

WELCOME TO



PRESENTATION

Ian and Sam

Intro to R

01

R ORIGINS

- Created by [Ross Ihaka](#) and [Robert Gentleman](#) in [1993](#)
- Written primarily in [C](#)
- Inspired by the [S programming language](#), which was used for statistical analysis



R USES

- Specifically designed for **statistical analysis**
- Very good for **data visualization** and **graphing**
- Used in academic research, financial services, retail, government services and more



MULTI-PARADIGM

Functional

Functions are pure and can be treated as variables

Object Oriented

Code can be organized into objects with their own variables and functions

Imperative

Every step in the program is written explicitly

Procedural

Step by step instructions are divided into functions



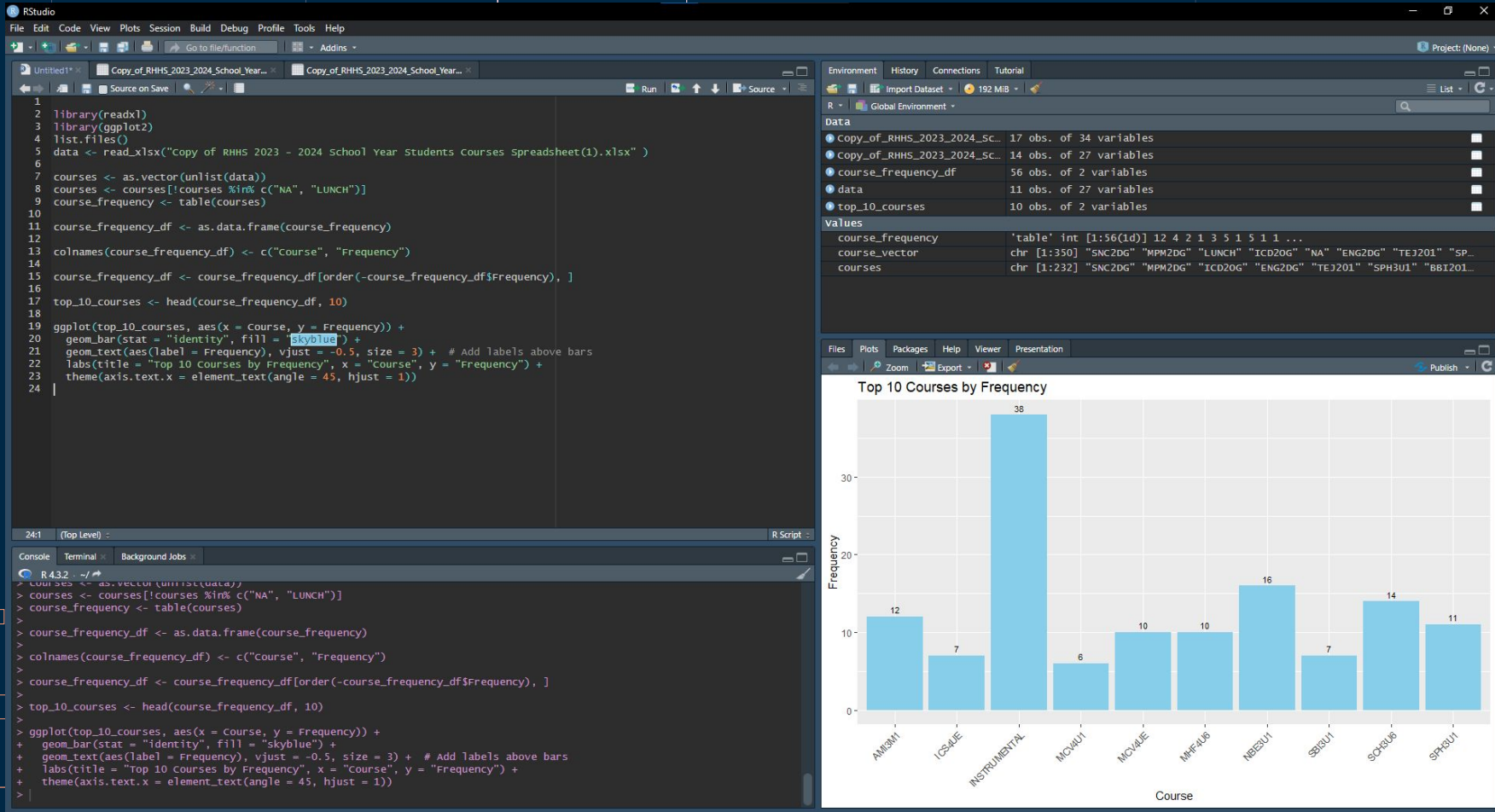
Popularity of R

- R is following a downwards trend in terms of popularity
- 20th most popular language in TIOBE Index, down from 16th in April



Key Features

02







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The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux](#) ([Debian](#), [Fedora/Redhat](#), [Ubuntu](#))
- [Download R for macOS](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

