Hw4 Insu Yoon 1003180933

Introduction

The data set is from the voters in Wisconsin to vote for Trump in 2016. The purpose of this paper is that what demographic factors have influenced on the number of voting on Trump. There are two hypotheses to be investigated:

1. Is Trumpism a primarily urban/rural phenomenon?
2. Is Trump appealing to white voters?

Method

$$Y_i \sim \text{Binomial}(N_i, \rho_i)$$

$$log[\rho_i/(1 - \rho_i)] = \mu + X_i\beta + U_i$$

$$U_i = BYM(\sigma^2, \phi)$$

- N_i is the number of voters in the Republican primary in county i
- Y_i is the number of Trump voters

X_i is the vector that includes

- propWhite is the proportion who are white
- propInd is the proportion who are Indegeous
- logPdens is log ratio of Total population and surface area

U_i is a spatial random effect following a BYM model.

Conclusion

From figure 2, figure 5, and figure 6, we first can see that the most reddish part in figure 2 has shown that least proportion of voting Trump in figure 5 and 6. Moreover, the table also indicates that the ratio of total population and surface area does not over 1 which results in that the Trumpism is less likely spread on urban area.

Again, we also can see from figure 1, figure 5, figure 6, the area where high proportion of white living show that the higher proportion of who vote for Trump. Moreover, when we look at the table, we can see that meaningful median value from proportion of white so that we can conclude that our hypothesis that Trump has succeeded on appealing to white voters.
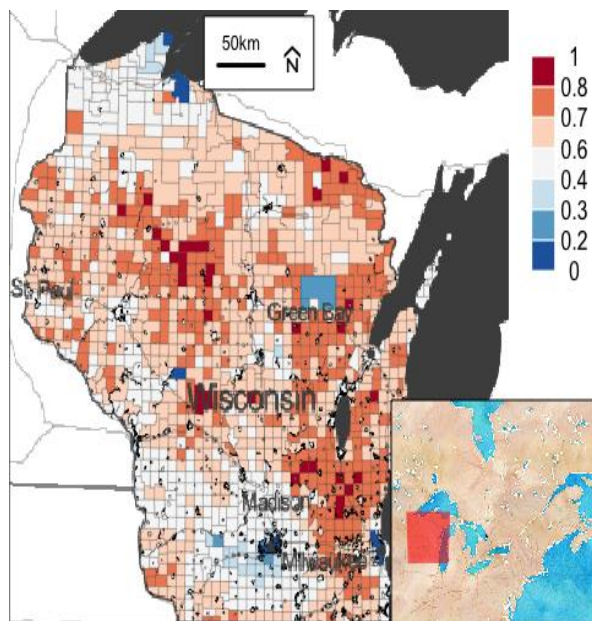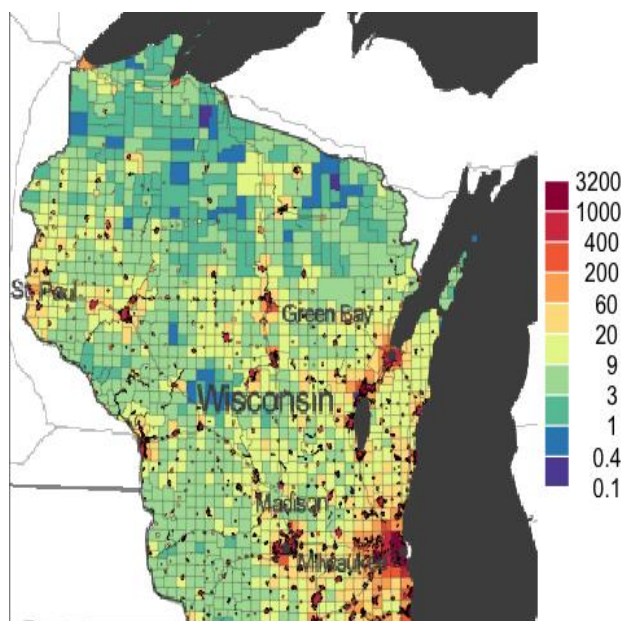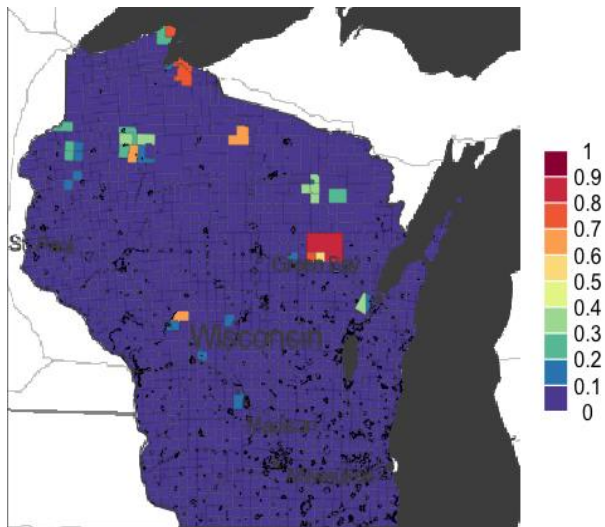
Figure 1 Trump voters

