Department of Statistics

ST 310: Machine Learning (for Data Science)

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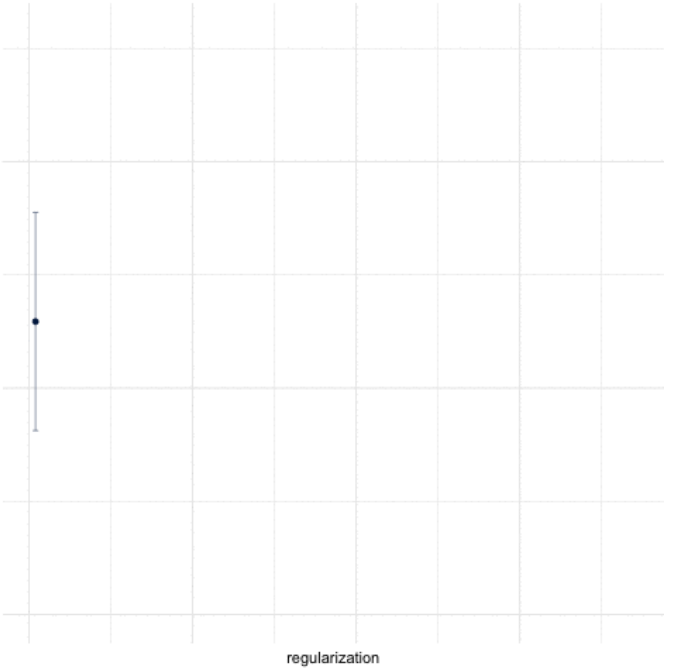
Website: ml4ds.com

About the course

- Course info
- Quick preview
- Teaching/course philosophy



Course info

Format

- *Mostly* self-contained -- ask if you need help!
- Seminars: pre-work, Zoom links on Moodle
- Course page http://ml4ds.com/ (links, slides, misc. notes)
- Participation, active learning
- Assigned weekly readings, attendance of lectures and seminars
- Readings / supplemental references
  - **ISLR** Introduction to Statistical Learning
  - **ESL** Elements of Statistical Learning
  - **CASI** Computer Age Statistical Inference
  - **Mixtape** Causal Inference: The Mixtape
  - **R4DS** R for Data Science

Assessments

As described in the course listing

- Problem sets: 4 total, 2 are summative
- Summative
  - Problem sets (30%)
  - Individual project (40%) in LT
  - Group project (30%) in LT

Quick preview

Don't worry about following all the details now

We'll introduce R coding gradually

Data | Code | Plot | Modify | Plot again

```
library(gapminder)
gapminder %>% head() %>% kable()
```

country	continent	year	lifeExp	pop	gdpPercap
Afghanistan	Asia	1952	28.801	8425333	779.4453
Afghanistan	Asia	1957	30.332	9240934	820.8530
Afghanistan	Asia	1962	31.997	10267083	853.1007
Afghanistan	Asia	1967	34.020	11537966	836.1971
Afghanistan	Asia	1972	36.088	13079460	739.9811
Afghanistan	Asia	1977	38.438	14880372	786.1134

