# Stepwise Correction

*Jeffrey Uslan*

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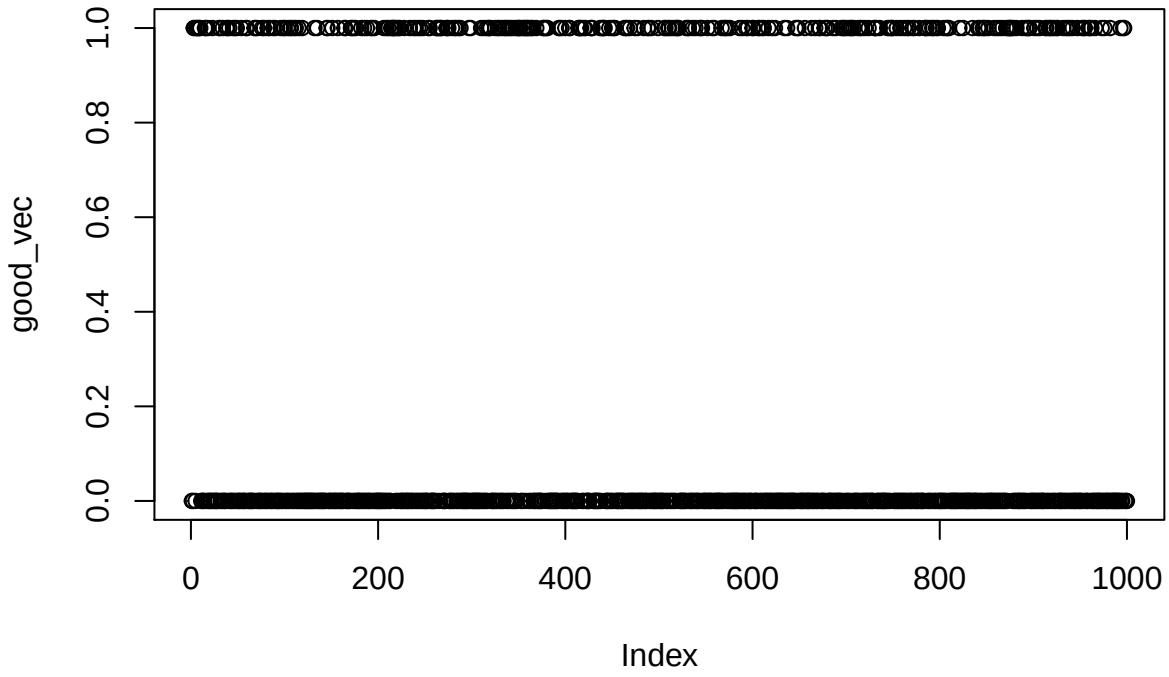
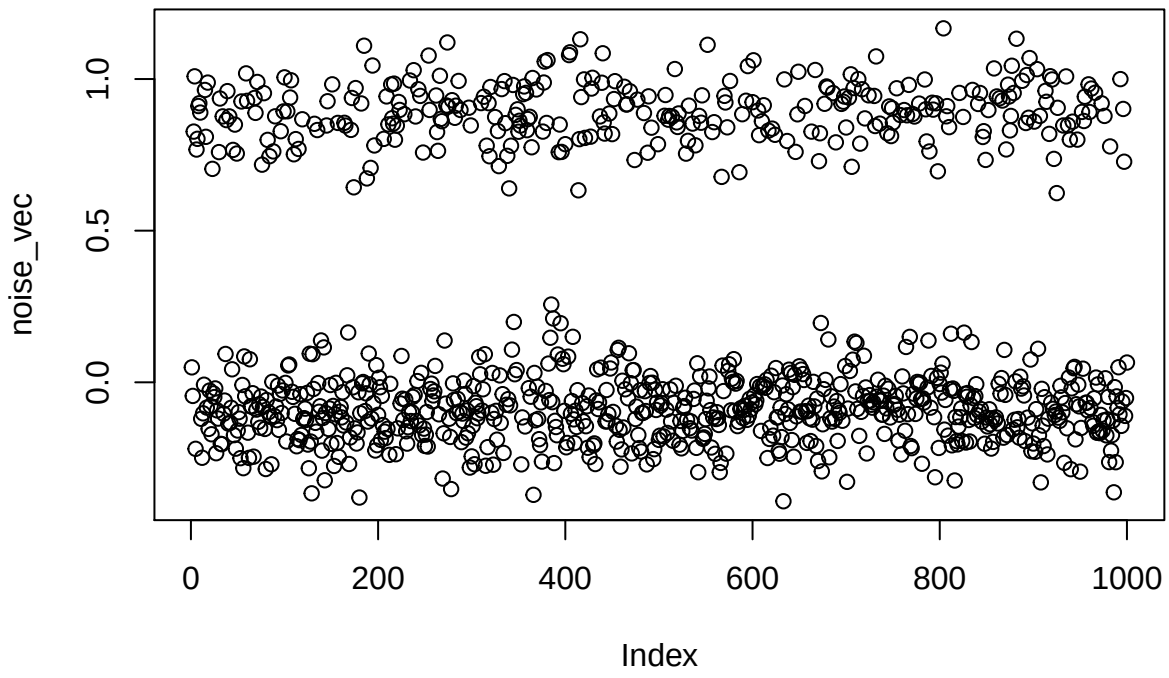
## Fabricate some on-off data

```
len=1000
good_vec=round(runif(len,max=.75))
plot(good_vec)
```



