RNA-Seq Fault detection

If gene i is on which, sequencing depth has uniform distribution U(2,3.75) based on Nooshin’s paper.

I set mu to small number .01, has normal distribution ~N (0, .05), is a positive number from normal distribution with mean 0 and variance 3.

Perturbation noise has Bernoulli distribution with p equals to .05.

Yi ~Poisson ()

Regarding our last conversation, I need to check the whiteness of the

Residual error = Y[k] – E[Y[k] | Y[k-1],…,Y[1]] after change occurs in the system. In this case the length of a window needed to be larger (300 points instead of 100 points) than the Gaussian noise case and I estimate correlation for each window with 20 lags.

In Gaussian noise case I use chi-square test with 10 (lags) degree of freedom as a threshold however for RNA-seq this assumption dose not work so, by trial and error I set a threshold to 4.

Fig 1, dna\_dsb changes from 0 to 1 at point 1203, the residual error is not white any more in the interval [1000,1300].



Fig 2, dna\_dsb changes from 0 to 1 at point 1533, the residual error is not white any more in the interval [1300,1600].



Fig 3, dna\_dsb changes from 0 to 1 at point 2000, the residual error is not white any more in the interval [1880,2180].



Fig 4, ATM stuck at 1, after point 2000. The system detects this change in the interval [1770,2070].



Fig 5, ATM stuck at 0, after point 900. The system detects this change in the interval [900,1200].



Fig 6, P53 stuck at 1, after point 900. The system detects this change in the interval [690,990].



Fig 7, P53 stuck at 0, after point 900. The system detects this change in the interval [9001200].



Fig 8, WIP1 stuck at 1, after point 1550. The system detects this change in the interval [1470,1770].



Fig 9, WIP1 stuck at 0, after point 1550. The system detects this change in the interval [1310,1610].



Fig10, MDM2 stuck at 1, after point 1780. The system detects this change in the interval [1640,1940].



Fig11, MDM2 stuck at 0, after point 1780. The system detects this change in the interval [1600,1900].