Figure 2 Pop density
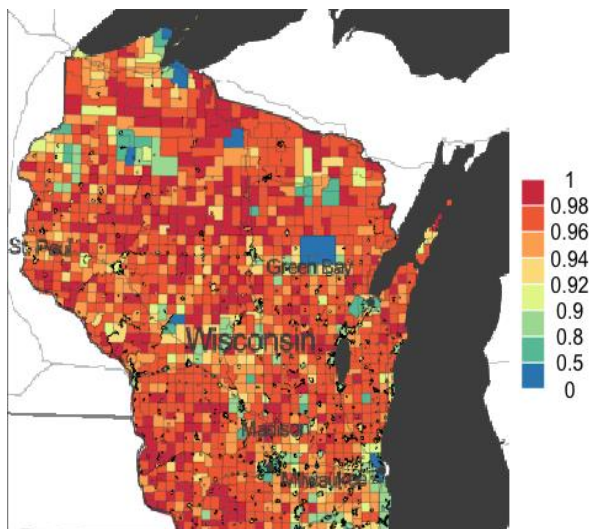
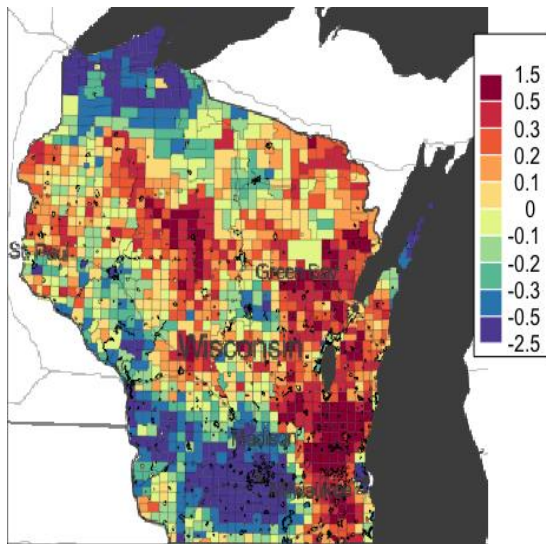*Figure 3* Proportion of Indigenous

Figure 4 Proportion of White

Figure 5 Random
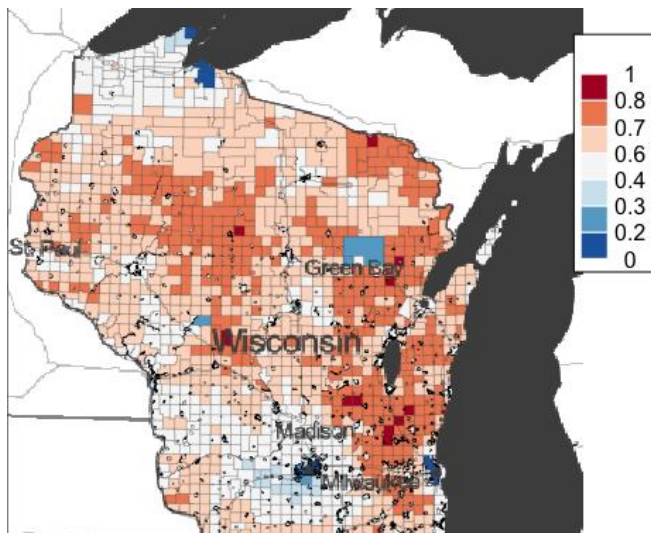
Figure 6 Fitted

Table

	0.5quant	0.025quant	0.975quant
(Intercept)	0.56987	0.43742	0.74359
logPdens	0.92214	0.91412	0.93022
propWhite	4.13040	3.16421	5.38049
propInd	0.45406	0.32156	0.64006
sd	1.37542	1.35625	1.39802
propSpatial	2.61415	2.50641	2.68099

