

Note on EI Usage

July 2021

Script 1 shows an example from our EI runs, focused on the Democratic Primary Runoff contest in the 2018 Texas Governor’s race.

We use the outputs of these runs to identify candidates of choice and to determine our confidence levels for those identifications. We emphasize that these tasks are handled modularly in our workflow and this EI method can be replaced by a user’s own choice, whether EI or another inference method. These particular choices of techniques and parameter settings are suitable for the cases in our paper, but care should be taken for a user adapting this framework to new states or even new elections. Users are advised to verify that their choice of methods is generating consistent outputs with good convergence heuristics and, where possible, to check selected outputs against available ground truth. We always recommend exploring the EI parameters beyond the default settings.

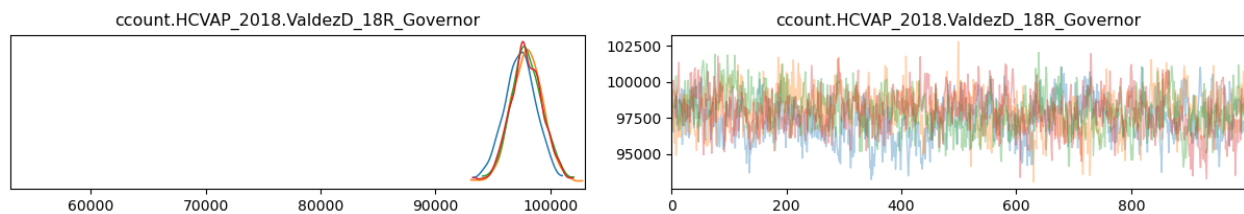
Figure 1 shows trace plots of estimated Latino and Black votes for Valdez and White from four different runs of Script 1. Though there is small variation run-to-run, we find the stability to be satisfactory for this use case. In particular, the runs have converged enough to identify clear candidates of choice (such as Valdez for Latino voters) and to determine when a candidate of choice is very uncertain (as for Valdez/White with Black voters).

```

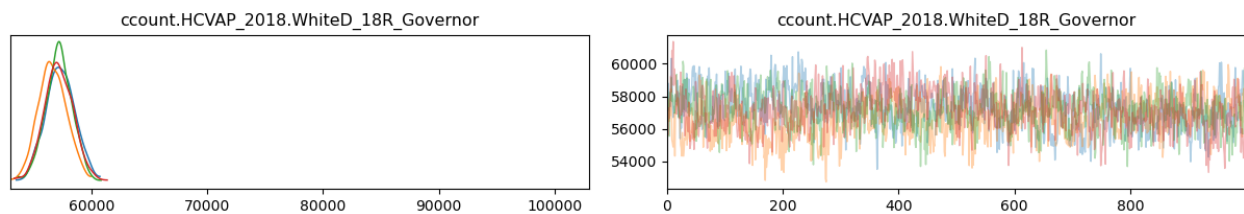
1  library('eiPack')
2  library(readr)
3  library(stringr)
4
5  elec_data <- data.frame(read_csv('TX_cvap_for_EI.csv'))
6
7  ntunes_val <- 10
8  tunedraws <- 10000
9  thin_mcmc <- 100
10 burnin_mcmc <- 100000
11
12 e <- '18R_Governor'
13 form <- "cbind(ValdezD_18R_Governor, WhiteD_18R_Governor,
  ↳ X18R_Governor_abstain) ~ cbind(BCVAP_2018, HCVAP_2018, WCVAP_2018,
  ↳ OCVAP_2018, X18R_Governor_CVAP)"
14
15 tune.nocov <- tuneMD(form, data = elec_data, ntunes = ntunes_val, totaldraws =
  ↳ tunedraws)
16 out.nocov <- ei.MD.bayes(form, covariate = NULL, data = elec_data, tune.list =
  ↳ tune.nocov, ret.mcmc = TRUE, burnin = burnin_mcmc, thin = thin_mcmc)
17
18 sink("18R_Governor_ei_summary.txt")
19 print(summary(out.nocov, quantiles = c(.025, .05, .5, .95, .975)))
20 sink()
21
22 mcmc_df <- data.frame(as.matrix(out.nocov$draws$Cell.counts, iters = TRUE))
23 write.csv(mcmc_df, "18R_Governor_EI_SAMPLES.csv")
24
25 mcmc_df_prec <- as.matrix(out.nocov$draws$Beta)
26 x <- colMeans(mcmc_df_prec)
27 y <- apply(mcmc_df_prec, 2, sd)
28 probs <- c(0:8/8)
29 q_0 <- apply(mcmc_df_prec, MARGIN = 2, FUN = quantile, probs = probs)
30 write.csv(t(q_0), "18R_Governor_prec_quants.csv")
31 write.csv(x, "18R_Governor_prec_means.csv")
32 write.csv(y, "18R_Governor_prec_sd.csv")

```

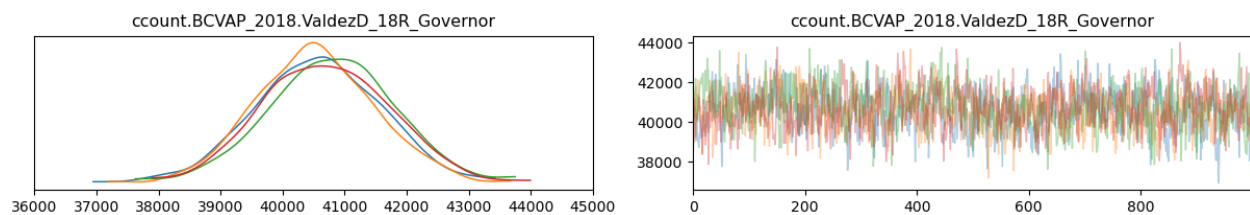
Script 1: EI Example using the Texas 2018 Gubernatorial Democratic primary runoff election



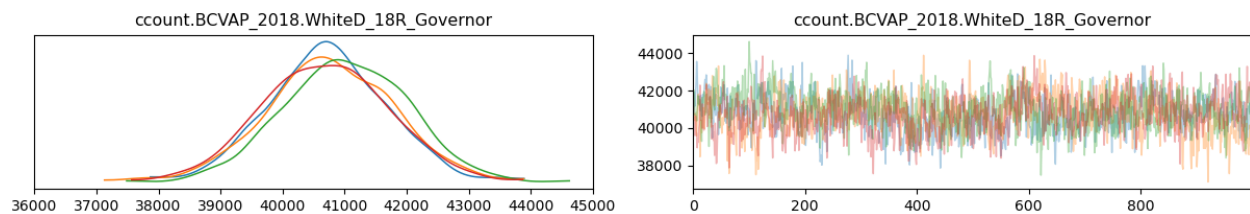
(a) Latino Votes for Valdez



(b) Latino Votes for White



(c) Black Votes for Valdez



(d) Black Votes for White

Figure 1: Trace plots comparing four different runs of Script 1