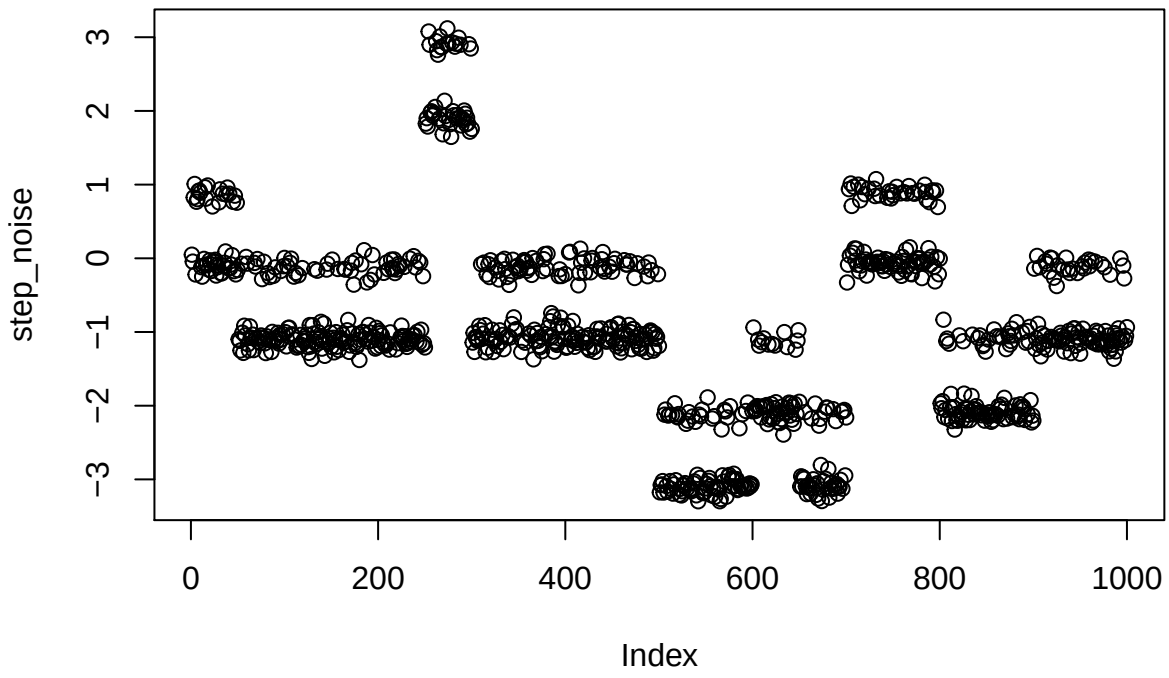

## Give it noise

```
noise=rnorm(len,-.1,.1)
noise_vec=good_vec+noise
plot(noise_vec)
```



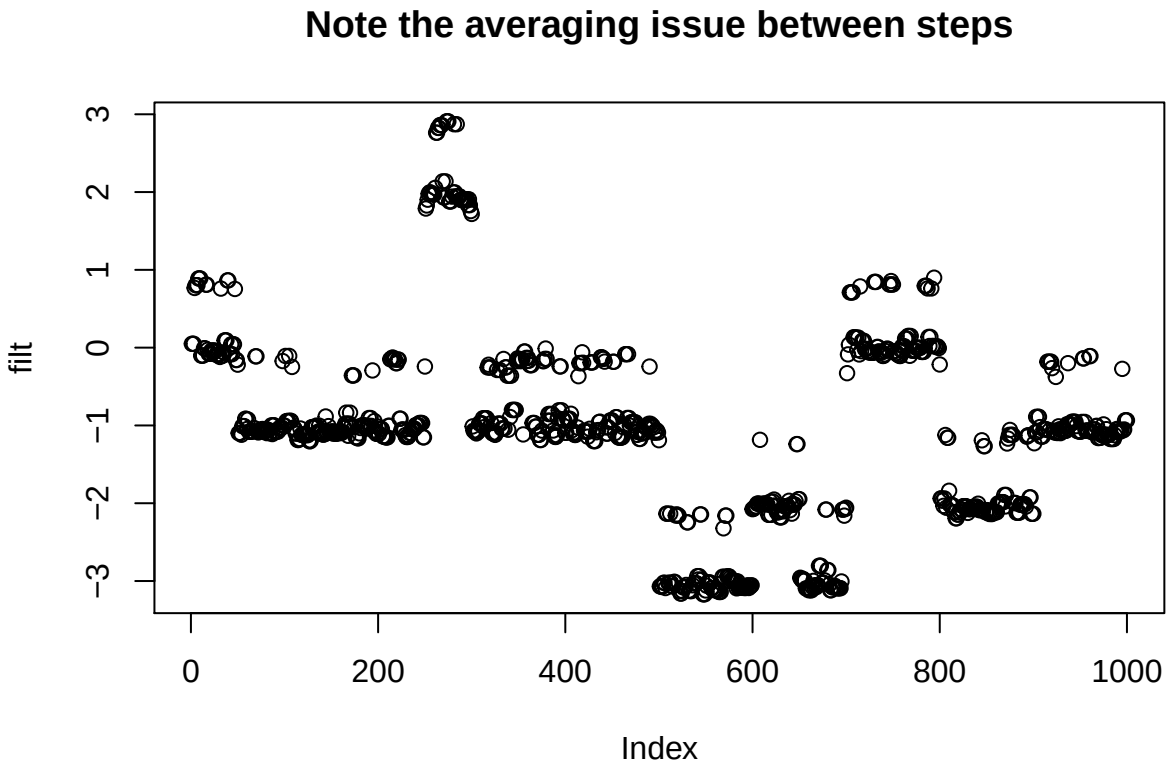

## Introduce some "step noise"

```
steps=round(rnorm(20,-1,1))
t=sapply(steps,function(x) x*rep(1,50))
steps_10=NULL
for(i in 1:ncol(t)) steps_10=c(steps_10,t[,i])
step_noise=noise_vec+steps_10
plot(step_noise)
```

