

CODE HISTORY ANALYSIS AND VISUALISATION

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<http://bit.ly/22RCfI2>





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michaelfeathers / delta-flora

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Code

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64 commits

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https://github.com/mich



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michaelfeathers added smooth and sharpen along with edge_extend

Latest commit 756ae53 on Jun 24, 2015



lib added smooth and sharpen along with edge_extend

10 months ago



spec factored all array extensions from analytics.rb

a year ago



.gitignore added adds per hour

2 years ago



README.rdoc added example output

a year ago



Rakefile added spec for CodeEvent

a year ago



delta-flora

- github.com/michaelfeathers/delta-flora/

```
lib — irb TERM_PROGRAM=Apple_Terminal — 67x19
irb(main):001:0> load 'repository.rb'
=> true
irb(main):002:0> load 'array_ext.rb'
=> true
irb(main):003:0> events = Repository.new('..').events
```

```
lib — irb TERM_PROGRAM=Apple_Terminal — 67x19
15 +0100 lib/code_event.rb CodeEvent::method_score: 2 24 26, bb6812
66b6498921008c2fc4ef0191686411f160 added 2015-04-23 09:24:15 +0100
lib/code_event.rb CodeEvent::method_complexity: 2 28 30, bb681266b6
498921008c2fc4ef0191686411f160 added 2015-04-23 09:24:15 +0100 lib/
code_event.rb CodeEvent::method_functional_score: 2 32 34, bb681266
b6498921008c2fc4ef0191686411f160 added 2015-04-23 09:24:15 +0100 li
b/code_event.rb CodeEvent::git_local: 2 60 62, bb681266b6498921008c
2fc4ef0191686411f160 changed 2015-04-23 09:24:15 +0100 lib/reposito
ry.rb Repository::new_event: 11 103 114, bb681266b6498921008c2fc4ef
0191686411f160 changed 2015-04-23 09:24:15 +0100 lib/repository.rb
Repository::write: 2 116 118, 7dfde62fbdcf7c2b1c217d76556f43c1ddb77
d58 changed 2015-04-25 00:08:35 +0100 lib/code_event.rb CodeEvent::
method_score: 2 24 26, 5690e4ebfb5d7ccdc1f235e79afb8df8443f5994 add
ed 2015-04-25 00:19:43 +0100 lib/analytics.rb method_shark: 3 10 13
]
irb(main):004:0> events.first
=> f75d684dbfcc8e02a07ea49fe7d266fbf51a3ca6 added 2012-12-03 10:58:
26 +0000 analytics.rb month_from_date: 2 5 7
irb(main):005:0>
```

```
irb(main):004:0> events.first
=> f75d684dbfcc8e02a07ea49fe7d266fbf51a3ca6 added 2012-12-03 10:58:
26 +0000 analytics.rb month_from_date: 2 5 7
irb(main):005:0>
irb(main):006:0*
irb(main):007:0*
irb(main):008:0*
irb(main):009:0* def class_method_count_freq es
irb(main):010:1>   es.group_by(&:class_name)
irb(main):011:1>     .map { |_,vl| vl.map(&:method_name).uniq.count }
irb(main):012:1>   .freq
irb(main):013:1> end
=> :class_method_count_freq
irb(main):014:0>
irb(main):015:0*
irb(main):016:0*
irb(main):017:0*
irb(main):018:0*
irb(main):019:0*
```

```
[irb(main):008:0*  
irb(main):009:0* def class_method_count_freq es  
irb(main):010:1>   es.group_by(&:class_name)  
irb(main):011:1>     .map { |_,vl| vl.map(&:method_name).uniq.count }  
irb(main):012:1>   .freq  
irb(main):013:1> end  
=> :class_method_count_freq  
[irb(main):014:0>  
[irb(main):015:0*  
[irb(main):016:0*  
[irb(main):017:0*  
[irb(main):018:0*  
[irb(main):019:0* class_method_count_freq(events)  
=> [[1, 2], [2, 3], [4, 3], [5, 1], [7, 1], [9, 2], [11, 2], [17, 1]  
, [93, 1]]  
[irb(main):020:0>  
[irb(main):021:0*  
[irb(main):022:0*  
irb(main):023:0* █
```

WHY?

SOFTWARE DESIGN

Your Code As a Crime Scene

Use Forensic Techniques to Arrest Defects, Bottlenecks, and Bad Design in Your Programs

Adam Tornhill

edited by Fahmida Y. Rashid

Foreword by Michael Feathers, author of Working Effectively with Legacy Code

PROJECT HISTORY

Predictive Models of Development Teams and the Systems they Build

- Robert Smallshire

It's awkward to perform science experiments on developers, so let's simulate them instead! The emerging field of software process dynamics applies systems thinking and simulated experiments of software development teams and the systems they build, to inform decisions on projects, process and architecture.

In 1968 Melvin Conway pointed out a seemingly inevitable symmetry between organisations and the software systems they construct. Organisations today are more fluid than 40 years ago, with short developer tenure, and frequent migration of individuals between projects and employers. In this slot we'll examine – and perhaps collect – data on the tenure and productivity of programmers and use this to gain insight into codebases, by simulating their growth with simple stochastic models. From such models, we can make important predictions about the maintainability and long-term viability of software systems, with implications for how we approach software design, documentation and how we assemble teams.

