uRProgramming

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Madison R user Group Meeting

1. Introduction

- Teaching to myself and others R programming.
- Approach R programming to similar to the programming languages used in software engineering.
- Benefits utilizing other auxiliary tools.
- Disadvantages of not using modular programming and software development tools.

What is R

- Programming language mainly used for statistical programming
- Free to download and use
- Strong Contribution from user Community
- Relative to the other statistical programming
- Deficits, except CRAN there is no authority to verify the packages

TIOBE Index | TIOBE - The

www.tiobe.com/tiobe-index/

should be adopted when starting to build a new software system. The definition of the TIOBE index can be found here.

Mar 2017	Mar 2016	Change	Programming Language	Ratings	Change
1	1		Java	16.384%	-4.14%
2	2		C	7.742%	-6.86%
3	3		C++	5.184%	-1.54%
4	4		C#	4.409%	+0.14%
5	**5**		**Python**	**3.919%**	**-0.34%**
6	7	⌃	Visual Basic .NET	3.174%	+0.61%
7	6	⌄	PHP	3.009%	+0.24%
8	8		JavaScript	2.667%	+0.33%
9	11	⌃	Delphi/Object Pascal	2.544%	+0.54%
10	14	⌃⌃	Swift	2.268%	+0.68%
11	9	⌄	Perl	2.261%	+0.01%
12	10	⌄	Ruby	2.254%	+0.02%
13	12	⌄	Assembly language	2.232%	+0.39%
14	16	⌃	R	2.016%	+0.73%
15	13	⌄	Visual Basic	2.008%	+0.33%
16	15	⌄	Objective-C	1.997%	+0.54%
17	48	⌃⌃	Go	1.982%	+1.78%
18	18		MATLAB	1.854%	+0.66%

R Distribution

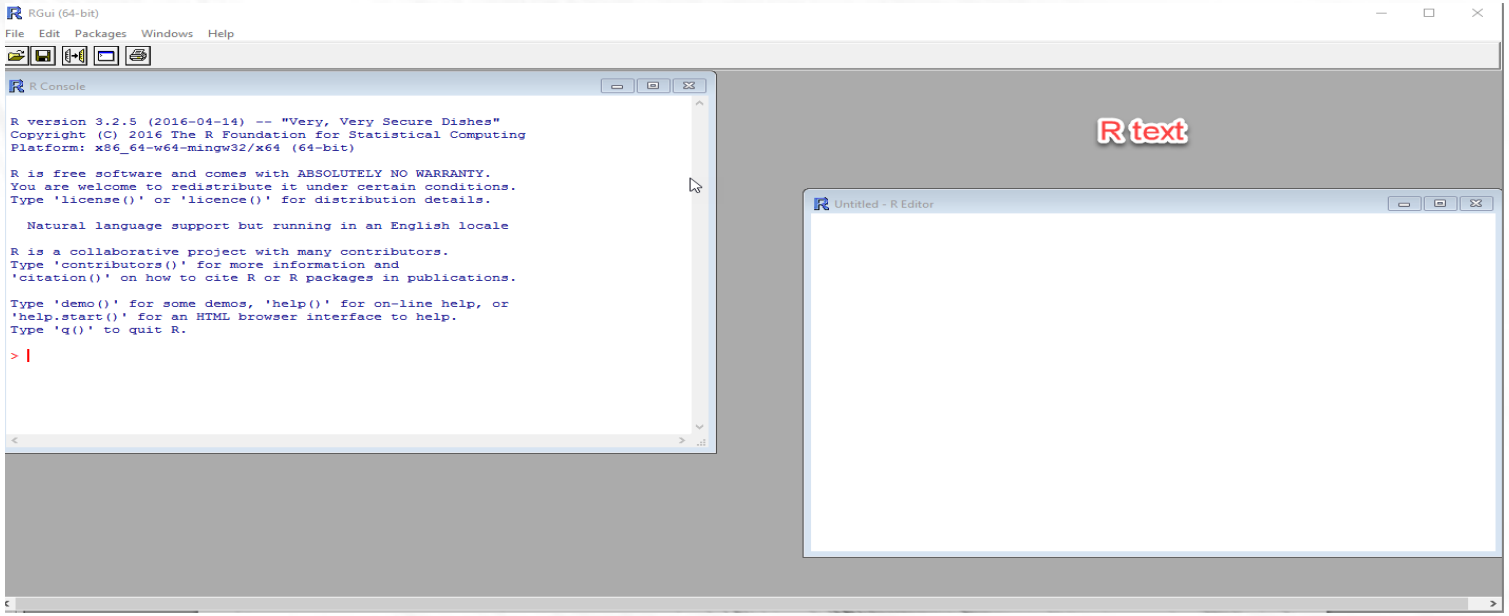
- Linux
  - Debian
  - Ubuntu
- Windows
- Mac OS

