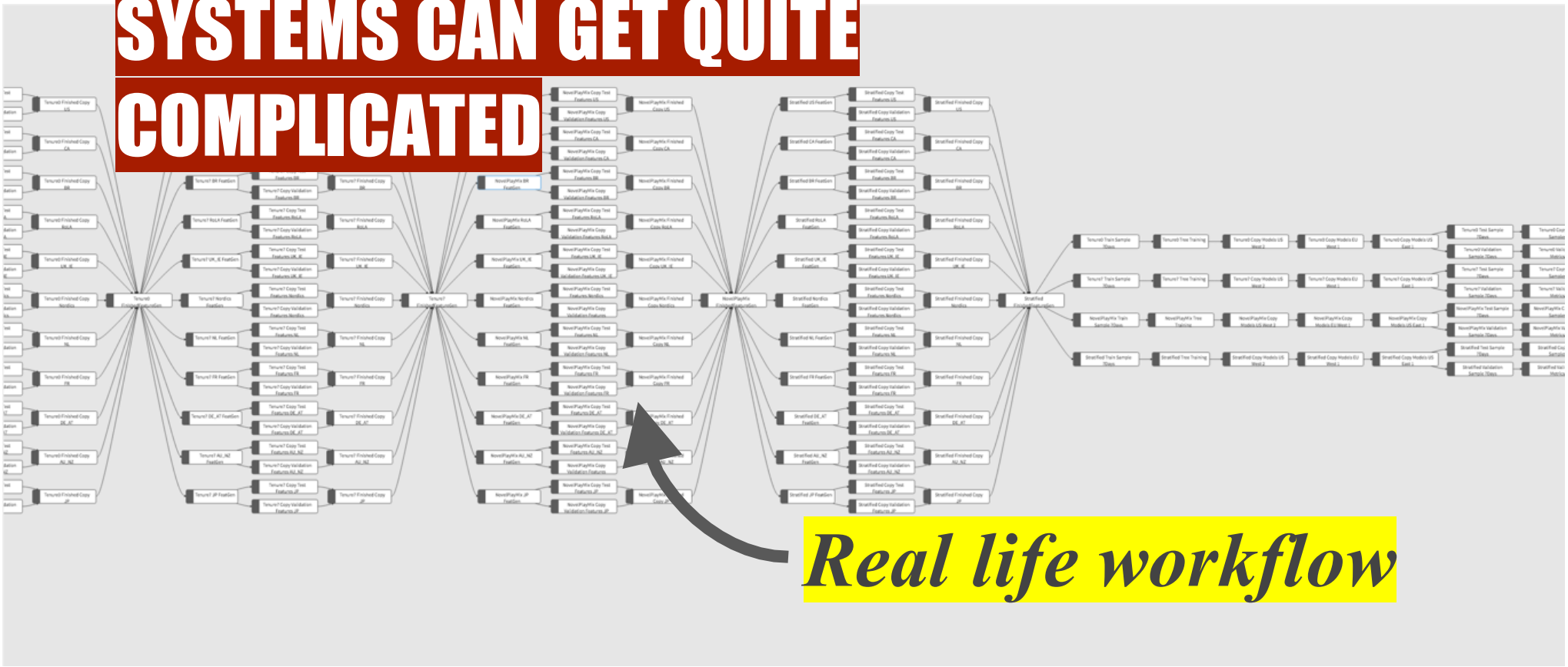
NETFLIX

CONSTANTLY INNOVATING

. . . .



MACHINE LEARNING SYSTEMS CAN GET QUITE COMPLICATED



Real life workflow

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VISUALIZATIONS CAN HELP WITH

GUIDANCE

INTROSPECTION

EVALUATION

DURING THE INNOVATION CYCLE

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STATISTICAL VISUALIZATIONS CAN BE PAINFUL

Consider a researcher at Netflix who who has raw data in a spark dataframe with columns:

show_id, num_of_views, country, timestamp, video_age

The researcher wants to make the following plot:

Plot the ***five most popular*** titles,

according to total number of views,

in the ***last 5 hours,***

as bar charts ***faceted by country***,

where the bars are ***color coded*** by video_age.

Sorting

Aggregating after filtering by timestamp

Grouping data by a categorical value (Country)

Mapping a quantitative column to a color

One could perform all these operations on the DF first and then create one bar plot per country via a loop.

Painful indeed!

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VEGAS

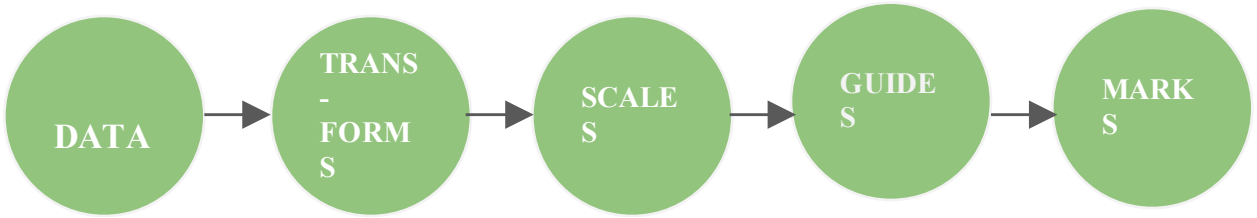
DECLARATIVE STATISTICAL VISUALIZATION GRAMMAR

IN SCALA

You tell is ***WHAT*** should be done with the data, and it knows ***HOW*** to do it!