In the second part of the talk we'll build a software dynamics model simulating the growth of a system, and the flow of code change, before concluding with the remarks on the nature of modelling and the basics of making your own models.

GENERIC INSIGHTS

WHY VISUALISE?

A 3-D View of a Chart That Predicts The Economic Future: The Yield Curve

By GREGOR AISCH and AMANDA COX MARCH 18, 2015

• ○ ○ ○ ○ ○ ○ ○

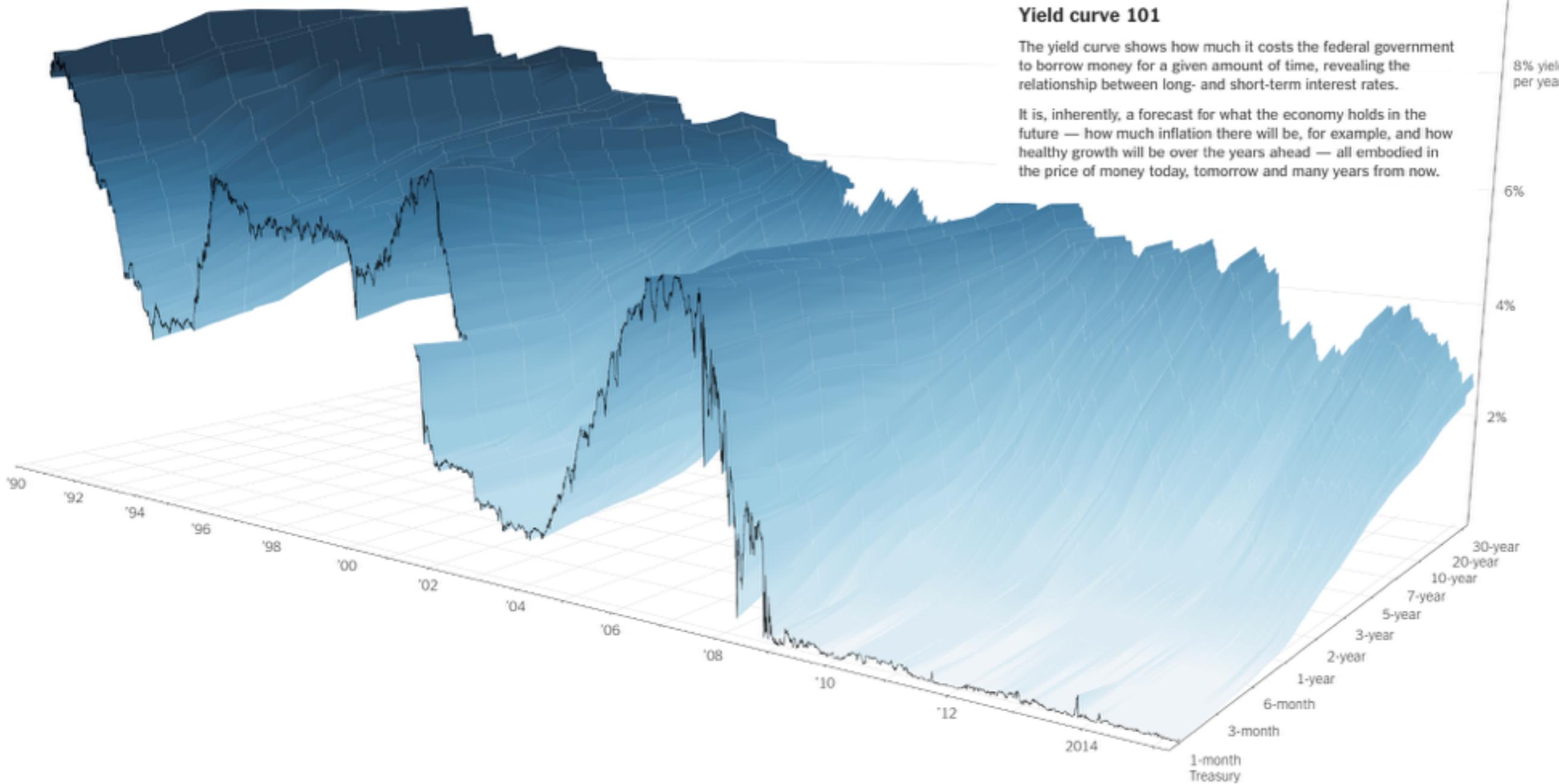
Back

