Untitled

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27 November 2015

```r
##Uploading the data set
d<-read.csv(file = "/Users/Nitij singh/Documents/gdpcoun.csv")
##########################
#Descriptive Statistics########
##########################
#Creating separate table for developed countries
d1<-subset(d,d$D.E.De == 1)
#View the new table
View(d1)
# Dropping the variable country name
d1$X<-NULL
# Dropping the variable years
d1$X.1<-NULL
#Summary Statisitc of Developed Countries
summary(d1)
```

```
##       D.E.De     GDP.Growth         Lab.Qual          Lab.Quant
##  Min.   :1   Min.   :-8.631   Min.   :-1.2487   Min.   :-9.9211
##  1st Qu.:1   1st Qu.: 1.528   1st Qu.: 0.1684   1st Qu.:-0.1009
##  Median :1   Median : 2.582   Median : 0.3080   Median : 0.9513
##  Mean   :1   Mean   : 2.307   Mean   : 0.3683   Mean   : 0.8325
##  3rd Qu.:1   3rd Qu.: 3.700   3rd Qu.: 0.5316   3rd Qu.: 1.9577
##  Max.   :1   Max.   :10.234   Max.   : 1.6147   Max.   : 5.6898
##   ICT.Capital      NICT.Capital     Cl.Quality         Cl.Quant
##  Min.   : 0.5678   Min.   :-2.459   Min.   :-0.8349   Min.   :-6.26626
##  1st Qu.: 7.9922   1st Qu.: 1.482   1st Qu.: 0.1181   1st Qu.:-0.06874
##  Median :11.3690   Median : 2.182   Median : 0.1900   Median : 0.60905
##  Mean   :11.1155   Mean   : 2.324   Mean   : 0.2296   Mean   : 0.49789
##  3rd Qu.:14.0709   3rd Qu.: 2.880   3rd Qu.: 0.3420   3rd Qu.: 1.24928
##  Max.   :24.4539   Max.   : 7.957   Max.   : 1.0359   Max.   : 3.20281
##    ContriICT        ContriNICT
##  Min.   :0.02453   Min.   :-0.7256
##  1st Qu.:0.33692   1st Qu.: 0.4360
##  Median :0.52180   Median : 0.6500
##  Mean   :0.54836   Mean   : 0.7778
##  3rd Qu.:0.73754   3rd Qu.: 0.9742
##  Max.   :1.32499   Max.   : 3.0919
##  Export.of.goods.and.services....of.GDP.
##  Min.   : 9.038
##  1st Qu.:25.354
##  Median :36.226
##  Mean   :36.643
##  3rd Qu.:44.418
##  Max.   :96.588
```

```r
#Creating separate table for emerging countries
d2<-subset(d,d$D.E.De == 2)
#Viewing the new table
View(d2)
#Dropping the variable country name
d2$X<-NULL
#Dropping the variable years
d2$X.1<-NULL
##Summary statisitc of Emerging Countries
summary(d2)
```