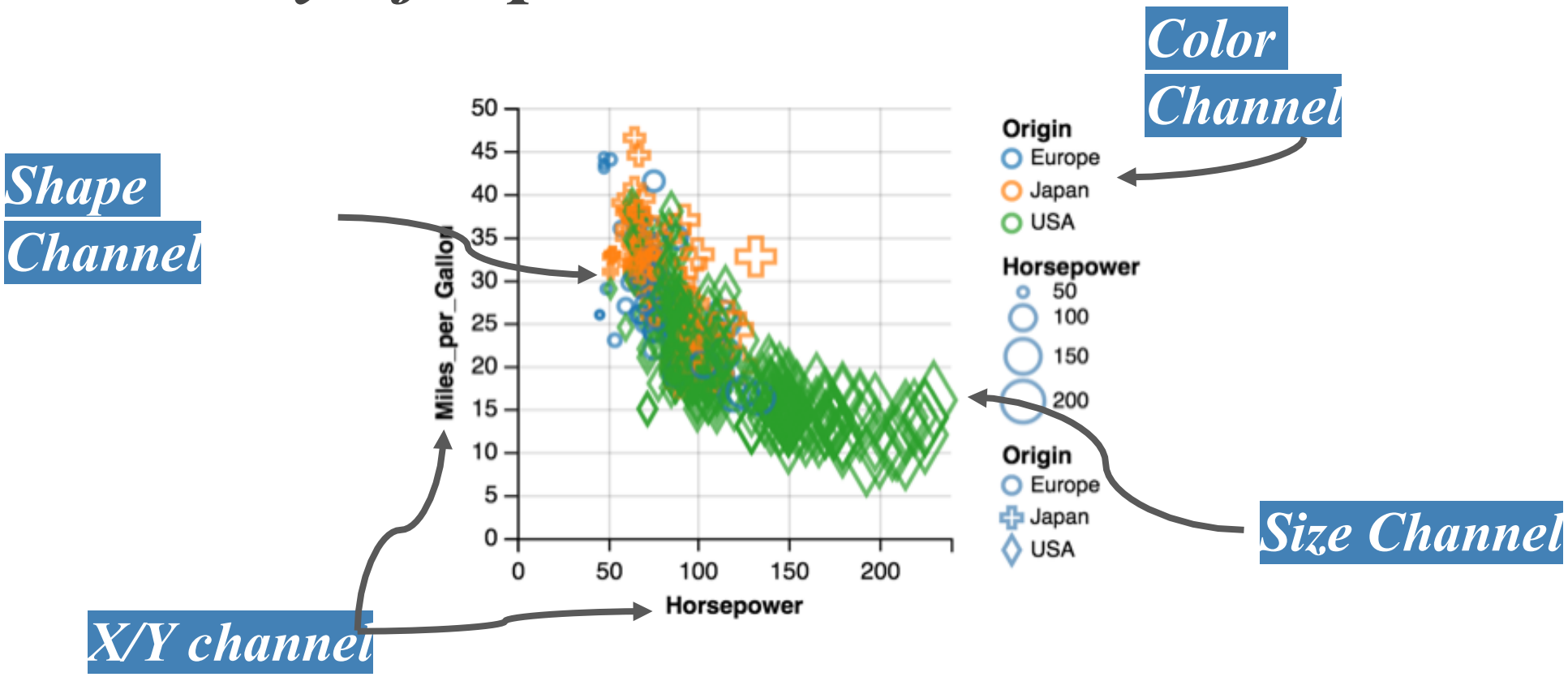
Operations such as ***filtering***, ***aggregation***, ***faceting*** are built into the visualization, rather than putting the burden on the user to massage the data into shape.

Complex visualizations can be built with a few high level abstractions:



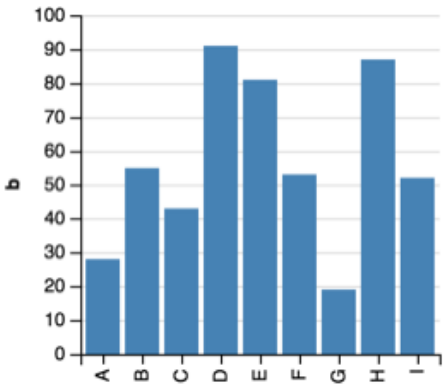
cf : Altair Talk by Brian Granger in PyData 2016 https://youtu.be/v5mrwq7yJc4

