

Computer Lab 4

We will now perform 2D smoothing with tensor product P-splines, using the function `psp2dG()`. This function is provided in the attached file 'Pspline2Dfitter.R' (which also contains various support functions). You can either source this file or cut and paste this file and drop it into your R session.

[You can also find this function, as well as others, at www.stat.lsu.edu/faculty/marx.]

In this assignment, we will first fit 2D surfaces to normal responses (NY air quality), fitting ozone as a function of wind speed and temperature.

Sample script:

```
# Cautionary note: If you cut and paste from pdf, sometimes quotations `` are corrupted. Better
to use example script R file that is provided: computer_lab4.R

# Note you need to attach the air data (as in Lab 2) [from proper directory].

# Note: you also need the library(splines)

Data=read.table("air.txt", header=T)
attach(Data)
library(splines)
psp2dG(cbind(wind, temperature, ozone),
Pars= rbind(c(1,21,10, 3,1,2), c(55,98,10,3,1,2)),
family="Gaussian", x.lab="Wind", y.lab="Temp", z.lab="Ozone", se=F)
# Input:
#   Data: 3 columns, giving x, y, z
#   Pars: 2 rows with P-spline parameters: [min max nseg deg lambda pdeg]
#   Note: tuning parameters are 5th entry
```

Additionally we will fit 2D surfaces to 0/1 binomial responses (Kyphosis), fitting presence/absence to age and start position of surgery.

```
#Note you need to load("Kyphosis.Rdata") in session and also load library(splines). An example
fit function R file is also provided in: computer_lab4.R
KKyphosis=as.numeric(Kyphosis)-1
#creates a 0/1 response

psp2dG(Data=cbind( Start, Age, KKyphosis),
Pars= rbind( c(0,19,10,3,.1,2), c(0,207,10, 3,.1,2)),
x.lab="Start", y.lab="Age", z.lab="Kyphosis", family="binomial", se=F)

# Note Input:
#   Data: 3 columns, giving x, y, z
#   Pars: 2 rows with P-spline parameters: [min max nseg deg lambda pdeg]
#   Thus tuning parameters are 5th entry.
```

1. For each data set, find reasonable values for the two tuning parameters. For the air data (normal), try to minimize CV (provided in output list). For the kyphosis (binomial), try to minimize AIC (provided on output list). [Note that 'family' can be be "gaussian", "binomial", or "poisson"]
2. For the ozone (normal) data, fit a univariate P-spline smooth for ozone with temperature. For the kyphosis (binomial) data, fit a univariate P-spline smooth for kyphosis with start position. See if these smooth relationships are reflected in the optimal 2D smooth functions.