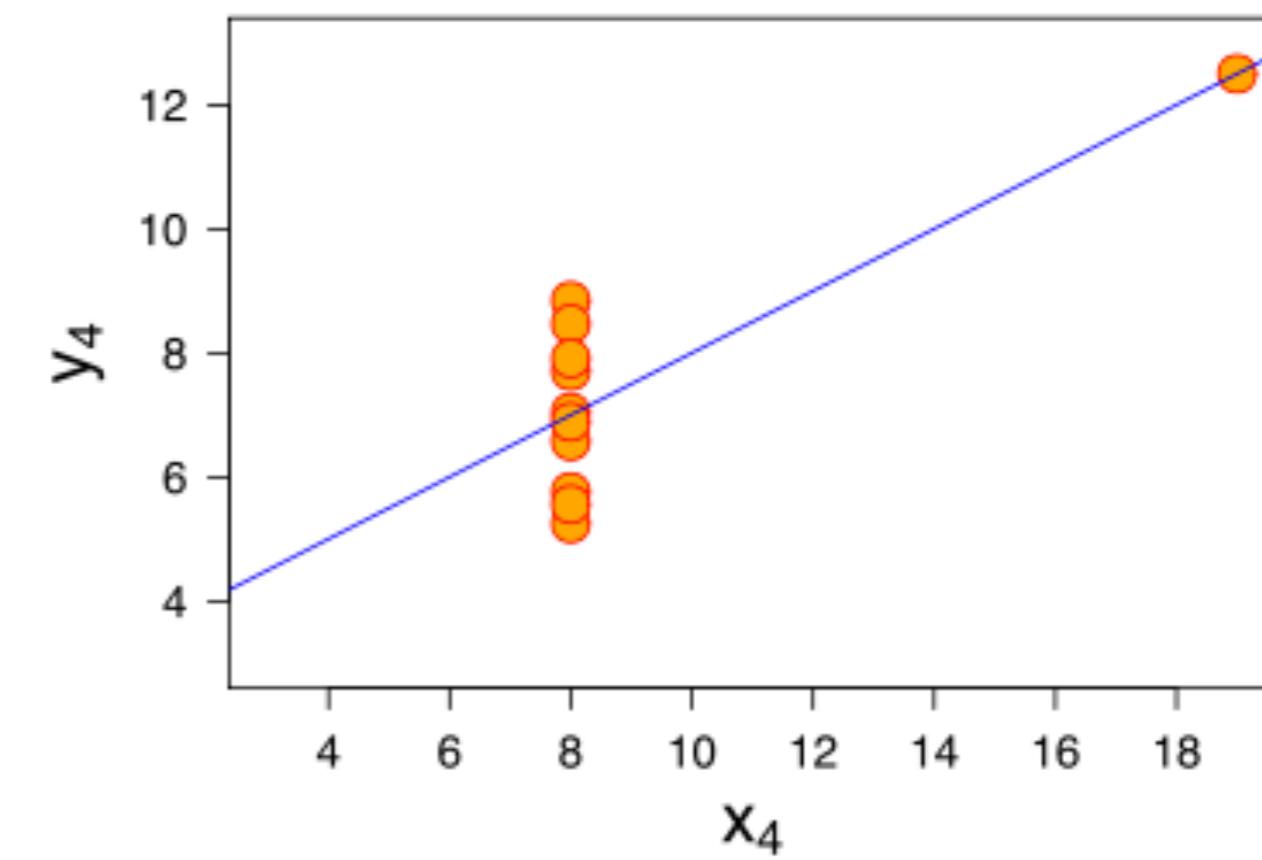
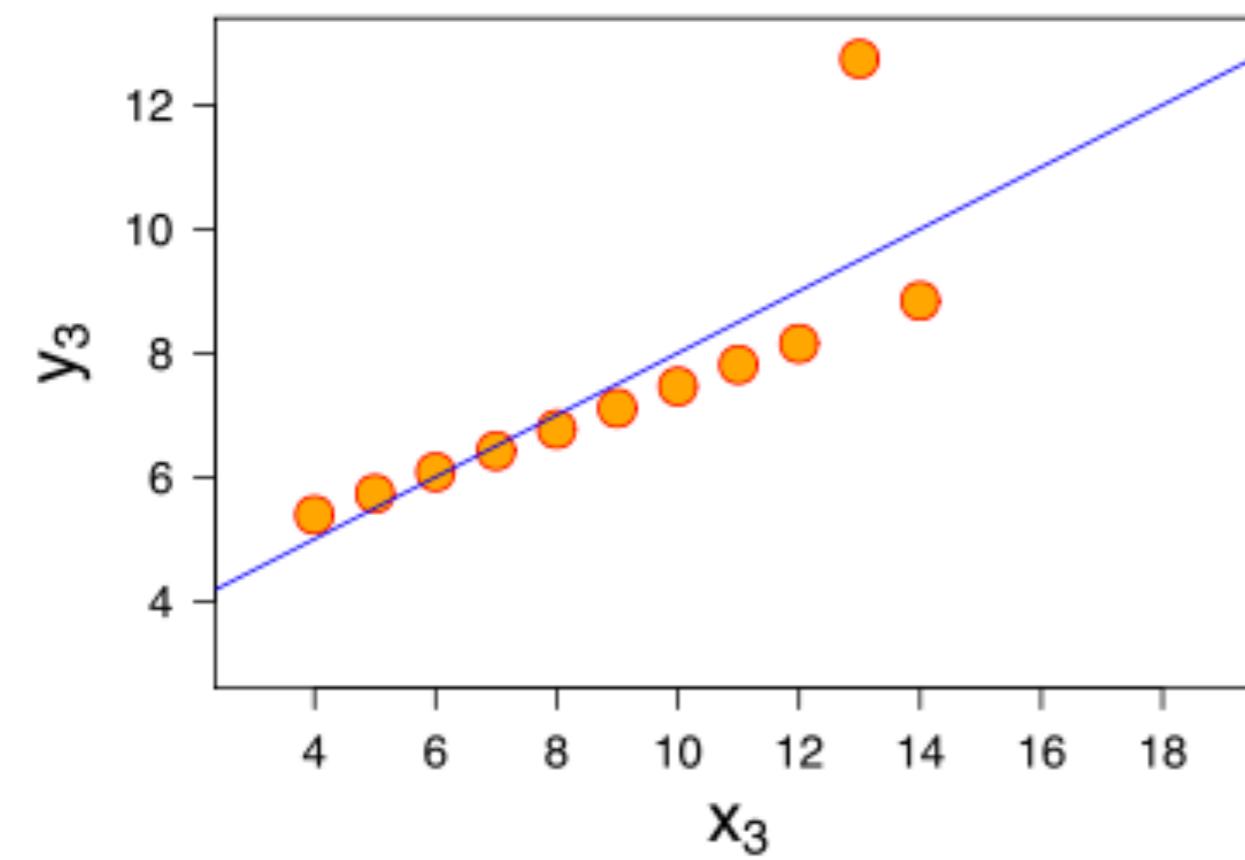
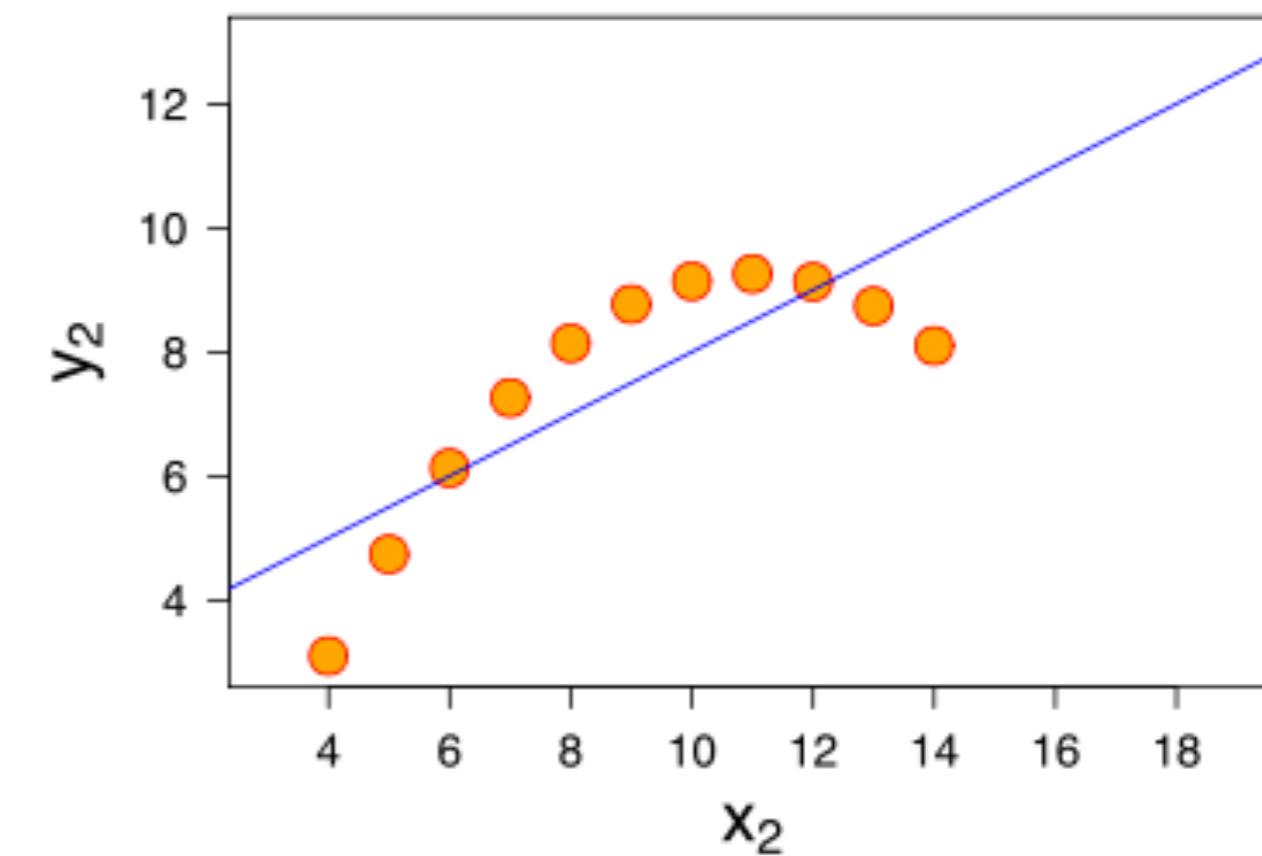
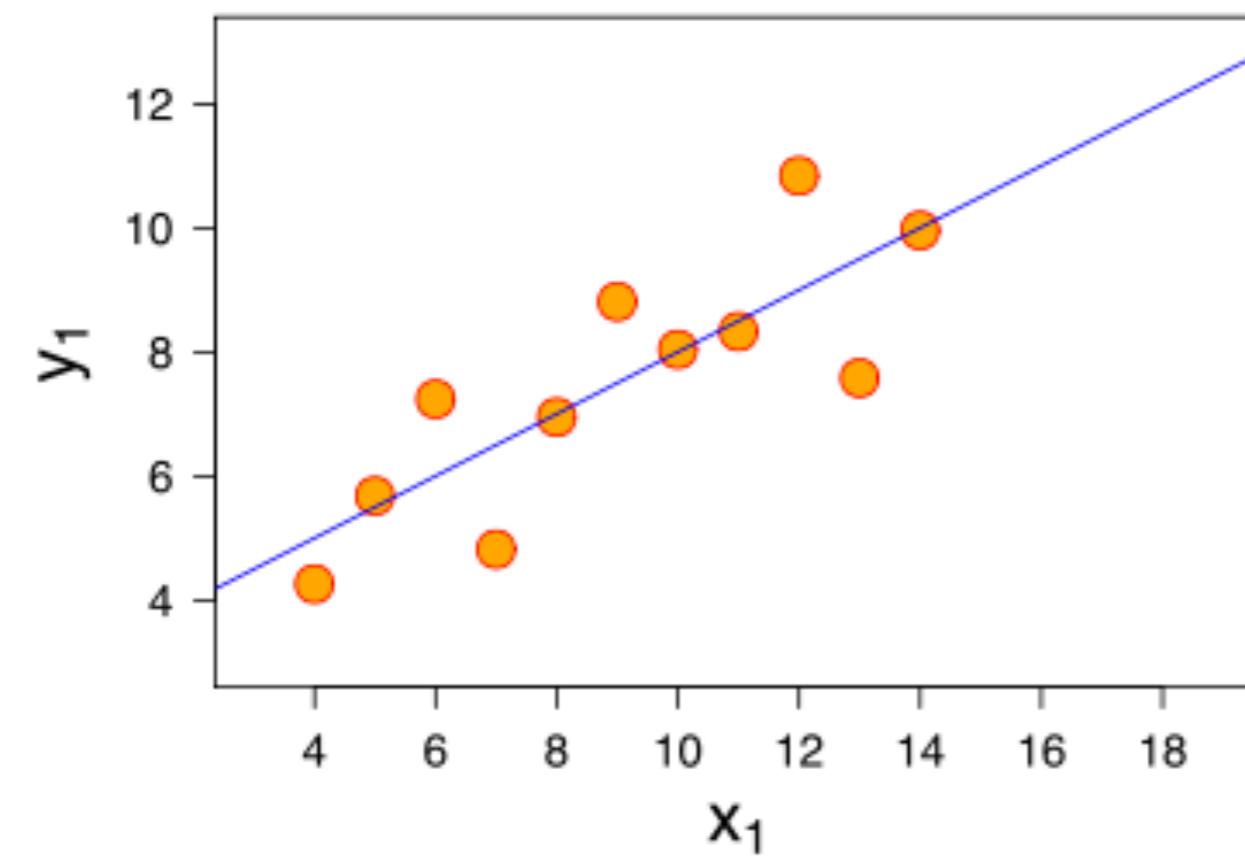
Next

