Assignment 2

Biomedical Data Science (MATH11174), 22/23, Semester 2

April 6, 2023

```
library(npreg)
```

```
Package 'npreg' version 1.1.0
Type 'citation("npreg")' to cite this package.
```

```
library(Pareto)
suppressMessages(library(tidyverse))
library(readxl)
library(gridExtra)
```

```
Attaching package: 'gridExtra'
```

```
The following object is masked from 'package:dplyr':

    combine
```

```
library(VGAM)
```

```
Loading required package: stats4
```

```
Loading required package: splines
```

```
# Structure of the FWI System
#DSR : Daily Severity Rating
#FWI : Fire Weather Index
#BUI : Buildup Index
#ISI : Initial Spread Index
#FFMC : Fine FUel Moisture Code
```

```r
#DMC : Duff Moisture Code
#DC : Drought Code
setwd("C:/Users/Johnny Lee/Documents/GitHub")
# setwd("A:/GitHub")
load("./BLAST/application/wildfire_prep.Rdata") #loading covariate-dependent thresholds
```

```r
psi <- 30
u <- quantile(Y, 0.975)
y <- Y[which(Y>u)]
fwi.scaled <- fwi.origin[which(Y>u),c(1:7)]
range01 <- function(x){(x-min(x))/(max(x)-min(x))}
fwi.scaled <- as.data.frame(sapply(fwi.scaled, FUN = range01))
n <- dim(fwi.scaled)[[1]]
p <- dim(fwi.scaled)[[2]]
fwi.df <- data.frame(fwi.scaled, BA=y)
```

```r
vgam.fit.scale <- vgam(BA ~ s(DSR) + s(FWI) + s(BUI) + s(ISI) + s(FFMC) + s(DMC) + s(DC),
                        data = fwi.df,
                        family = gpd(threshold = u,
                                     lshape="loglink",
                                     zero = NULL),
                        trace = TRUE,
                        control = vgam.control(maxit = 200))
```

```
Warning in s.vam(x, z, wz, tfit$smomat, which, tfit$smooth.frame, bf.maxit, :
