Playing with Data

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Contents

Chapter 1

Reproducibility and Real Data

1.1 Some Truth

> **“All models are wrong, but some are useful.”**

– George Box, 1976, *Journal of the American Statistical Association*

1.2 Critical Thinking, Analytics, and Reproducibility

Chapter 2

Today's agenda

- Vaccines
- Stanford's President
- Target
- Dataset 1 (Marathon Kids; size, means and correlation?)
- Dataset 2 (Starwars, BMIs by homeworld?)
- Dataset 3 (NFL; 4th down?)
- See if we've had fun

Chapter 3

Marathon Kids

3.1 About this data

trainer	pre	post
1	55.3846	97.1795
1	51.5385	96.0256
1	46.1538	94.4872
1	42.8205	91.4103
1	40.7692	88.3333
1	38.7179	84.8718

3.2 More about this data

trainer	n
1	142
2	142
3	142
4	142
5	142
6	142
7	142
8	142
9	142
10	142
11	142
12	142
13	142

3.3 Some fun data for you

Marathon Kids Data

3.4 The Hard Way

trainer	pre	post
1	55.38460	97.1795000
1	51.53850	96.0256000
1	46.15380	94.4872000
1	42.82050	91.4103000
1	40.76920	88.3333000
1	38.71790	84.8718000
1	35.64100	79.8718000
1	33.07690	77.5641000
1	28.97440	74.4872000
1	26.15380	71.4103000
1	23.07690	66.4103000
1	22.30770	61.7949000
1	22.30770	57.1795000
1	23.33330	52.9487000
1	25.89740	51.0256000
1	29.48720	51.0256000
1	32.82050	51.0256000
1	35.38460	51.4103000
1	40.25640	51.4103000
1	44.10260	52.9487000
1	46.66670	54.1026000
1	50.00000	55.2564000
1	53.07690	55.6410000
1	56.66670	56.0256000
1	59.23080	57.9487000
1	61.28210	62.1795000
1	61.53850	66.4103000
1	61.79490	69.1026000
1	57.43590	55.2564000
1	54.87180	49.8718000
1	52.56410	46.0256000
1	48.20510	38.3333000
1	49.48720	42.1795000
1	51.02560	44.1026000
1	45.38460	36.4103000
1	42.82050	32.5641000
1	38.71790	31.4103000
1	35.12820	30.2564000
1	32.56410	32.1795000
1	30.00000	36.7949000
1	33.58970	41.4103000
1	36.66670	45.6410000
1	38.20510	49.1026000
1	29.74360	36.0256000
1	29.74360	32.1795000
1	30.00000	29.1026000
1	32.05130	26.7949000
1	35.89740	25.2564000
1	41.02560	25.2564000
1	44.10260	25.6410000
1	47.17950	28.7180000

Chapter 4

Starwars

4.1 Data

Starwars Data

> **Which homeworlds have the greatest number of individuals with BMI's greater than the average for each homework?**