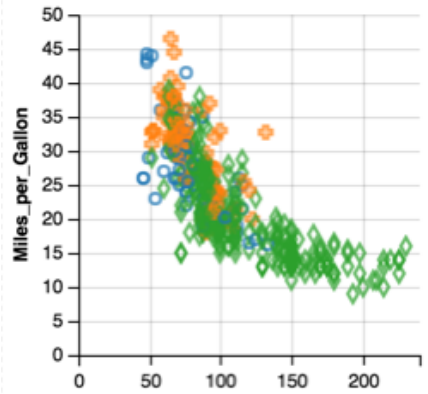
Anatomy of a plot

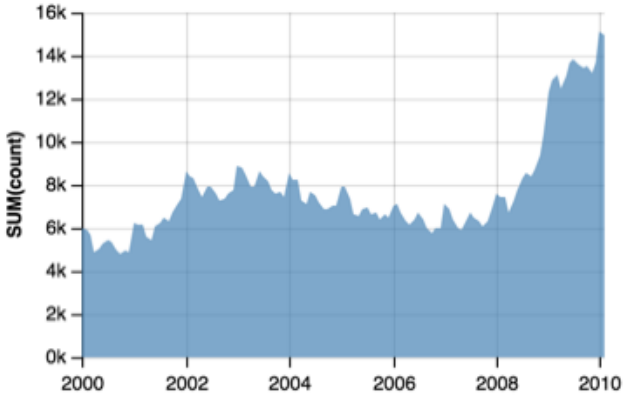


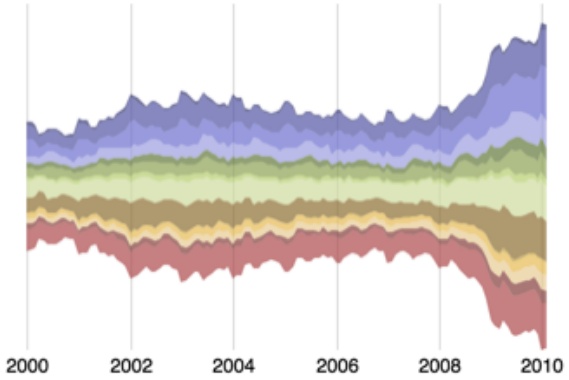
Features…

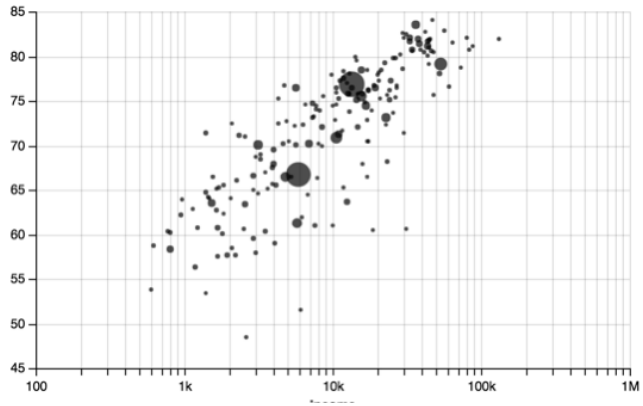
1. Supports most plot types



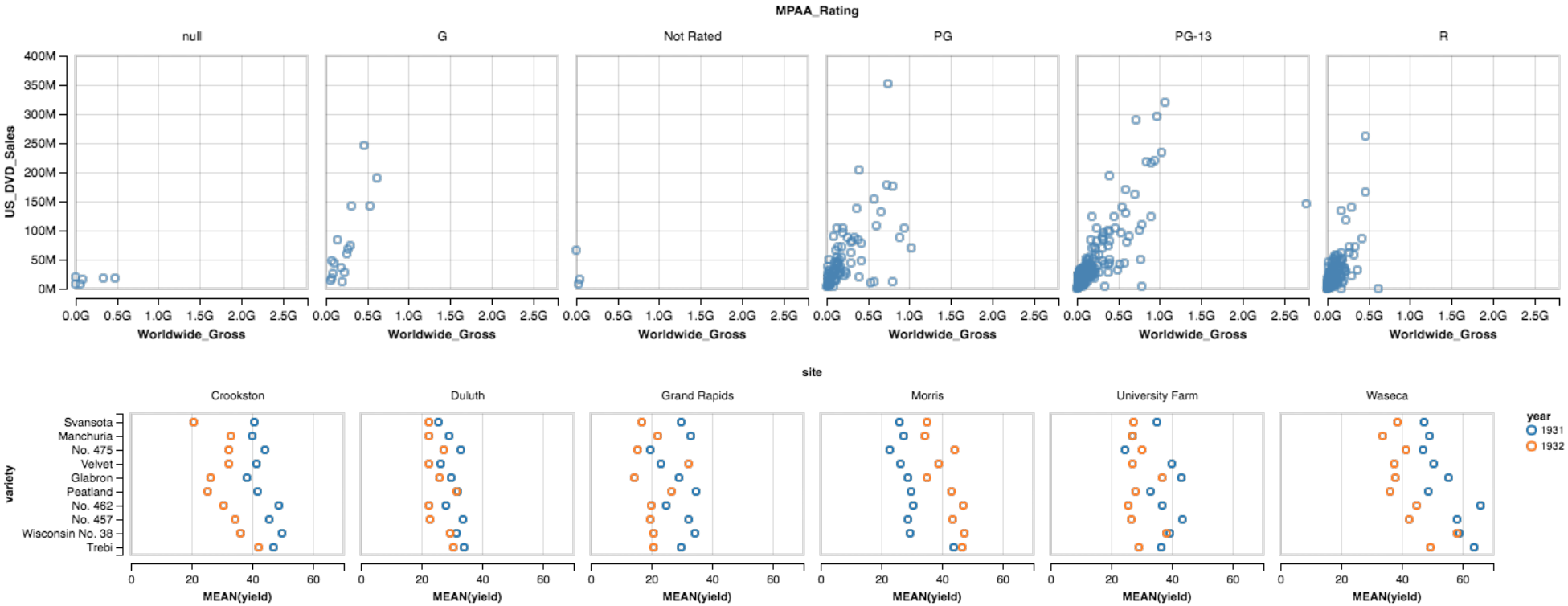








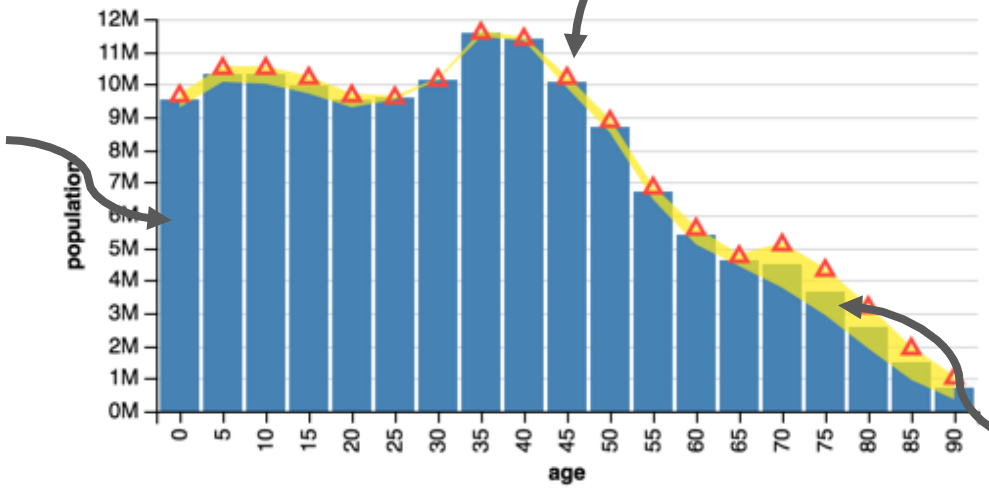
2. *Trellis plots*



3. Layers

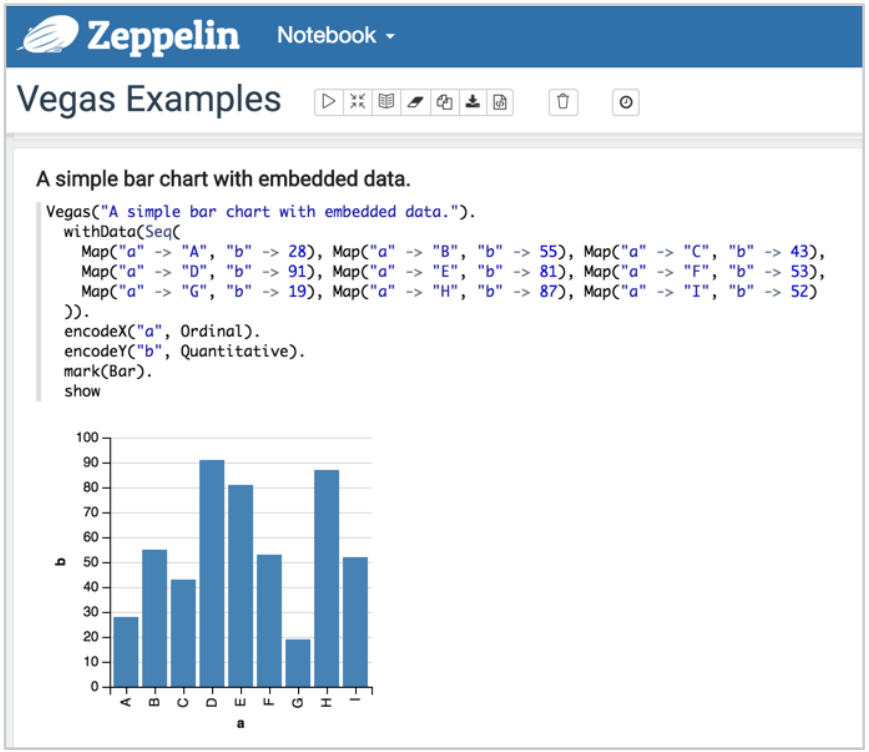
Layer 2.

Layer 1.



Layer 3.

4. Notebook and Consoles



5. Built-in spark support

Pass In DF.

```
Vegas
   .withDataFrame(myDataFrame)
   .encodeX("population")
   .encodeY("age")
```

Mapped Columns

6. Visual statistics

- Advanced Binning
- Sorting
- Scaling
- Custom Transforms
- Time Series
- Aggregation
- Filtering
- Math functions (log, etc)
- Missing data support
- Descriptive Statistics

How It Works !