Yield curve 101

The yield curve shows how much it costs the federal government to borrow money for a given amount of time, revealing the relationship between long- and short-term interest rates.

It is, inherently, a forecast for what the economy holds in the future — how much inflation there will be, for example, and how healthy growth will be over the years ahead — all embodied in the price of money today, tomorrow and many years from now.





DEMO

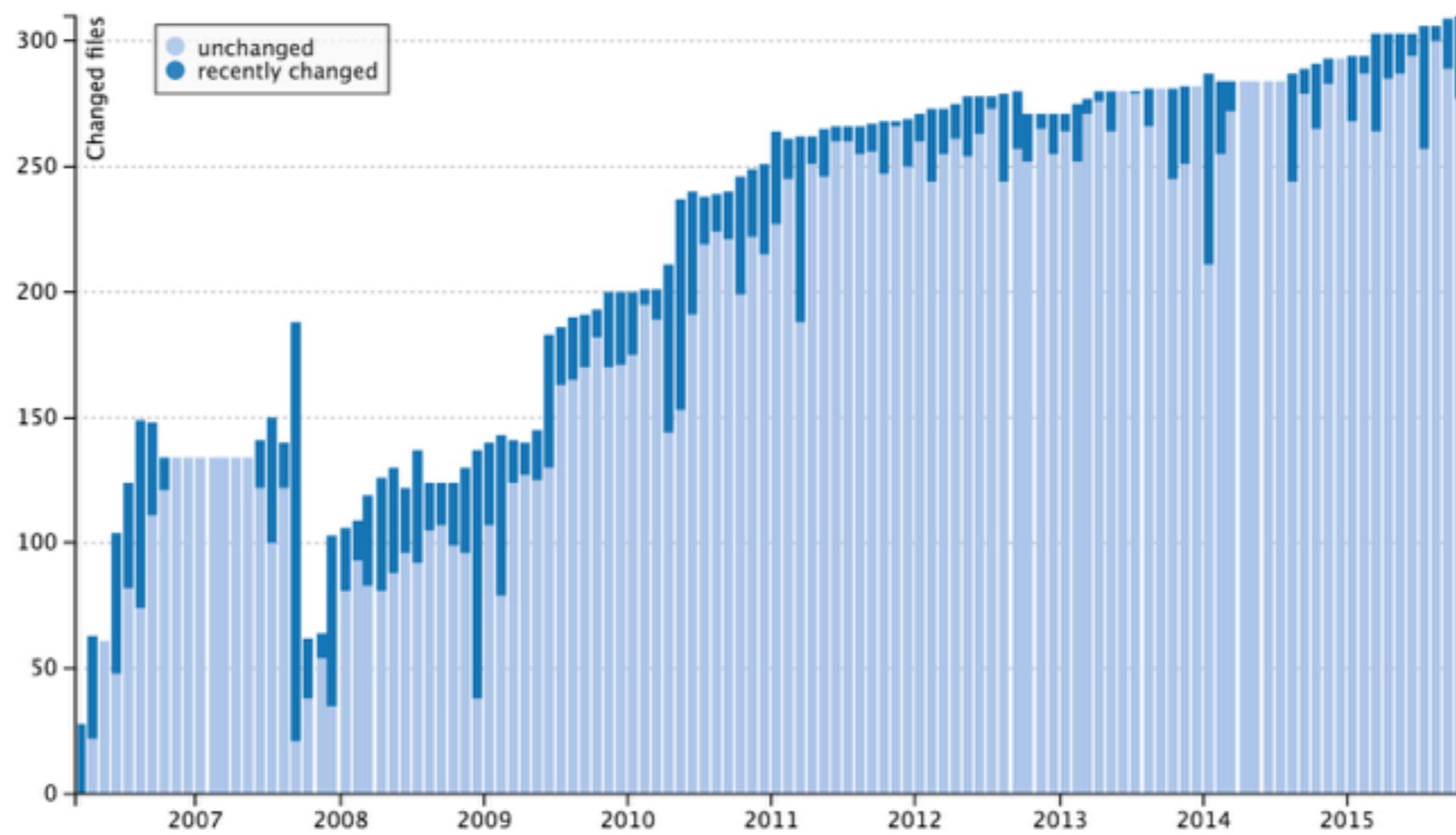
Code History Miner

Server for project code history analysis and visualization.

[Download](#)

0.1 beta, built on 20 Mar 2016

Amount of changing files chart (Clojure)





Plugins

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- [+ JBehave \(5\)](#)
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- [+ Maven 2 \(21\)](#)
- [+ Menu Components \(7\)](#)

Code History Mining

Products: [IntelliJ IDEA](#), [RubyMine](#), [WebStorm](#), [PhpStorm](#), [PyCharm](#), [AppCode](#), [Android Studio](#), [0xDBE](#), [CLion](#), [Rider](#)Vendor: [Dmitry Kandalov](#)Email: [dmitry.kandalov \[at\] gmail.com](mailto:dmitry.kandalov@gmail.com)Source code: <https://github.com/dkandalov/code-history-mining>

Authors:

[syl](#)

This is proof-of-concept plugin for code history visualization and analysis.

For more details and examples of visualizations see [GitHub page](#).

See also [code history miner](#) web server and CLI with similar functionality.

Downloads: 19615

Rating:

Participated in rating: 2

[Comment and rate](#)

