BCC Complexity Report

BCC algorithm analysis with graph

```
library(basicTrendline)
library(spatialEco)

data=read.csv("./biconnectivity_tests/output.csv",sep="\t")

par(mfrow=c(2,2))
trendline(data$vertex,data$edge,model='line3P',
          main="F1 Polynomial y=a*x^2+b*x+c",
          xlab="vertex",ylab="edge",pch=20)
```

```
##
## Call:
## lm(formula = y ~ I(x^2) + x)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -10584.14   -618.72     18.13     85.84  18639.86
##
## Coefficients:
##                Estimate  Std. Error t value Pr(>|t|)
## (Intercept) -1.4774e+02  1.1140e+03 -0.1326   0.8949
## I(x^2)       6.0184e-03  7.2448e-03  0.8307   0.4094
## x            7.2951e+00  7.6182e+00  0.9576   0.3421
##
## Residual standard error: 5276.1 on 60 degrees of freedom
## Multiple R-squared:  0.44282,    Adjusted R-squared:  0.42425
## F-statistic: 23.843 on 2 and 60 DF,  p-value: 2.3975e-08
##
##
## N: 63 , AIC: 1263.7 , BIC:  1272.2
## Residual Sum of Squares:  1670233187
```

```
trendline(data$vertex+data$edge,data$time,model='line2P',
          main="F2 Linear y=a*x+b",
          xlab="vertex+edge",ylab="time",pch=20)
```

```
##
## Call:
## lm(formula = y ~ x)
##
## Residuals:
##         Min          1Q      Median          3Q         Max
## -0.00866584 -0.00037092  0.00052356  0.00073184  0.02112323
##
## Coefficients:
##                Estimate  Std. Error t value Pr(>|t|)
## (Intercept) -7.6773e-04  4.8999e-04 -1.5668   0.1223
## x            1.5755e-06  6.1841e-08 25.4763   <2e-16 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0034983 on 61 degrees of freedom
## Multiple R-squared:  0.91409,    Adjusted R-squared:  0.91268
## F-statistic: 649.04 on 1 and 61 DF,  p-value: < 2.22e-16
##
##
## N: 63 , AIC: -529.84 , BIC:  -523.41
## Residual Sum of Squares:  0.00074651
```

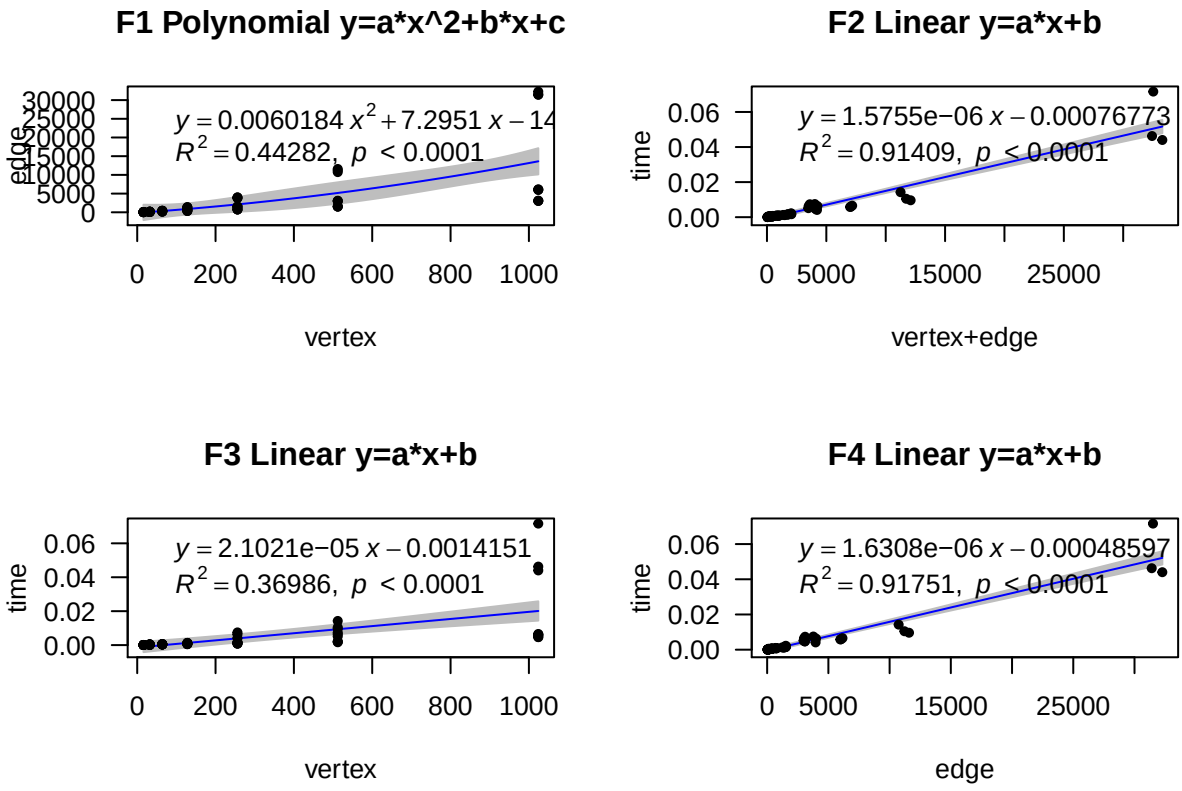
```
trendline(data$vertex,data$time,model='line2P',
          main="F3 Linear y=a*x+b",
          xlab="vertex",ylab="time",pch=20)
```

```
##
## Call:
## lm(formula = y ~ x)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0154190 -0.0023446  0.0004601  0.0011342  0.0515020
##
## Coefficients:
##               Estimate  Std. Error t value  Pr(>|t|)
## (Intercept) -1.4151e-03  1.5700e-03 -0.9014    0.3709
## x            2.1020e-05  3.5130e-06  5.9836 1.245e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0094743 on 61 degrees of freedom
## Multiple R-squared:  0.36986,    Adjusted R-squared:  0.35953
## F-statistic: 35.804 on 1 and 61 DF,  p-value: 1.2453e-07
##
##
## N: 63 , AIC: -404.3 , BIC:  -397.87
## Residual Sum of Squares:  0.0054755
```

```
trendline(data$edge,data$time,model='line2P',
          main="F4 Linear y=a*x+b",
          xlab="edge",ylab="time",pch=20)
```

```
##
## Call:
## lm(formula = y ~ x)
##
## Residuals:
##         Min          1Q      Median          3Q         Max
## -0.00878234 -0.00015908  0.00037655  0.00049826  0.02071056
##
## Coefficients:
##               Estimate  Std. Error t value Pr(>|t|)
## (Intercept) -4.8597e-04  4.7534e-04 -1.0224   0.3107
## x            1.6308e-06  6.2609e-08 26.0479   <2e-16 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0034279 on 61 degrees of freedom
## Multiple R-squared:  0.91751,    Adjusted R-squared:  0.91616
## F-statistic: 678.49 on 1 and 61 DF,  p-value: < 2.22e-16
##
##
## N: 63 , AIC: -532.4 , BIC:  -525.97
## Residual Sum of Squares:  0.00071678
```




```
summary(data$vertex)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    16.0    32.0   128.0   290.3   512.0  1024.0
```

```
summary(data$edge)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    30.0   156.5   714.0  3171.9  3026.5 32273.0
```

```
summary(data$vertex+data$edge)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    46.0   189.5   842.0  3462.2  3563.5 33297.0
```