```
##      D.E.De    GDP.Growth        Lab.Qual         Lab.Quant
##  Min.   :2   Min.   :-11.426   Min.   :-2.7864   Min.   :-11.910
##  1st Qu.:2   1st Qu.:  1.793   1st Qu.: 0.2281   1st Qu.: -0.443
##  Median :2   Median :  3.931   Median : 0.4248   Median :  1.358
##  Mean   :2   Mean   :  3.354   Mean   : 0.4584   Mean   :  1.228
##  3rd Qu.:2   3rd Qu.:  5.565   3rd Qu.: 0.6386   3rd Qu.:  2.850
##  Max.   :2   Max.   : 10.148   Max.   : 4.4470   Max.   : 16.589
##   ICT.Capital      NICT.Capital      Cl.Quality         Cl.Quant
##  Min.   : 0.09741   Min.   :-1.790   Min.   :-2.05119   Min.   :-4.8904
##  1st Qu.:11.57976   1st Qu.: 2.280   1st Qu.: 0.08582   1st Qu.:-0.2250
##  Median :16.62387   Median : 3.639   Median : 0.21221   Median : 0.6730
##  Mean   :17.02244   Mean   : 4.000   Mean   : 0.24183   Mean   : 0.5562
##  3rd Qu.:22.23989   3rd Qu.: 5.259   3rd Qu.: 0.33372   3rd Qu.: 1.3740
##  Max.   :40.35037   Max.   :13.969   Max.   : 3.21971   Max.   : 5.5855
##    ContriICT         ContriNICT
##  Min.   :-0.003895   Min.   :-1.0760
##  1st Qu.: 0.404869   1st Qu.: 0.9215
##  Median : 0.613752   Median : 1.5248
##  Mean   : 0.722123   Mean   : 1.6892
##  3rd Qu.: 0.924292   3rd Qu.: 2.2489
##  Max.   : 2.561978   Max.   : 5.0004
##  Export.of.goods.and.services....of.GDP.
##  Min.   :  6.706
##  1st Qu.: 23.967
##  Median : 33.846
##  Mean   : 40.620
##  3rd Qu.: 53.078
##  Max.   :121.312
```

```r
#Creating separate table for developing countries
d3<-subset(d,d$D.E.De == 3)
#Dropping the variables country name
d3$X<-NULL
#Dropping the variable year
d3$X.1<-NULL
#Summary statistics of Developing countries
summary(d3)
```

```
##      D.E.De    GDP.Growth        Lab.Qual         Lab.Quant
##  Min.   :3   Min.   :-14.072   Min.   :-0.1247   Min.   :-17.487
##  1st Qu.:3   1st Qu.:  3.300   1st Qu.: 0.1505   1st Qu.:  1.522
##  Median :3   Median :  4.802   Median : 0.2866   Median :  2.715
```

```
## Mean   :3     Mean   : 4.872   Mean   : 0.2603   Mean   : 2.788
## 3rd Qu.:3    3rd Qu.: 6.137   3rd Qu.: 0.3435   3rd Qu.: 3.907
## Max.   :3     Max.   :19.349   Max.   : 0.7314   Max.   :20.593
##   ICT.Capital     NICT.Capital      Cl.Quality        Cl.Quant
## Min.   :-0.4625  Min.   :-0.4561  Min.   :-0.06235  Min.   :-9.3315
## 1st Qu.:11.2184  1st Qu.: 2.4931  1st Qu.: 0.06817  1st Qu.: 0.7133
## Median :15.5674  Median : 3.4708  Median : 0.14361  Median : 1.2593
## Mean   :17.1562  Mean   : 4.3258  Mean   : 0.12141  Mean   : 1.3639
## 3rd Qu.:22.1123  3rd Qu.: 5.8583  3rd Qu.: 0.16369  3rd Qu.: 1.9813
## Max.   :43.7080  Max.   :11.2052  Max.   : 0.30076  Max.   :10.9890
##    ContriICT        ContriNICT
## Min.   :-0.01064  Min.   :-0.2892
## 1st Qu.: 0.34028  1st Qu.: 1.1429
## Median : 0.58623  Median : 1.6457
## Mean   : 0.77307  Mean   : 2.0708
## 3rd Qu.: 0.89637  3rd Qu.: 2.8490
## Max.   : 8.38740  Max.   : 6.3529
## Export.of.goods.and.services....of.GDP.
## Min.   : 9.707
## 1st Qu.:19.875
## Median :26.441
## Mean   :28.232
## 3rd Qu.:35.669
## Max.   :56.506
```

```r
#############################
####### Modelling###########
#Installing plm package
# Loading the pannel data package in the memory
library(plm)
```

```
## Loading required package: Formula
```

```r
# Loading the formula package in the memory
library(Formula)
################################################################################
##### Evaluating impact of ICT on GDP growth in developed countries#######
################################################################################
# Attaching data set for developed countries
d4<-subset(d,d$D.E.De == 1)
attach(d4)
d4$X<-NULL
# Defining dependent and indenpendt variable
Y <- cbind(d4$GDP.Growth)
X <- cbind(d4$ContriICT, d4$ContriNICT)
# Descriptive statistics
summary(Y)
```

```
##        V1
## Min.   :-8.631
## 1st Qu.: 1.528
## Median : 2.582
## Mean   : 2.307
```

```
## 3rd Qu.: 3.700
## Max.   :10.234
```

```
summary(X)
```

```
##       V1                V2
## Min.   :0.02453   Min.   :-0.7256
## 1st Qu.:0.33692   1st Qu.: 0.4360
## Median :0.52180   Median : 0.6500
## Mean   :0.54836   Mean   : 0.7778
## 3rd Qu.:0.73754   3rd Qu.: 0.9742
## Max.   :1.32499   Max.   : 3.0919
```

```
# Set data as pannel data
pdata <- plm.data(d4,index=c("D.E.De", "X.1"))
```

```
## serie D.E.De  is constant and has been removed
```

```
# Pooled OLS Estimater
pooling <- plm(Y ~ X, data=pdata, model= "pooling")
```

```
## series D.E.De is constant and has been removed
```

```
summary(pooling)
```

```
## Oneway (individual) effect Pooling Model
##
## Call:
## plm(formula = Y ~ X, data = pdata, model = "pooling")
##
## Unbalanced Panel: n=16, T=19-19, N=304
##
## Residuals :
##    Min. 1st Qu.  Median 3rd Qu.    Max.
## -10.200  -0.696   0.300   1.120   4.680
##
## Coefficients :
##              Estimate Std. Error t-value  Pr(>|t|)
## (Intercept) 0.015952   0.275789  0.0578    0.9539
## X1          1.740230   0.435956  3.9918 8.246e-05 ***
## X2          1.718388   0.220382  7.7973 1.042e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    1731
## Residual Sum of Squares: 1284.2
## R-Squared      :  0.25809
##      Adj. R-Squared :  0.25554
## F-statistic: 52.3552 on 2 and 301 DF, p-value: < 2.22e-16
```

```
# Putting control variable for Export % of GDP
Y1 <- cbind(d4$GDP.Growth)
X1 <- cbind(d4$ContriICT, d4$ContriNICT, d4$Export.of.goods.and.services....of.GDP.)
