

4.7 fitting a series of regressions

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July 3, 2016

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reference:

- ARM chapter 04, github

```
library(rstan)
rstan_options(auto_write = TRUE)
options(mc.cores = parallel::detectCores())
library(ggplot2)
```

data

```
### Data file names
# nesYYYY.data.R, where YYYY == seq(1972, 2000, 4)
```

model

nes.stan

```
data {
  int<lower=0> N;
  vector[N] partyid7;
  vector[N] real_ideo;
  vector[N] race_adj;
  vector[N] educ1;
  vector[N] gender;
  vector[N] income;
  int age_discrete[N];
}
transformed data {
  vector[N] age30_44;          // age as factor
  vector[N] age45_64;
  vector[N] age65up;

  for (n in 1:N) {
    age30_44[n] = age_discrete[n] == 2;
    age45_64[n] = age_discrete[n] == 3;
    age65up[n]  = age_discrete[n] == 4;
  }
}
```

```

parameters {
  vector[9] beta;
  real<lower=0> sigma;
}
model {
  // vectorization
  partyid7 ~ normal(beta[1] +
    beta[2] * real_ideo +
    beta[3] * race_adj +
    beta[4] * age30_44 +
    beta[5] * age45_64 +
    beta[6] * age65up +
    beta[7] * educ1 +
    beta[8] * gender +
    beta[9] * income,
    sigma);
}

```

fit

```

### Model
## Sampling over eight years & building a data frame for Figure 4.6
nes.post <- data.frame(c(), c(), c(), c(), c()) # empty data frame
years <- seq(1972, 2000, 4)
predictor <- c("Intercept", "Ideology", "Black", "Age.30.44", "Age.45.64",
  "Age.65.up", "Education", "Female", "Income")
predictor <- factor(predictor, levels = predictor)
for (i in years) {
  source(paste("nes", i, ".data.R", sep=""))
  data.list <- c("N", "partyid7", "real_ideo", "race_adj", "age_discrete",
    "educ1", "gender", "income")
  sf <- stan(file='nes.stan', data=data.list, iter=1000, chains=4)
  beta.post <- extract(sf, "beta")$beta
  beta.mean <- colMeans(beta.post)
  beta.sd <- apply(beta.post, 2, sd)
  nes.post <- rbind(nes.post,
    data.frame(year = rep(i, 9), predictor,
      Coefficient = beta.mean,
      lower = beta.mean - 0.67 * beta.sd,
      upper = beta.mean + 0.67 * beta.sd))
}

```

```

## Figure 4.6
p <- ggplot(nes.post) +
  geom_pointrange(aes(x = year, y = Coefficient, ymin = lower, ymax = upper)) +
  geom_hline(yintercept = 0, linetype = "dashed") +
  scale_x_continuous(breaks = seq(1972, 2000, 4),
    labels = c("1972", "", "", "", "", "", "", "2000")) +
  theme_bw() +
  facet_wrap(~ predictor, scales = "free_y", ncol = 5)
print(p)

```