Appendix

```r
resTrump = diseasemapping::bym(trump ~ logPdens + propWhite +
  propInd, data = wisconsinCsubm, prior = list(sd = c(log(2.5),
  0.5), propSpatial = c(0.5, 0.5)), Ntrials = wisconsinCsubm$Total,
  family = "binomial")

## Warning in .local(formula, data, adjMat, region.id, ...): There are 1 regi
ons
## without neighbours, consider removing these.

## Warning in inla.model.properties.generic(inla.trim.family(model), mm[names
(mm) == : Model 'bym2' in section 'latent' is marked as 'experimental'; chang
es may appear at any time.
##   Use this model with extra care!!! Further warnings are disabled.

## x[.,.] <- val : x being coerced from Tsparse* to CsparseMatrix

save(resTrump, file = "../Hw4/data/resWisconsin.RData", compress = "xz")

theColTrump = mapmisc::colourScale(wisconsinCsubm$propTrump,
  col = "RdBu", breaks = sort(unique(setdiff(c(0, 1, seq(0.2,
    0.8, by = 0.1)), 0.5))), style = "fixed", rev = TRUE)
theColPop = mapmisc::colourScale(wisconsinCsubm$pdens, col = "Spectral",
  breaks = 11, style = "equal", transform = "log", digits = 1,
  rev = TRUE)
theColWhite = mapmisc::colourScale(wisconsinCsubm$propWhite,
  col = "Spectral", breaks = c(0, 0.5, 0.8, 0.9, seq(0.9,
    1, by = 0.02)), style = "fixed", rev = TRUE)
theColInd = mapmisc::colourScale(wisconsinCsubm$propInd,
  col = "Spectral", breaks = seq(0, 1, by = 0.1), style = "fixed",
  rev = TRUE)
theBg = mapmisc::tonerToTrans(mapmisc::openmap(wisconsinCm,
  fact = 2, path = "stamen-toner"), col = "grey30")
theInset = mapmisc::openmap(wisconsinCm, zoom = 6, path = "stamen-watercolor"
,
  crs = mapmisc::crsMerc, buffer = c(0, 1500, 100, 700) *
1000)

library("sp")
mapmisc::map.new(wisconsinCsubm, 0.85)
sp::plot(wisconsinCsubm, col = theColTrump$plot, add = TRUE,
  lwd = 0.2)
raster::plot(theBg, add = TRUE, maxpixels = 10^7)
```

```r
mapmisc::insetMap(wisconsinCsubm, "bottomright", theInset,
  outer = TRUE, width = 0.35)
mapmisc::scaleBar(wisconsinCsubm, "top", cex = 0.8)
mapmisc::legendBreaks("topright", theColTrump, bty = "n",
  inset = 0)


mapmisc::map.new(wisconsinCsubm, 0.85)
plot(wisconsinCsubm, col = theColPop$plot, add = TRUE, lwd = 0.2)
plot(theBg, add = TRUE, maxpixels = 10^7)
mapmisc::legendBreaks("right", theColPop, bty = "n", inset = 0)


mapmisc::map.new(wisconsinCsubm, 0.85)
plot(wisconsinCsubm, col = theColInd$plot, add = TRUE, lwd = 0.2)
plot(theBg, add = TRUE, maxpixels = 10^7)
mapmisc::legendBreaks("right", theColInd, bty = "n", inset = 0)


mapmisc::map.new(wisconsinCsubm, 0.85)
plot(wisconsinCsubm, col = theColWhite$plot, add = TRUE,
  lwd = 0.2)
plot(theBg, add = TRUE, maxpixels = 10^7)
mapmisc::legendBreaks("right", theColWhite, bty = "n", inset = 0)


theColRandom = mapmisc::colourScale(resTrump$data$random.mean,
  col = "Spectral", breaks = 11, style = "quantile", rev = TRUE,
  dec = 1)
theColFit = mapmisc::colourScale(resTrump$data$fitted.invlogit,
  col = "RdBu", rev = TRUE, breaks = sort(unique(setdiff(c(0,
    1, seq(0.2, 0.8, by = 0.1)), 0.5))), style = "fixed")
mapmisc::map.new(wisconsinCsubm, 0.85)
plot(resTrump$data, col = theColRandom$plot, add = TRUE,
lwd = 0.2)
plot(theBg, add = TRUE, maxpixels = 10^7)
mapmisc::legendBreaks("topright", theColRandom)


mapmisc::map.new(wisconsinCsubm, 0.85)
plot(resTrump$data, col = theColFit$plot, add = TRUE, lwd = 0.2)
plot(theBg, add = TRUE, maxpixels = 10^7)
mapmisc::legendBreaks("topright", theColFit)

knitr::kable(exp(resTrump$parameters$summary)[, paste0(c(0.5,
  0.025, 0.975), "quant")], digits = 5)
```

```
knitr::kable(sd(wisconsinCsubm$logPdens)*exp(resTrump$parameters$summary$mean
))
```

x
1.064853
1.722692
7.714315
0.848095
2.572287
4.873378