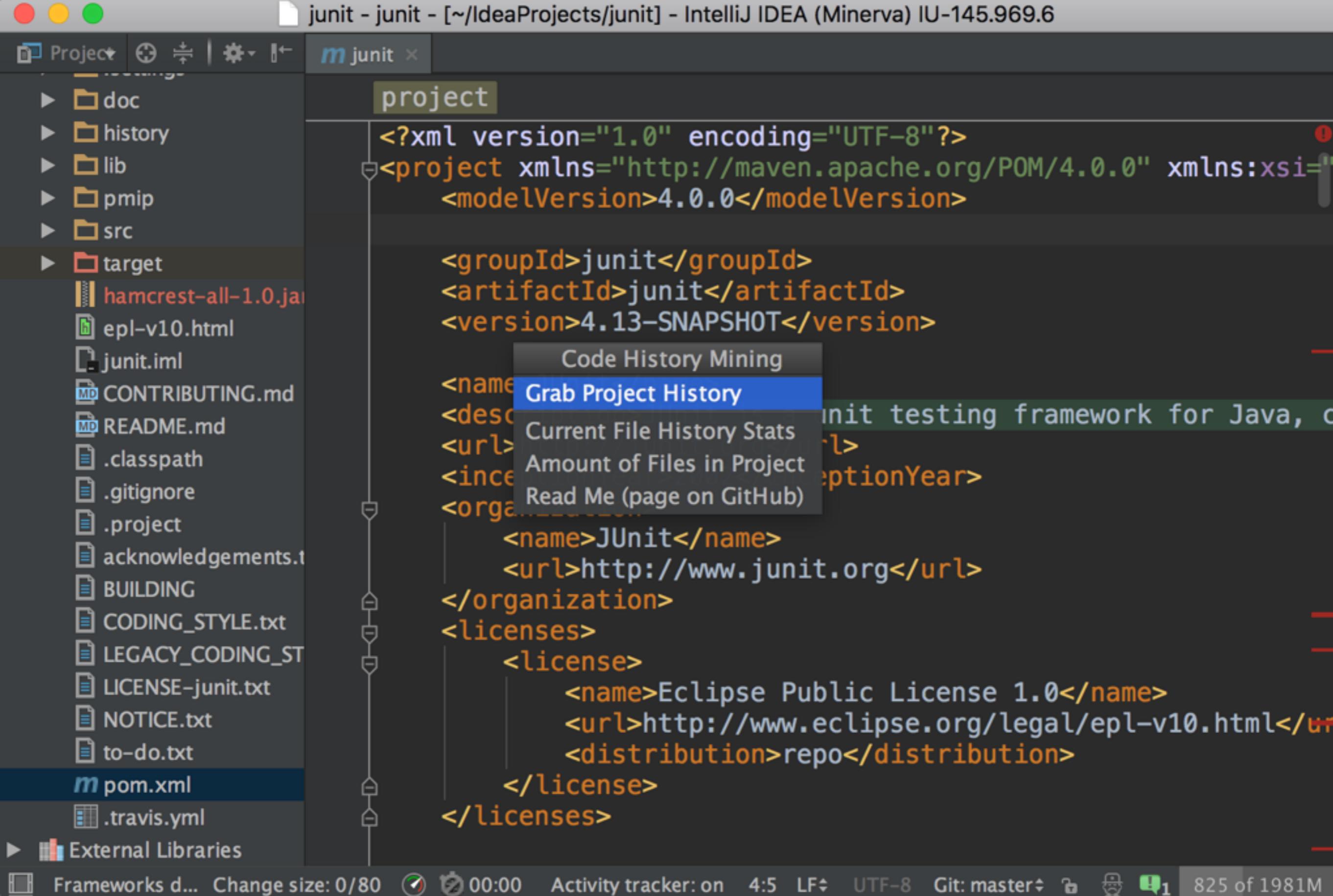
Version	Compatible builds	Date	
0.3.0 beta	142.2084 +	03.03.2016	Download
0.2.8 beta	140.2493 – 142.2084	10.08.2015	Download
0.2.6 beta	134 – 140.2493	18.04.2015	Download
0.2.0 beta	122.600 – 133.*	28.03.2014	Download
0.1.7 beta	122.600 +	04.03.2014	Download

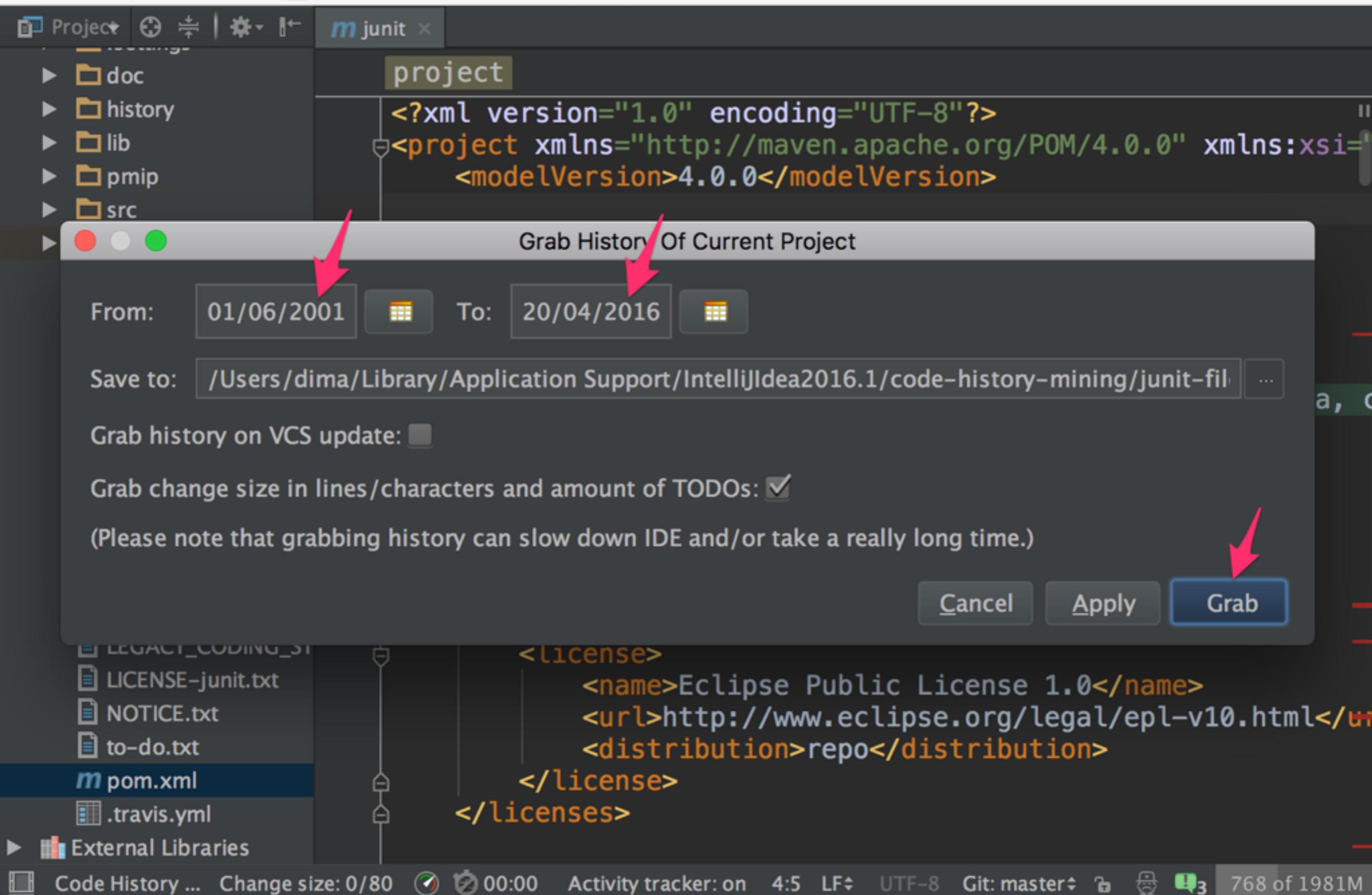
18 updates are hidden [show all updates](#)