- CRAN packages (over 10,000 packages)

  https://cran.r-project.org/web/packages/

2 Environment Setup for R scripts

- Windows (once you installed R)
  - RGUI or R shell is avaliable

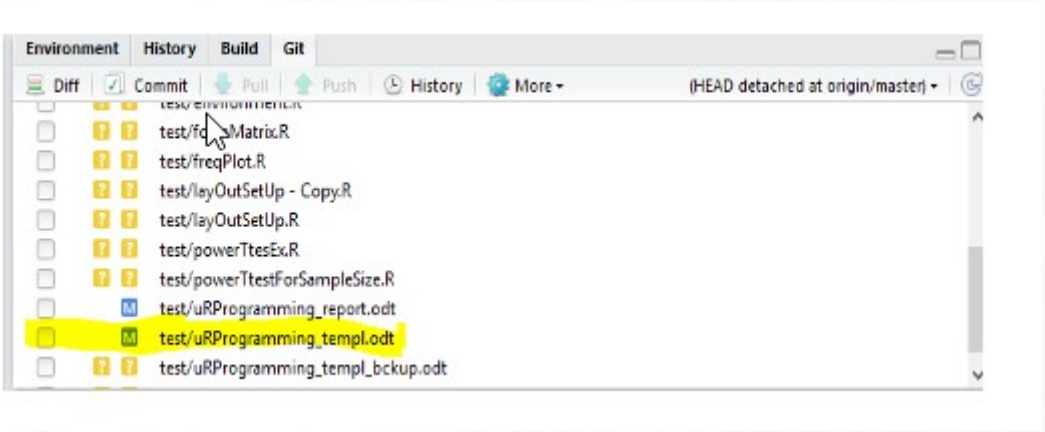


- Or use IDE like Rstudio or Microsoft R open

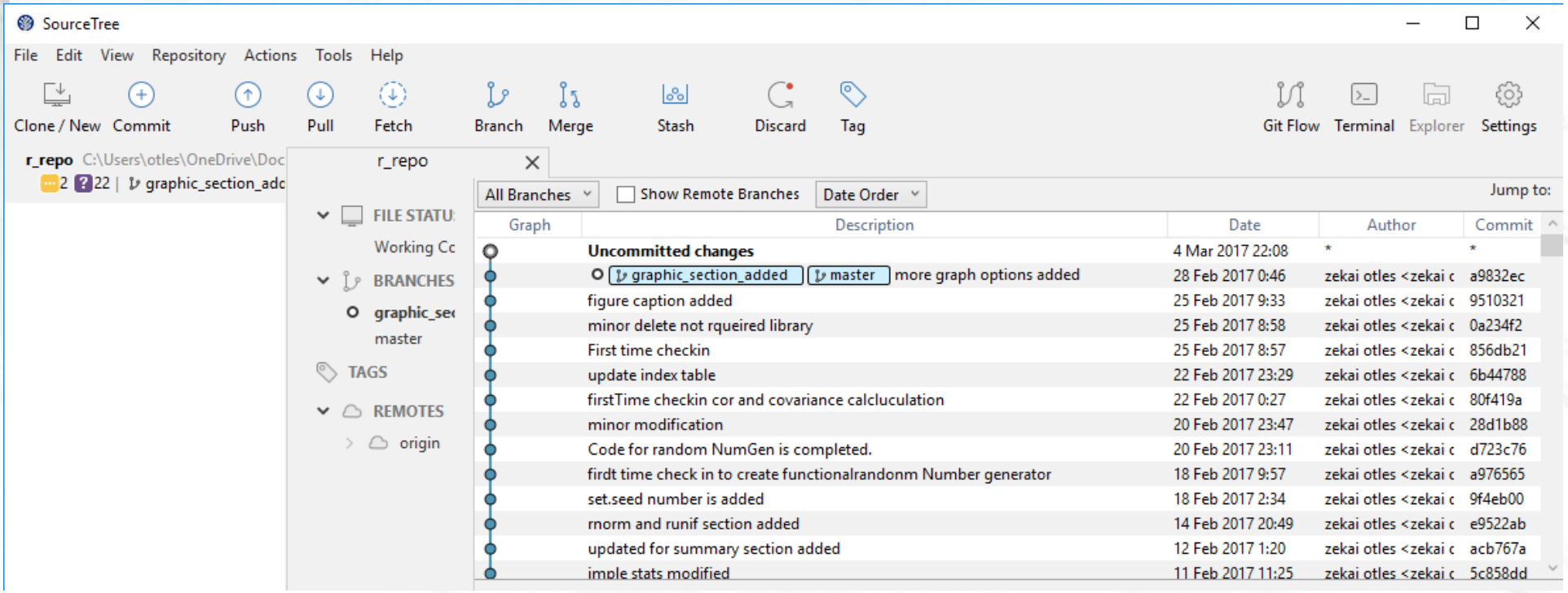
How do you maintain the scripts

- Manually create different versions
- Or use version control common practice
  - Version control such as git, svn or commercial products
  - One way is to use graphical or command line interface
- Chapter II uRProgramming

- Git plugin Rstudio (live demo from R studio)



- Source tree (live demo)



Demo version control

- Use git with Rstudio
- Checkin
- Modify
- Pull
- Push

Build R package

- Command line
- Build package from Rstudio

Modular Programming

- In general, long scripts are pretty common
- Modularize the scripts using function
- Generalize the functions, so it can be used for multiple times
- Ex. Functions

3. Data types in R

- Logical
- Character
- Integer
- Double
- Complex
- Ex:

4. Conditional Statements

- If block
- If {} else {}
- Switch (modular if block)

```
switch("iki", bir = "bir", iki = "Two", uc = "uc")
```

```
[1] "Two"
```

5. Loop structures

Reaching elements by sequence

```
for (values in sequence) {
statement
}
```

Access of certain elements by controlling

```
while(expression){
statement
}
```

6. Data Structures

- Where the data stored
  - Database file (MySQL)
  - Flat data files (csv, excel files)

Data Structures

- Data Frame
- Vector for atomic data types, such as integer
- Matrix (special two dimensional array storage)
- Array one to multi dimesional data storage
- List heteregenous data storage

7. Simple Statistical Functions

- Simple Stats
- Normal Distrubution
- Random Number Generation (seed)

8. Graphical Outputs

- Histogram
- Barplot
- Stack barplot
- Multiline xy plots

Table Output

- Table
- as.table