Chapter 5

NFL

5.1 Data

NFL Data

NFL Descriptions

5.2 Whoa, when do I go for it again, on 4th down?

5.3 Reproducibility: Building is better

nflfastr

Chapter 6

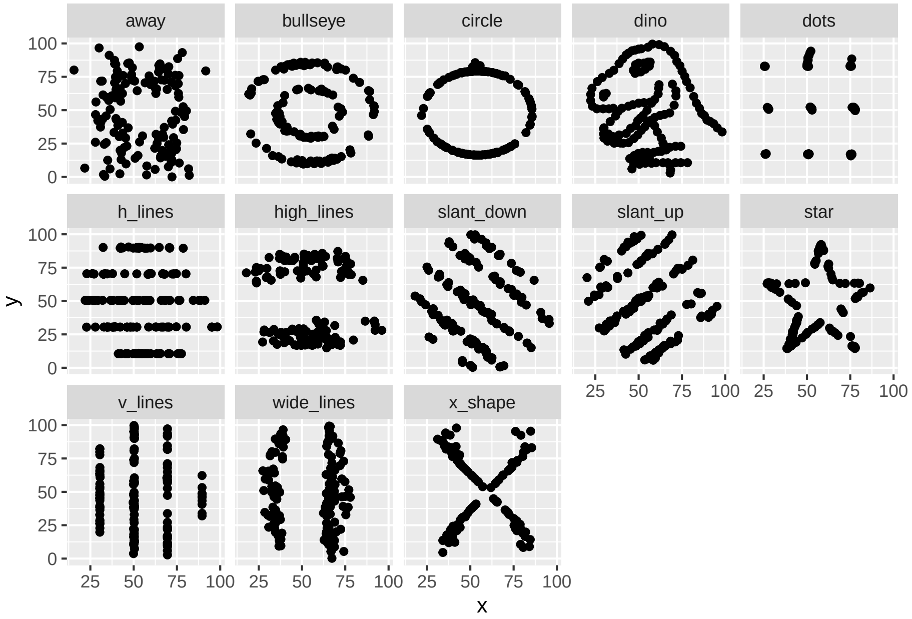
Some Final Thoughts

6.1 Marathon Kids

6.1.1 Mean and correlation Results

dataset	mean(x)	mean(y)	cor(x, y)
away	54.26610	47.83472	-0.0641284
bullseye	54.26873	47.83082	-0.0685864
circle	54.26732	47.83772	-0.0683434
dino	54.26327	47.83225	-0.0644719
dots	54.26030	47.83983	-0.0603414
h_lines	54.26144	47.83025	-0.0617148
high_lines	54.26881	47.83545	-0.0685042
slant_down	54.26785	47.83590	-0.0689797
slant_up	54.26588	47.83150	-0.0686092
star	54.26734	47.83955	-0.0629611
v_lines	54.26993	47.83699	-0.0694456
wide_lines	54.26692	47.83160	-0.0665752
x_shape	54.26015	47.83972	-0.0655833

6.1.2 Mean and correlation Results



6.1.3 Reference

Same Stats, Different Graphs: Generating Datasets with Varied Appearance and Identical Statistics through Simulated Annealing. Matejka, Fitzmaurice. Proceedings of the 2017 CHI Conference on Human Factors in Computing SystemsMay 2017 Pages 1290–1294 https://doi.org/10.1145/3025453.3025912.

6.2 Starwars

6.2.1 Missing values by variable

```
#> # A tibble: 1 x 6
#>    name height  mass homeworld birth_year species
#>   <int>  <int> <int>     <int>      <int>   <int>
#> 1     0      6    28        10         44       4
```

6.2.2 BMI summary

```
#> # A tibble: 56 x 5
#>    name               height  mass homeworld   BMI
#>    <chr>               <int> <dbl> <chr>     <dbl>
#>  1 Luke Skywalker        172    77 Tatooine   26.0
#>  2 C-3PO                 167    75 Tatooine   26.9
#>  3 R2-D2                  96    32 Naboo      34.7
#>  4 Darth Vader           202   136 Tatooine   33.3
#>  5 Leia Organa           150    49 Alderaan   21.8
#>  6 Owen Lars             178   120 Tatooine   37.9
#>  7 Beru Whitesun lars    165    75 Tatooine   27.5
#>  8 R5-D4                  97    32 Tatooine   34.0
#>  9 Biggs Darklighter     183    84 Tatooine   25.1
#> 10 Obi-Wan Kenobi        182    77 Stewjon    23.2
#> # ... with 46 more rows
```

mean_bmi	median_bmi	max_bmi	min_bmi
32.01696	24.56749	443.4286	12.88625

6.2.3 Top contenders...

```
#> # A tibble: 7 x 2
#>   homeworld count
#>   <chr>     <int>
#> 1 Naboo         3
#> 2 Tatooine      3
#> 3 Alderaan      1
#> 4 Corellia      1
#> 5 Kamino        1
#> 6 Kashyyyk      1
#> 7 Mirial        1
```

6.2.4 And the winner are...

```
#> # A tibble: 2 x 2
#>   homeworld count
#>   <chr>     <int>
#> 1 Naboo         3
#> 2 Tatooine      3
```

6.2.5 NFL, one option

Just one person's thoughts