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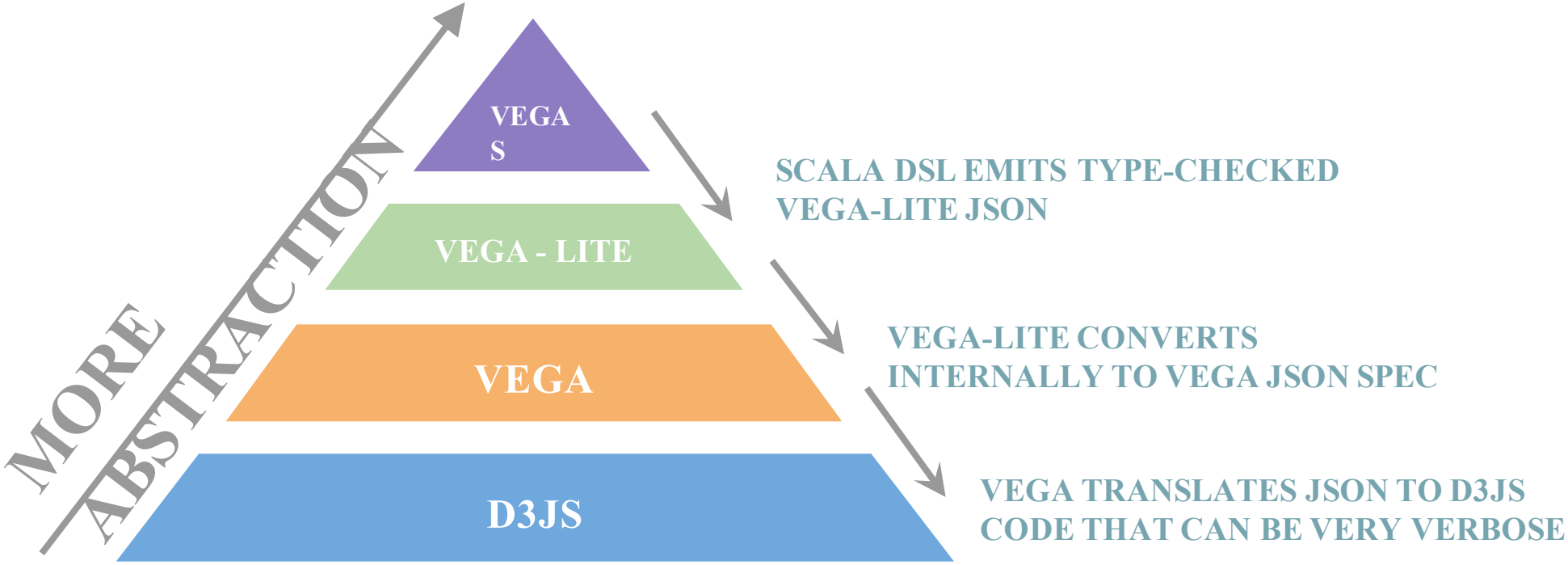
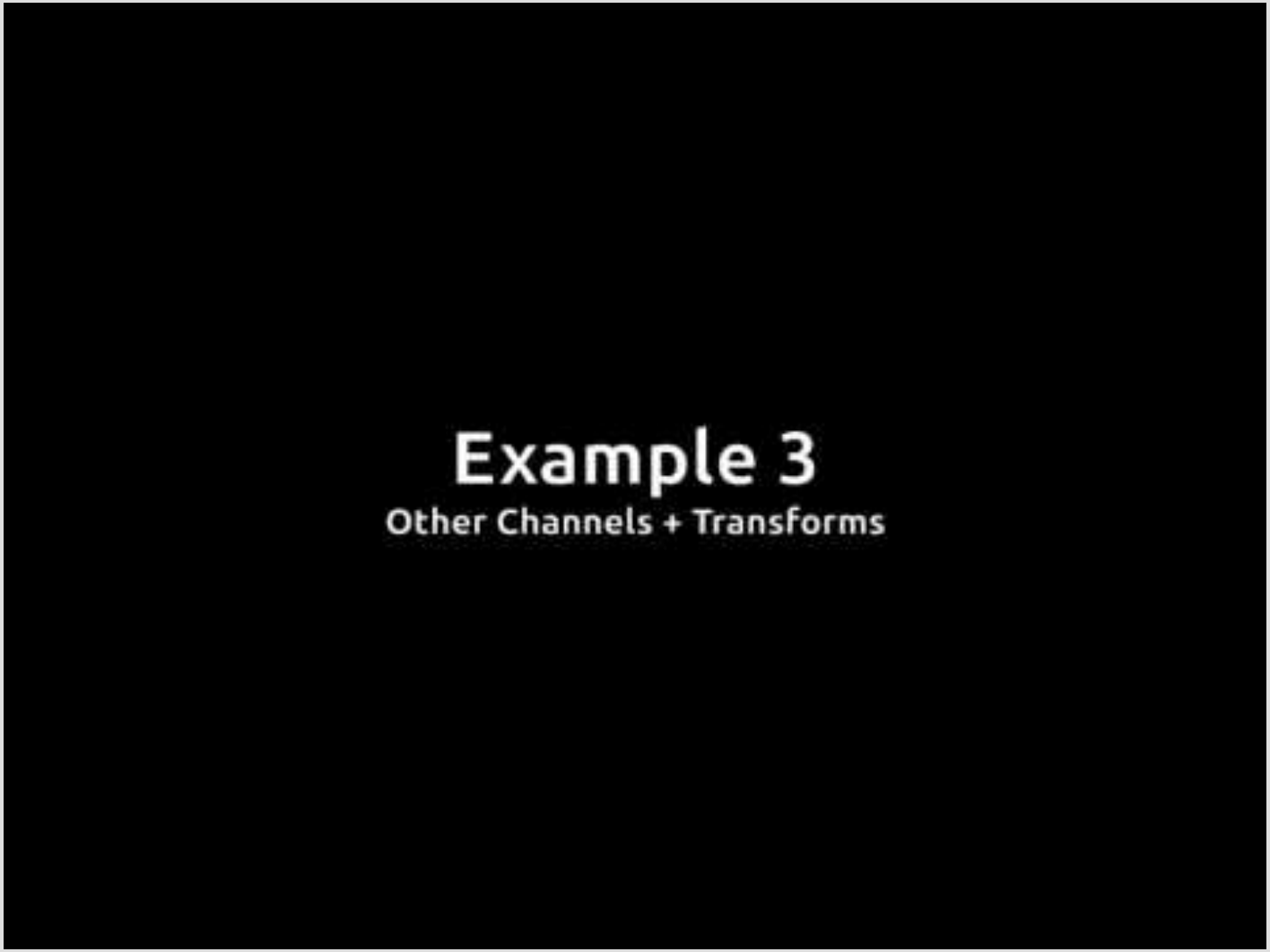
A SCALA DSL FOR VEGA-LITE