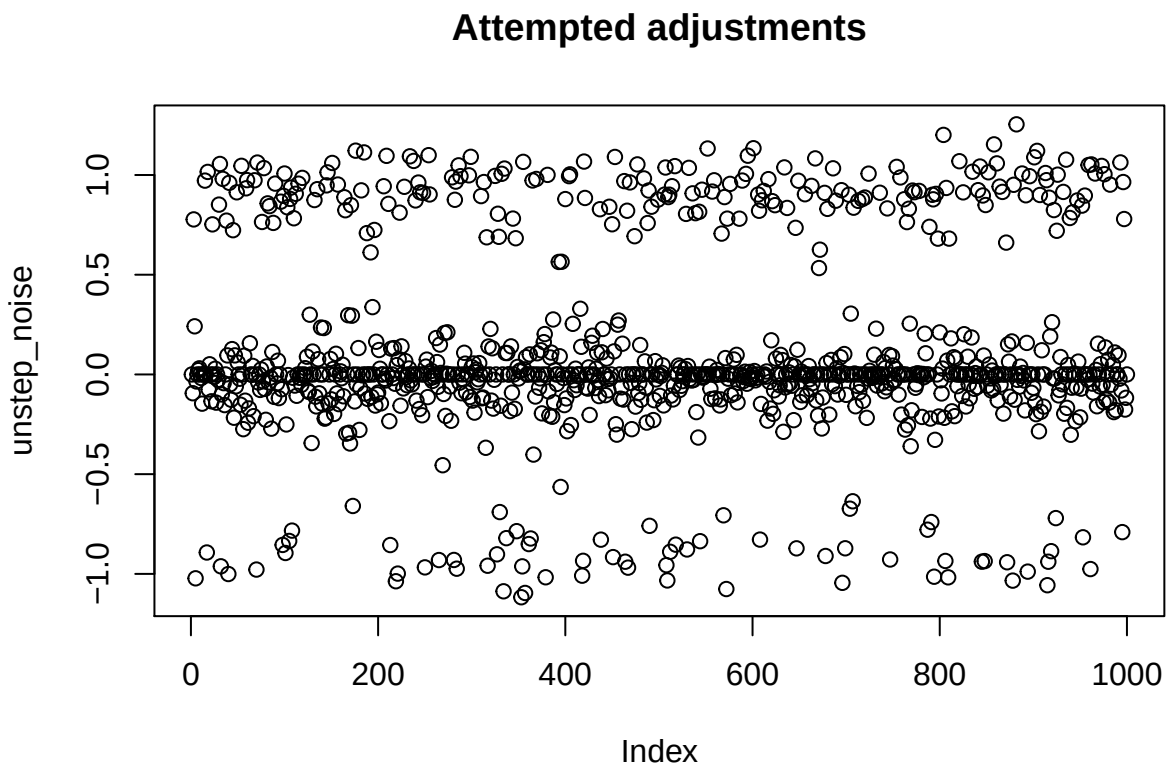



## Try to fix using moving median

```
filter_window=5
filt=runmed((step_noise),filter_window)

plot(filt)
title("Note the averaging issue between steps")
```

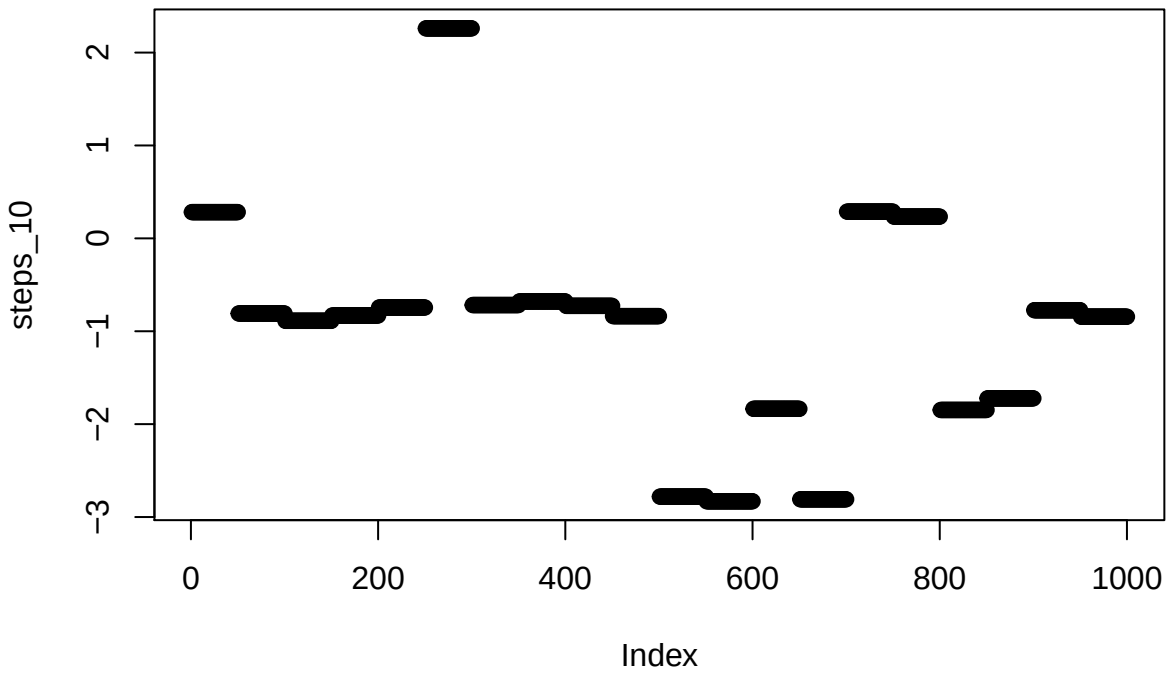



```
unstep_noise=step_noise-filt
plot(unstep_noise,type="p")
title("Attempted adjustments")
```

