Replicating the Three-Factor Model

##Fama-French Data

French’s data library contains data for the factors, corresponding market returns and risk free rates, as well as the portfolios returns featured in the papers:

• 3 Factors 1926.07.01 to 2018.03.29 as daily / weekly / monthly data

• 5 Factors 1963.07.01 to 2018.03.29 as daily / monthly / yearly data

• 25 Portfolios (5x5) formed on Size and Book-to-Market 1926.07 to 2018.03 corresponding to the

Fama and French (1993) 3-factor setup (P24 Table 6).

##Batch Regression

With the OLS regression code working, below code runs regression on each portfolio and saves the results in a list `results`.

```{r}

# Store summaries into a results list

results <- list()

# The first column of P25 is dates, not data

for(i in 1:(ncol(P25)-1))

{

rirf<-unlist(P25[,i+1])-rf # Data starts from the 2nd col of P25

y<-lm(rirf~rmrf+smb+hml)

results[[i]]<-summary(y)

}

```

## Formatting the Results

We then read out the results, stack them into corresponding vectors, then reshape them into the $5\times 5$ format as in the paper for ease of comparison. Results are highly similar and we have not yet identify why they do not match exactly, perhaps due to rounding errors.

```{r}

betas <- vector()

std.errors <- vector()

t.values <- vector()

R.squareds <- vector()

# save all betas

for(i in 1:(ncol(P25)-1)) {

betas <- cbind(betas,results[[i]]$coefficients[,1])

std.errors <- cbind(std.errors,results[[i]]$sigma)

t.values <- cbind(t.values, results[[i]]$coefficients[,3])

R.squareds <- cbind(R.squareds, results[[i]]$adj.r.squared)

}

# resize the output to 5x5 format like Fama French paper

resize <- function(x)

{

df = data.frame(matrix(x, nrow=5, byrow = TRUE))

colnames(df) = c("Low", "2", "3", "4", "High")

rownames(df) = c("Small", "2", "3", "4", "Big")

return(df)

}

```

Directly use this



