

Computer Lab 1: IRLS

For independent Poisson sampling with response $Y_i \sim P(\mu_i), i = 1, 2, \dots, n$, a log-linear model with $\log(\mu_i) = x_i\beta$ is used to fit the data, where β is a $p \times 1$ parameter. Write a Splus or R program to carry out the computation.

[code:]

```
poissonGlm=function(x,y,b0.start)
{
  k=1
  b0=matrix(b0.start,ncol=1)
  W=matrix(0,nrow(x),nrow(x))
  repeat
  {
    eta=x%*%b0
    u=exp(eta)
    wi=u
    diag(W)=wi
    zi=eta+(y-u)/u
    b1=solve(t(x) %*% W %*% x) %*% t(x) %*% W %*% zi
    if (sqrt(sum((b1-b0)^2))<0.001) break;
    k=k+1
    b0=b1
  }
  result=list(W=W,coefficients=b1,iteration=k)
  return(result)
}
x=matrix(rnorm(16),4,4)
y=matrix(rpois(4,5),4,1)
poissonGlm(x,y,b0.start=c(0,0,0,0))

glm(y~1+x,family=poisson)  ### Splus (R) function
```

Note:

“solve” can be replaced by “ginverse” in Splus and “ginv” in R by loading “MASS” library.