Example 3
Other Channels + Transforms


ANY
QUESTIONS

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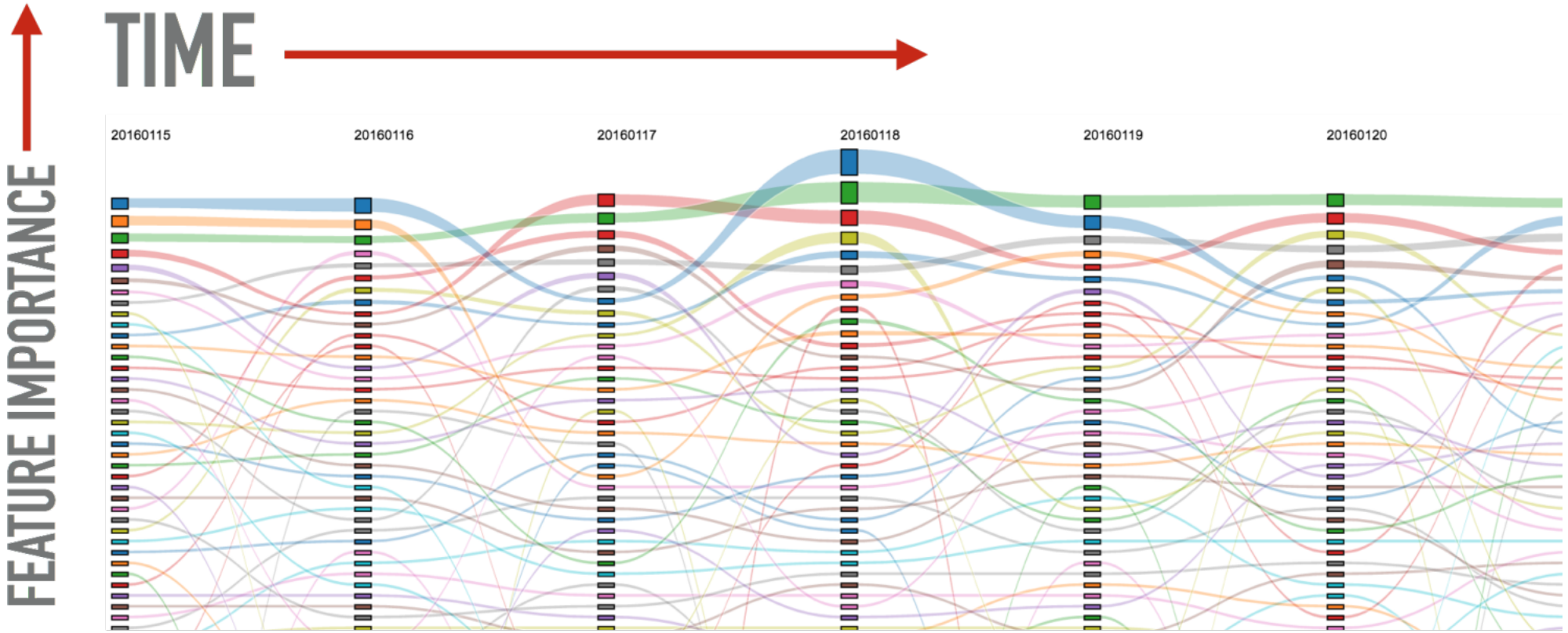
TIME
FEATURE IMPORTANCE
20160115
20160116
20160117
20160118
20160119
20160120