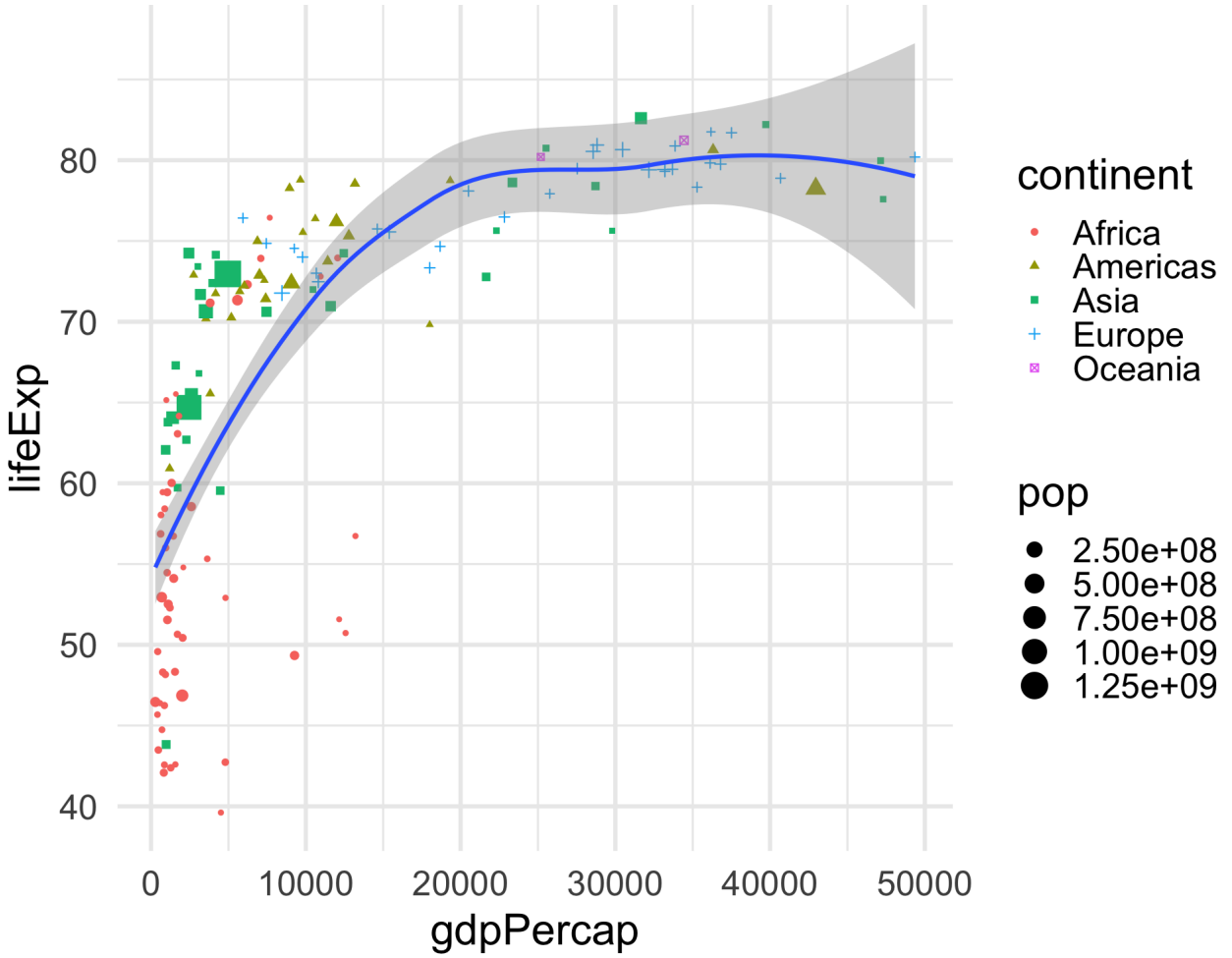
Data | Code | Plot | Modify | Plot again

```
gdp_data <- gapminder %>%
  filter(year == max(year))

life_exp_plot <-
  ggplot(gdp_data, aes(x = gdpPercap, y = lifeExp)) +
  geom_point(aes(color = continent,
                 shape = continent,
                 size = pop))

life_exp_plot +
  stat_smooth(formula = y ~ x, method = "loess", span = 1)
```