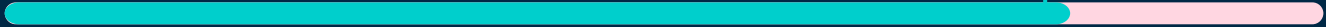
Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2023-10-31, Eye Holes) [R-4.3.2.tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).
- Contributed extension packages

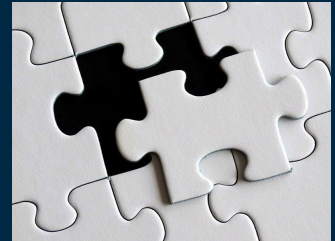
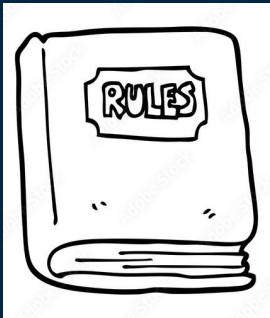
The Code

03



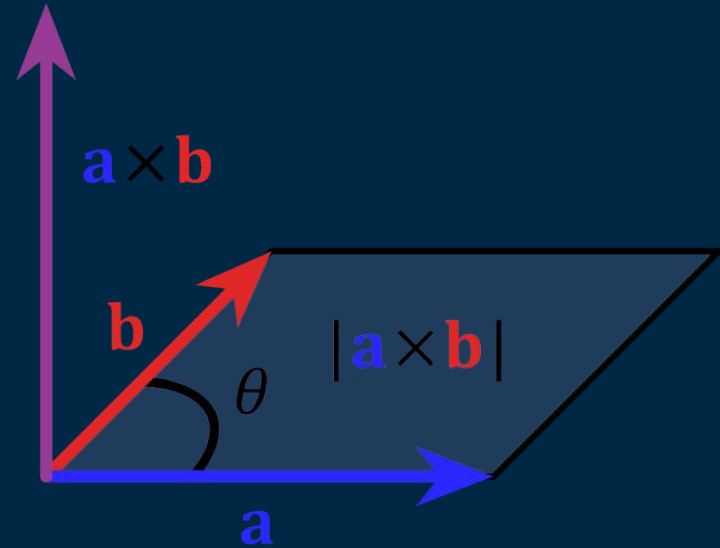
R SYNTAX VS. JAVA

- R syntax is simple but not elegant
 - While Java syntax is based on fundamental, logical building blocks, R syntax is rather a random rulebook
- Certain stuff can be implemented in too many ways (variable assignment, if/else)
- There are also certain simple operations that are tricky to implement
 - You have to use `cat()` and `paste()` functions for concatenation
- However, some aspects of R syntax are inspired by / similar to Java
 - 'L' character at the end of integers, escape characters, `{}` for different variable spaces



DATA STRUCTURES

- A variety of useful data structures in R
- Most are based on a simple data structure called a vector
 - Ordered, 1-indexed collection of data of the same type
 - Example: `v = c(200, 400, 50, 30)`
- Vectors can be extended in many ways
 - We can have multiple dimensions of data through matrices and arrays
 - Factors split data into "levels"
- We can also store data of different types in a single structure using a list



OTHER FEATURES

- R possesses a variety of different types of graphs that are simple to implement
 - Bar charts, pie charts, more complex ones such as strip charts
- Built-in functions for certain statistical values (mean, median, mode, percentile)
- 657 built-in colours with names!
- R has two types of classes:
 - S3 is a simplified, reduced version of OOP
 - S4 resembles object-oriented principles much more



EXAMPLE PROGRAM (SAM)

```
> marks = c(89, 94, 87, 87, 92, 86, 84, 84, 84,  
85, 95, 100, 97, 93, 96, 4, 2, 8, 10, 3)  
  
> markArray = array(marks, dim=c(5, 2, 2))  
  
> print(markArray)
```

, , 1

[,1] [,2]

[1,] 89 86

[2,] 94 84

[3,] 87 84

[4,] 87 84

[5,] 92 85

, , 2

[,1] [,2]

[1,] 95 4

[2,] 100 2

[3,] 97 8

[4,] 93 10

[5,] 96 3


```
> cat("Choi's Highest Mark:", markArray[2, 1, 2])
```

```
> cat("Timmerman's Specials!!",  
markArray[,c(2),2])
```

Choi's Highest Mark: 100

Timmerman's Specials!! 4 2 8 10 3

```
> indices = c(6, 7, 8, 9, 10, 16, 17, 18, 19, 20)
```

```
> for (index in indices) {
```

```
+ marks[index] <- marks[index-3]
```

```
+ }
```

```
> print(marks)
```

```
[1] 89 94 87 87 92 87 87 92 87 87  
95 100 97 93 96 97 93 96 97
```

```
[20] 93
```

```
> stats = factor(marks)
```

```
> print(stats)
```

```
> print(stats[-12])
```

```
> print(stats[-20])
```

```
[1] 89 94 87 87 92 87 87 92 87 87  
95 100 97 93 96 97 93 96 97
```

```
[20] 93
```

```
Levels: 87 89 92 93 94 95 96 97 100
```