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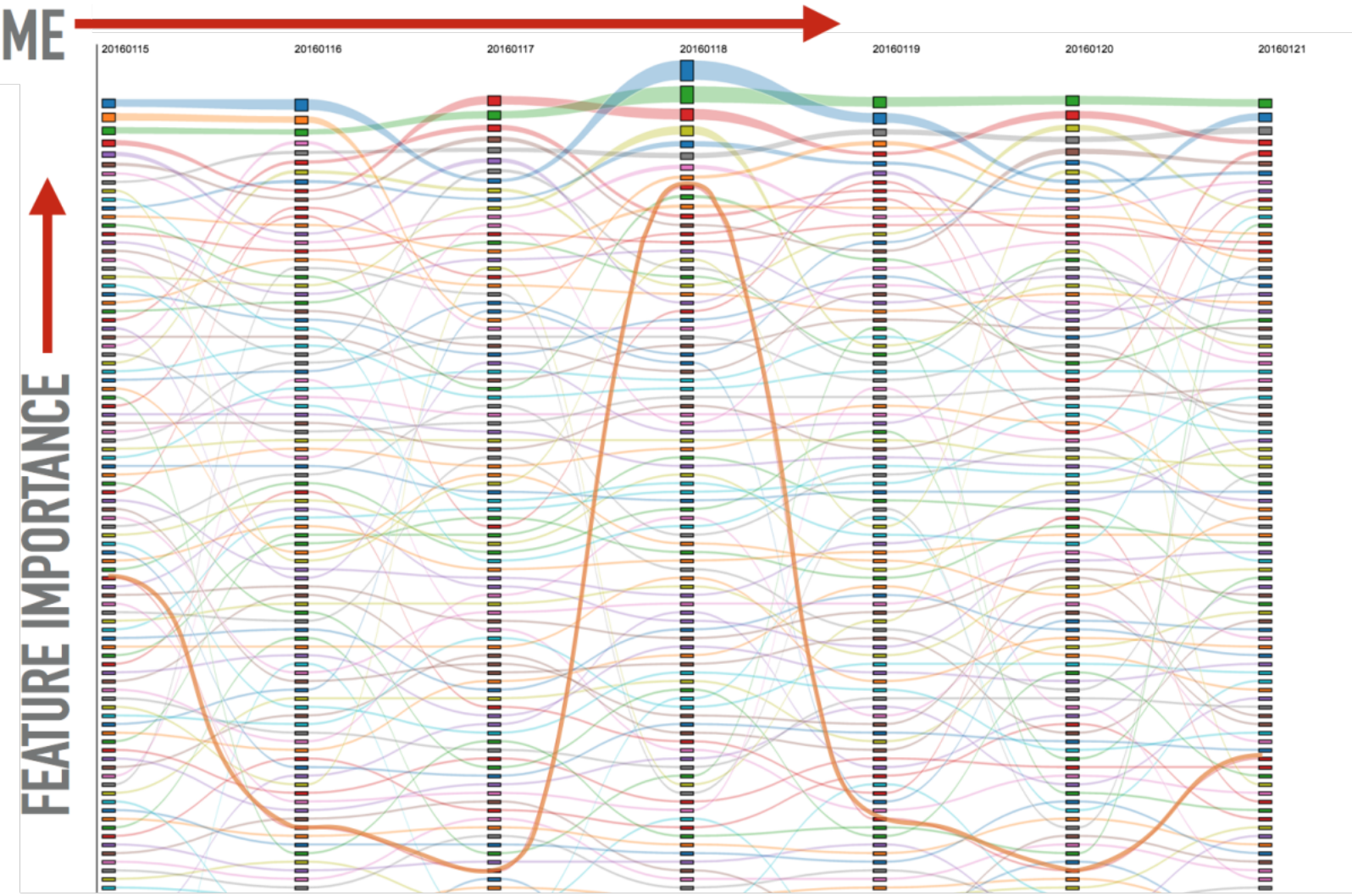
WHAT HAPPENED WITH THAT FEATURE?