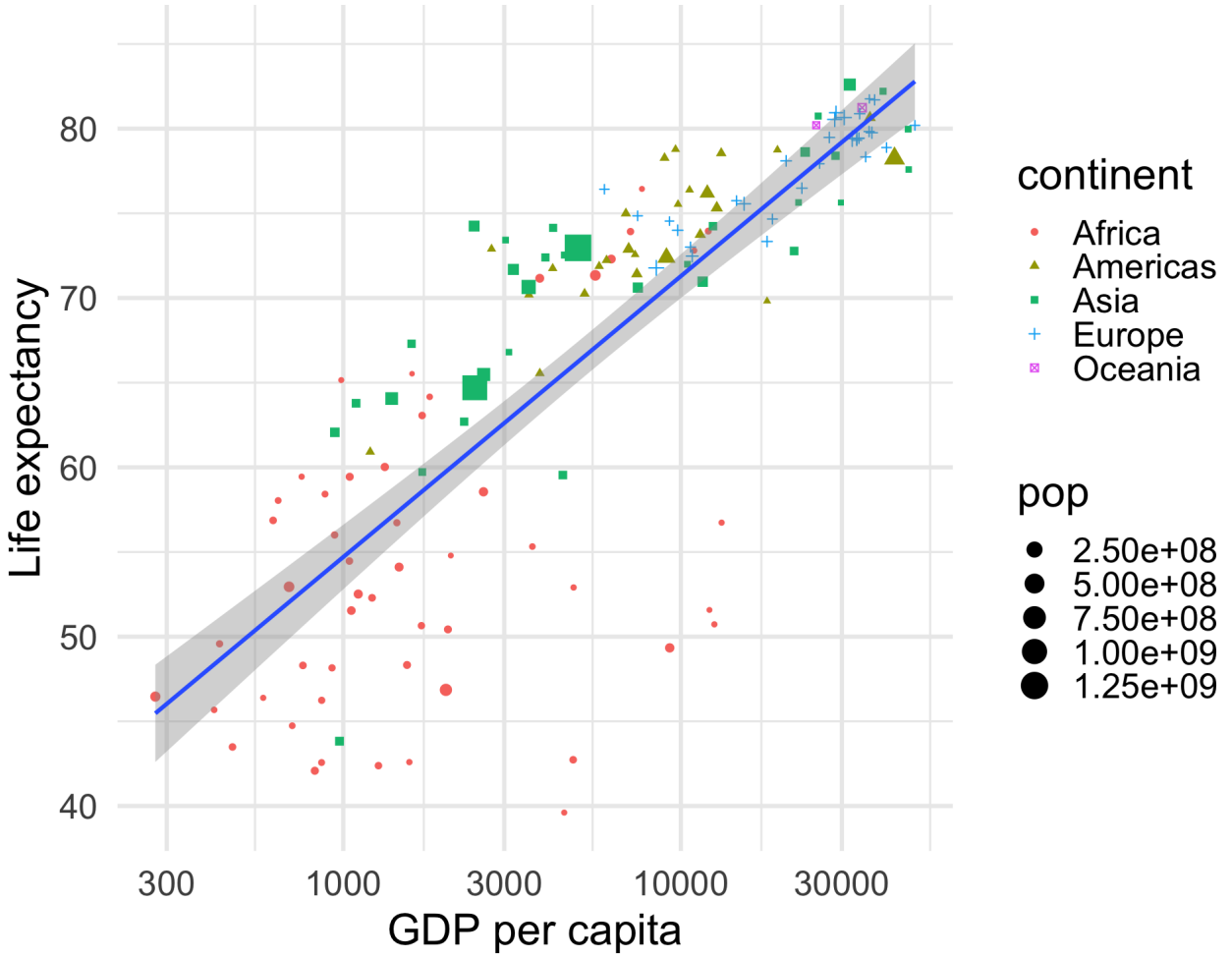
Data Code Plot Modify Plot again

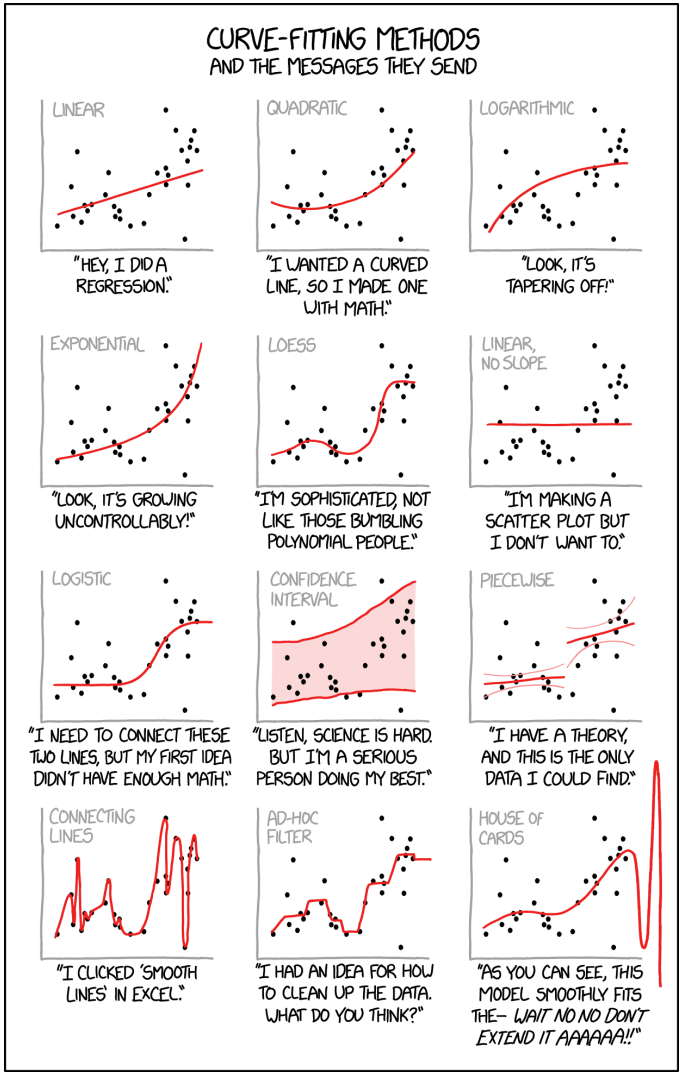


Data Code Plot **Modify** Plot again

```
life_exp_plot +
  scale_x_log10() +
  stat_smooth(formula = y ~ x, method = "lm") +
  xlab("GDP per capita") +
  ylab("Life expectancy")
```

Data Code Plot Modify Plot again





Source: xkcd

Yes, there will be memes, videos, etc...

Teaching/course philosophy

Recurring themes

- Human-centric ML
  - Tools for us to control, not conversely...
  - Ethics of data science
- Interpretability
  - Philosophy of science
  - Causality vs "curve fitting"
- Social learning
  - Come post on the forum!
  - (More on this later)