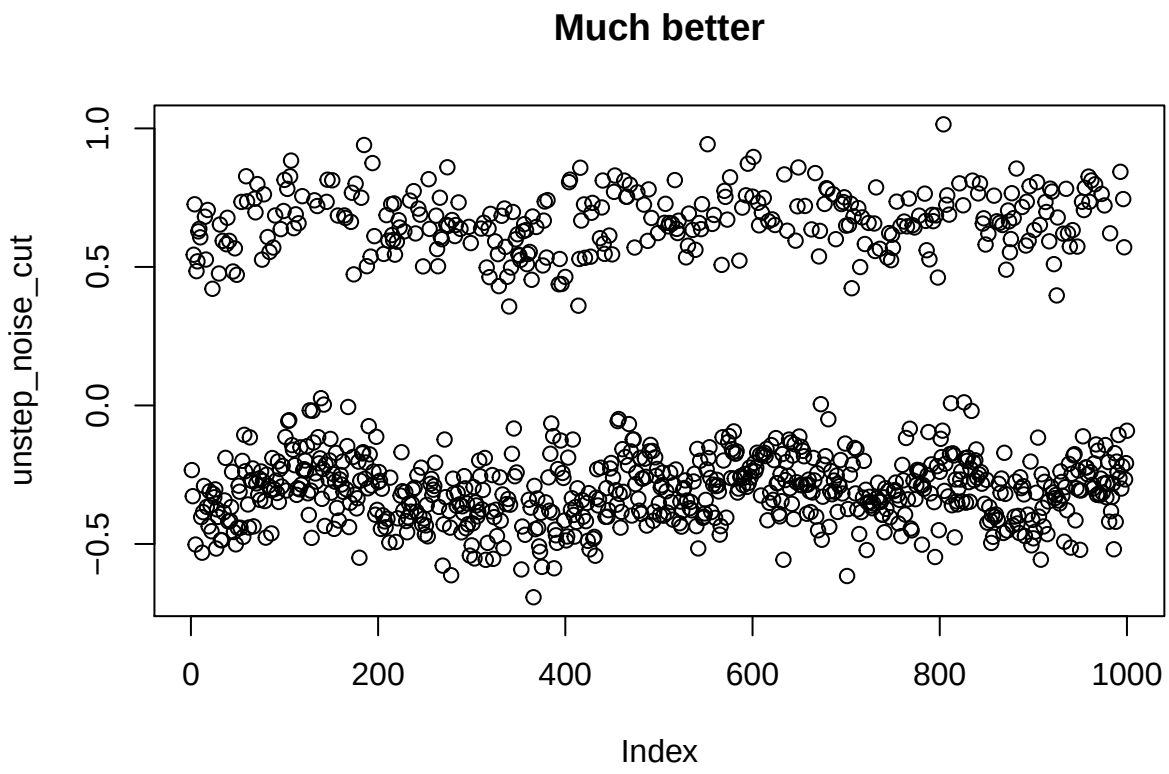



## Fit a step function fit

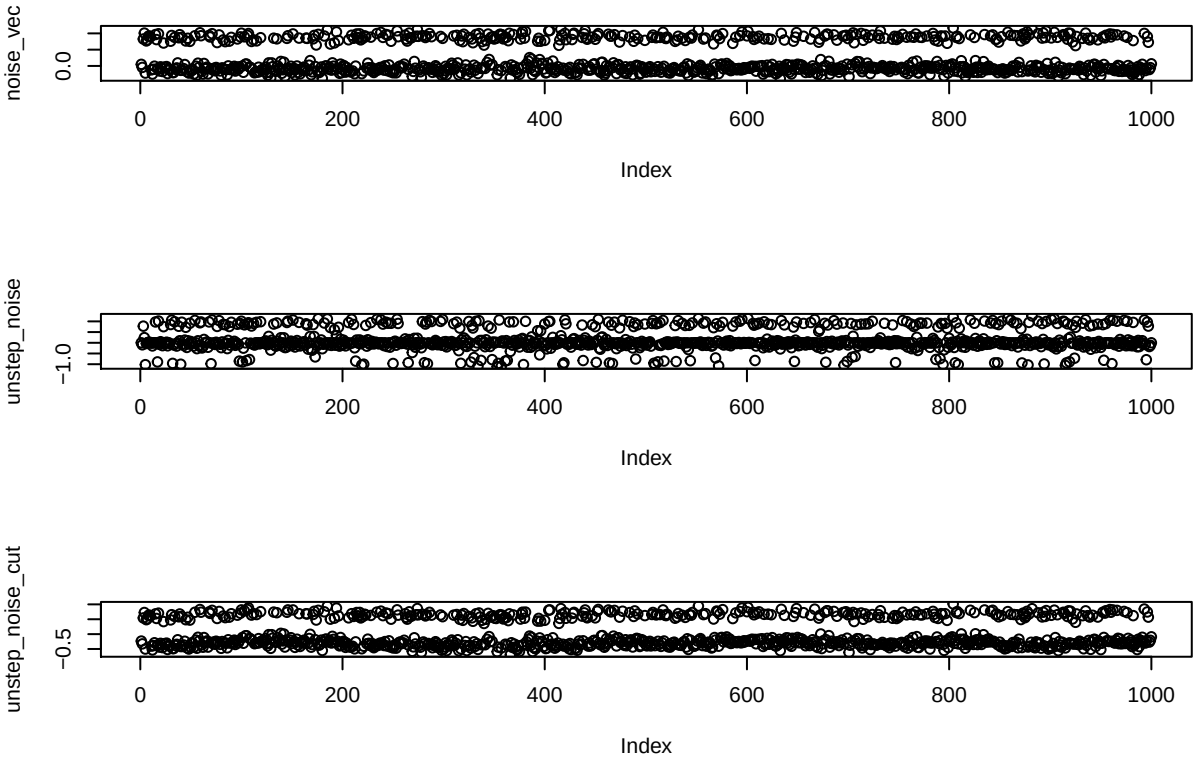
```
df=data.frame(x=1:len,y=step_noise)
fit=lm(df$y~0+cut(df$x,20))

step_fit=as.vector((coef(summary(fit))[,1]))
t=sapply(step_fit,function(x) x*rep(1,50))
steps_10=NULL
for(i in 1:ncol(t)) steps_10=c(steps_10,t[,i])
plot(steps_10)
```




```
unstep_noise_cut=step_noise-steps_10
plot(unstep_noise_cut)
title("Much better")
```




```
par(mfrow=c(3,1))
plot(noise_vec)
plot(unstep_noise,type="p")
plot(unstep_noise_cut)
```


noise_vec
0.0
0
200
400
600
800
1000
Index
unstep_noise
−1.0
0
200
400
600
800
1000
Index
unstep_noise_cut
−0.5
0
200
400
600
800
1000
Index