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0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74
75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

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Data-Driven Documents

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
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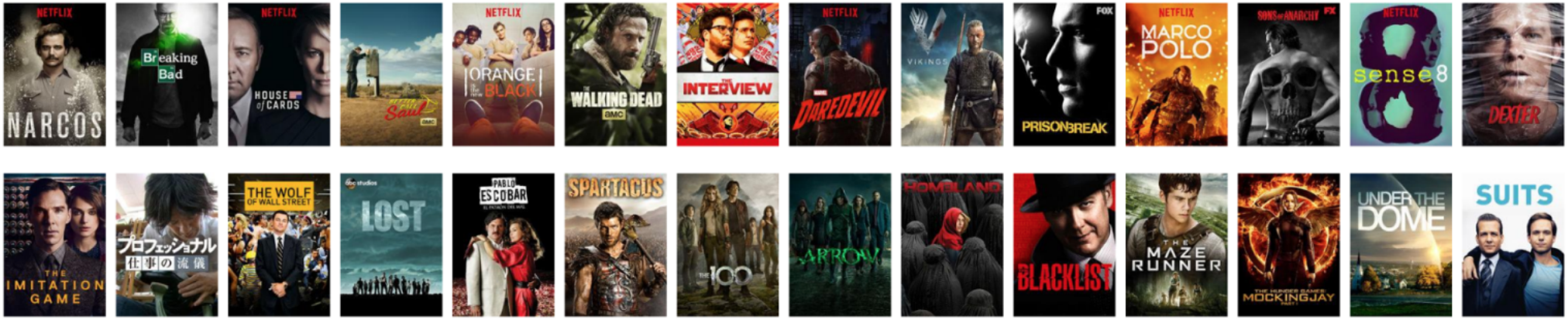

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
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75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99

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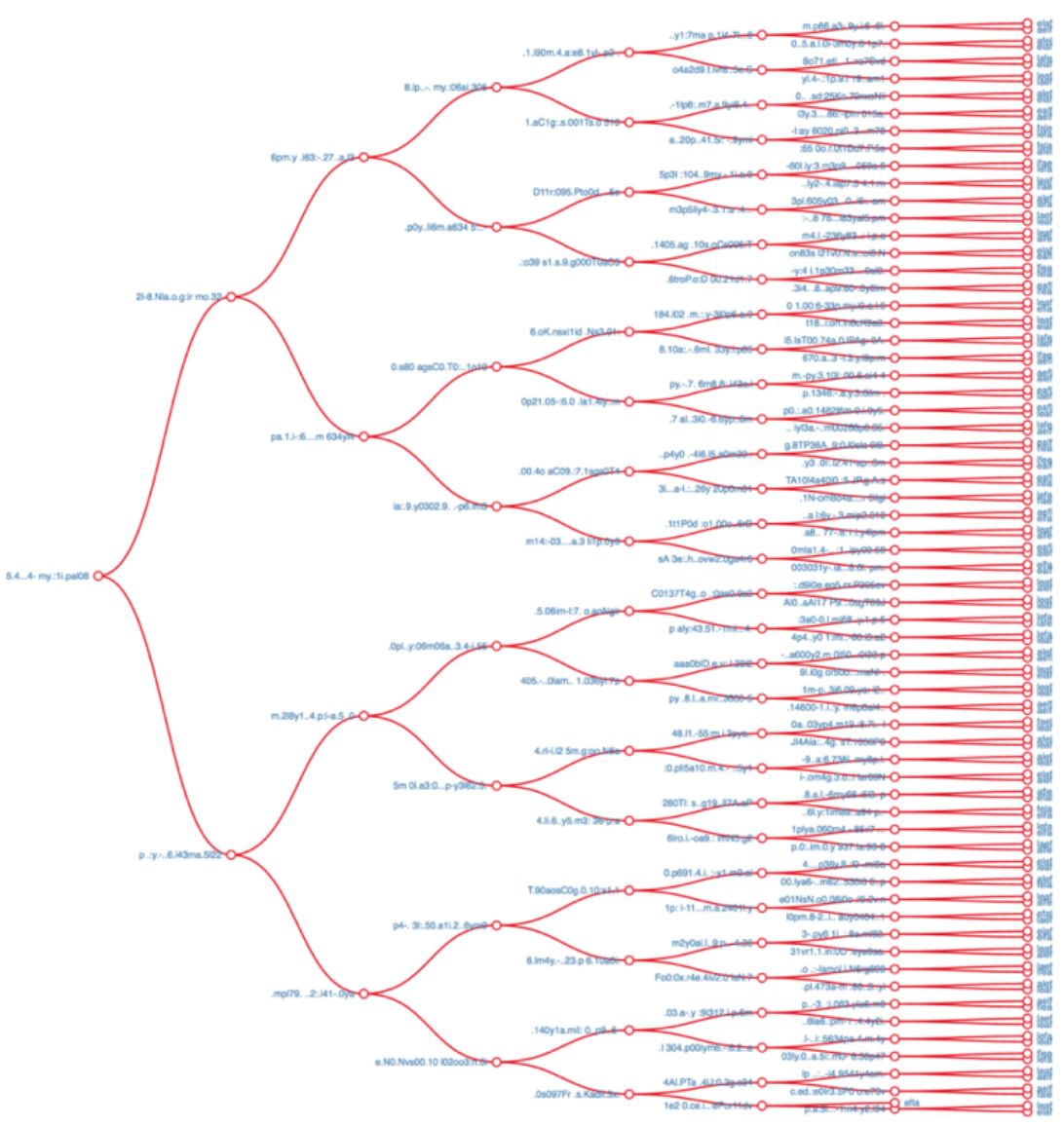
SPLITTING HAIRS!



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