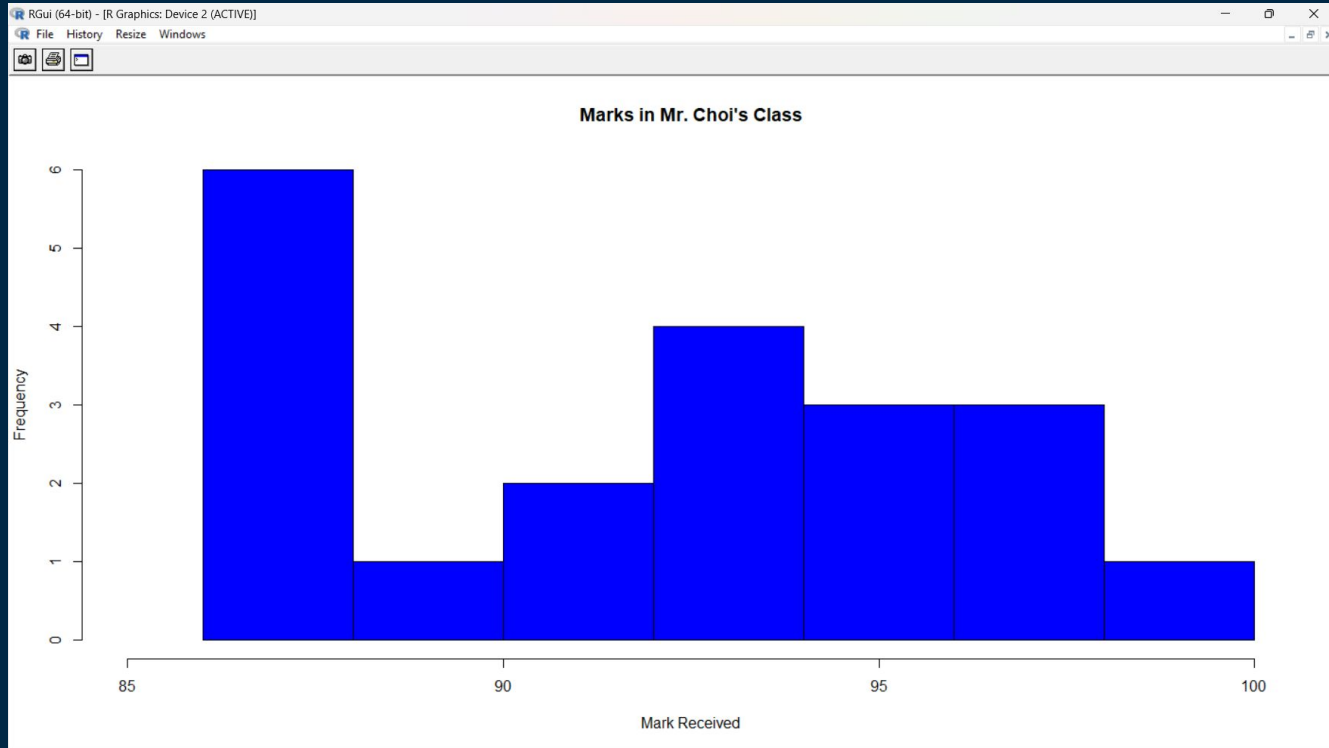
```
[1] 89 94 87 87 92 87 87 92 87 87 95 97 93  
96 97 93 96 97 93
```

```
Levels: 87 89 92 93 94 95 96 97 100
```

```
[1] 89 94 87 87 92 87 87 92 87 87  
95 100 97 93 96 97 93 96 97
```

```
Levels: 87 89 92 93 94 95 96 97 100
```

```
hist(marks, main = "Marks in Mr. Choi's Class",  
xlab = "Mark Received", ylab = "Frequency", col  
= "blue", xlim = c(85, 100), ylim = c(0, 6))
```



Our Verdict

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Should You Learn R?

- R is used heavily in some large companies for data science
 - For such companies, learning it would be very useful
- Pretty simple to implement graphs, just need a couple lines of simple command
- However, there are also many drawbacks
- R is pretty different structurally from a typical programming language
 - Not general purpose
 - Some limitations exist



Verdict: If you are not studying data science, then it is best to avoid R.

Alternatives to R

- Python
 - Very similar use cases (numpy and pandas)
- Google Sheets / Excel
 - Variety of different graphs as well, and no programming knowledge required
- Julia or Matlab
 - Both are more focused on computing aspects



The background is a dark navy blue. It is decorated with various geometric elements: small squares in teal, pink, and orange, and thin white vertical lines of varying lengths. These elements are scattered across the frame, creating a modern, minimalist aesthetic.

THANKS
FOR
LISTENING

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