# Pooled OLS Esitmater with control variable for developed countries
pool <- plm(Y1 ~ X1, data=pdata, model= "pool")
```

```
## series D.E.De is constant and has been removed
```

```
summary(pool)
```

```
## Oneway (individual) effect Pooling Model
##
## Call:
## plm(formula = Y1 ~ X1, data = pdata, model = "pool")
##
## Unbalanced Panel: n=16, T=19-19, N=304
##
## Residuals :
##    Min. 1st Qu.  Median 3rd Qu.     Max.
## -10.200  -0.656   0.322   1.140    4.330
##
## Coefficients :
##                Estimate Std. Error t-value  Pr(>|t|)
## (Intercept) -0.3149601  0.3408630 -0.9240 0.3562249
## X11          1.6511962  0.4380934  3.7691 0.0001973 ***
## X12          1.6728464  0.2215031  7.5522 5.192e-13 ***
## X13          0.0113297  0.0068949  1.6432 0.1013905
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    1731
## Residual Sum of Squares: 1272.8
## R-Squared      :  0.26471
##      Adj. R-Squared :  0.26123
## F-statistic: 36.0007 on 3 and 300 DF, p-value: < 2.22e-16
```
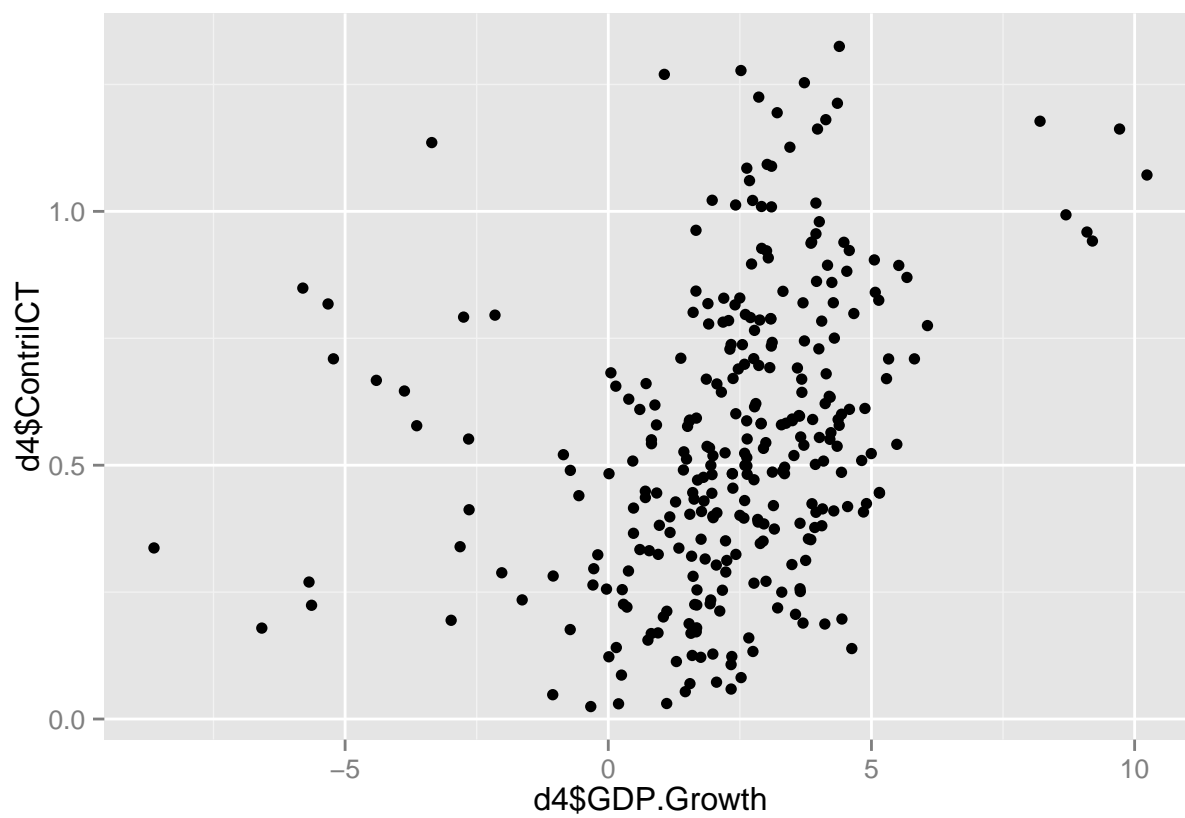
```
########## Visualization####################
#### Installing GGP Plots and GG Themes #######
library(ggplot2)
library(ggthemes)
library(plm)

qplot(d4$GDP.Growth,d4$ContriICT)
```

```
j <- ggplot(subset(d,d$D.E.De==1), aes(x = X.1, y = ContriICT))
j<-j +  geom_point()
j<-j + facet_wrap(~ X) +theme_bw()
j
```