's.vam()' convergence not obtained in 30 iterations

Warning in checkwz(wz, M = M, trace = trace, wzepsilon = control$wzepsilon): 1
diagonal elements of the working weights variable 'wz' have been replaced by
1.819e-12

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Warning in s.vam(x, z, wz, tfit$smomat, which, tfit$smooth.frame, bf.maxit, :
's.vam()' convergence not obtained in 30 iterations
```
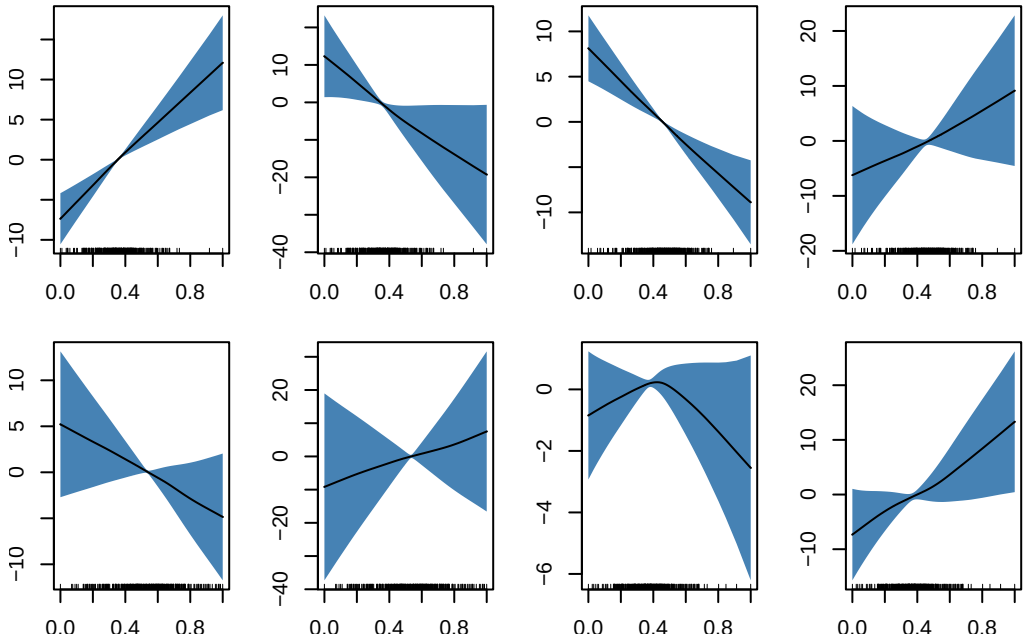
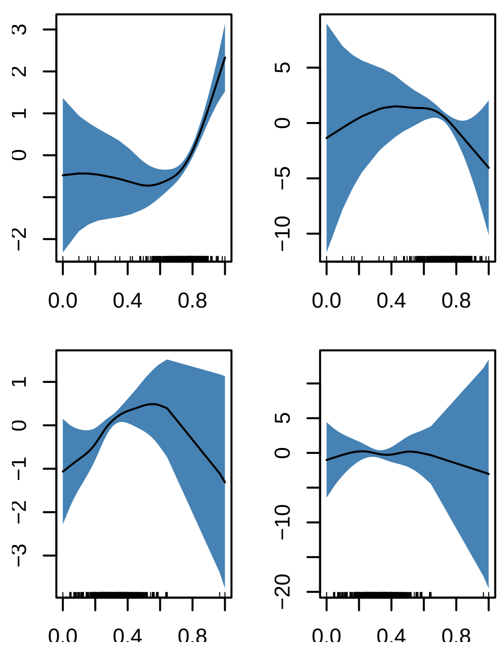

```
Warning in vgam.fit(x = x, y = y, w = w, mf = mf, Xm2 = Xm2, Ym2 = Ym2, :
convergence not obtained in 200 IRLS iterations
```

```
par(mfrow = c(2, 4), mar=c(1.75,1.75,1.75,1.75))
plot(vgam.fit.scale, se = TRUE, shade = TRUE, shcol = "steelblue")
```




```
par(mfrow = c(1, 1))
```




```
vgam.fit.1 <- vgam(BA ~ s(DSR) + s(FWI) + s(BUI) + s(ISI) + s(FFMC) + s(DMC) + s(DC),
                    data = fwi.df,
                    family = gpd(threshold = u,
                                 lshape="loglink",
                                 zero = 1),
                    trace = TRUE,
                    control = vgam.control(maxit = 200))
```

```
Warning in s.vam(x, z, wz, tfit$smomat, which, tfit$smooth.frame, bf.maxit, :
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's.vam()' convergence not obtained in 30 iterations
```
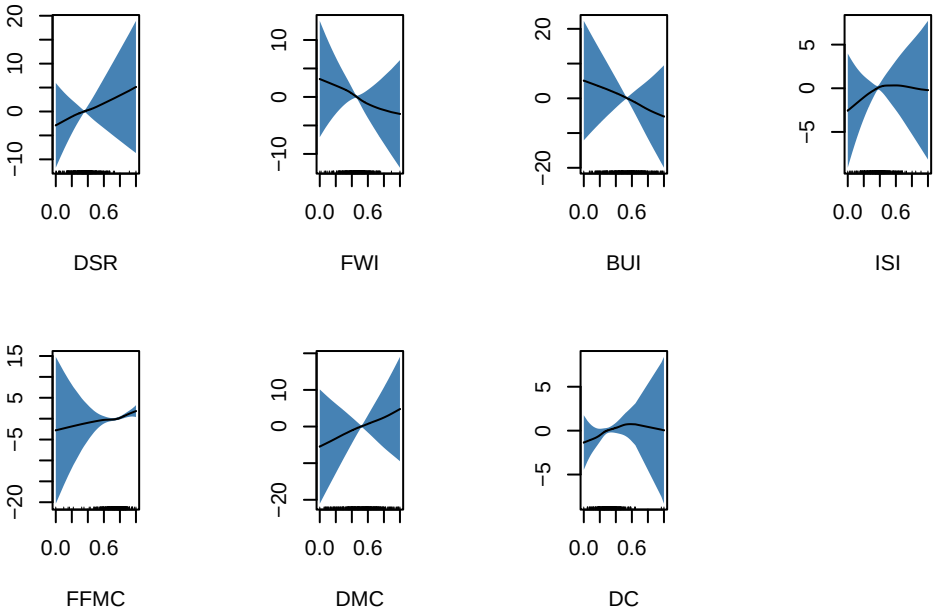

```
par(mfrow = c(2,4), mar=c(4,3,3,4))
plot(vgam.fit.1, se = TRUE, shade = TRUE, shcol = "steelblue")
par(mfrow = c(1, 1))
```


−10 0 10 20
0.0 0.6
DSR
−10 0 10
0.0 0.6
FWI
−20 0 20
0.0 0.6
BUI
−5 0 5
0.0 0.6
ISI
−20 −5 5 15
0.0 0.6
FFMC
−20 0 10
0.0 0.6
DMC
−5 0 5
0.0 0.6
DC