The screenshot shows the IntelliJ IDEA interface with the project 'junit' open. The left sidebar displays various files and folders, including 'doc', 'history', 'lib', 'pmip', 'src', 'target', 'hamcrest-all-1.0.jar', 'epl-v10.html', 'junit.iml', 'CONTRIBUTING.md', 'README.md', '.classpath', '.gitignore', '.project', 'acknowledgements.txt', 'BUILDING', 'CODING_STYLE.txt', 'LEGACY_CODING_ST...', 'LICENSE-junit.txt', 'NOTICE.txt', 'to-do.txt', 'pom.xml' (which is selected), and '.travis.yml'. The right pane shows the XML content of the 'pom.xml' file, which defines the Maven project structure for JUnit.

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.13-SNAPSHOT</version>
    <name>JUnit</name>
    <description>JUnit is a unit testing framework for Java, developed by Erich Gamma, Achim Rückert, and Markus Nagel</description>
    <url>http://junit.org</url>
    <inceptionYear>2002</inceptionYear>
    <organization>
        <name>JUnit</name>
        <url>http://www.junit.org</url>
    </organization>
    <licenses>
        <license>
            <name>Eclipse Public License 1.0</name>
            <url>http://www.eclipse.org/legal/epl-v10.html</url>
            <distribution>repo</distribution>
        </license>
    </licenses>

```





Project + ⌂ ⚙ ⌛

m junit x

project

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
```

Background Tasks

Grabbing project history

.classpath
.gitignore
.proj
acknowledgements
BUILDING
CODING_STYLE.txt
LEGACY_CODING_STYLE.txt
LICENSE-junit.txt
NOTICE.txt
to-do.txt
pom.xml
.travis.yml

</organization>
<licenses>
 <license>
 <name>Eclipse Public License 1.0</name>
 <url>http://www.eclipse.org/legal/epl-v10.html</url>
 <distribution>repo</distribution>
 </license>
</licenses>

External Libraries

Process running... Change size: 0/80 00:00 Activity tracker: on 4:5 LF+ UTF-8 Git: master 3 839 of 1981M

Project

m junit x

Code History Mining

project
<?xml
<projec
 !<m
 You can run [all vizualizations](#) or choose one in plugin popup menu.

```
<groupId>junit</groupId>
<artifactId>junit</artifactId>
<version>4.13-SNAPSHOT</version>

<name>JUnit</name>
<description>JUnit is a unit testing framework for Java, c
<url>http://junit.org</url>
<inceptionYear>2002</inceptionYear>
<organization>
    <name>JUnit</name>
    <url>http://www.junit.org</url>
</organization>
<licenses>
    <license>
        <name>Eclipse Public License 1.0</name>
        <url>http://www.eclipse.org/legal/epl-v10.html</ur
        <distribution>repo</distribution>
    </license>
</licenses>
```

doc
history
lib
pmip
src
target
hamcrest-all-1.0.jar
epl-v10.html
junit.iml
CONTRIBUTING.md
README.md
.classpath
.gitignore
.project
acknowledgements.t
BUILDING
CODING_STYLE.txt
LEGACY_CODING_ST
LICENSE-junit.txt
NOTICE.txt
to-do.txt
pom.xml
.travis.yml

External Libraries

Code History ... Change size: 0/80 00:00 Activity tracker: on 4:5 LF UTF-8 Git: master 1127 of 1981M

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2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,IMG00002.GIF,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,logo.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image1.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image2.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image3.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image4.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image5.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image6.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,Image7.gif,,/doc/cookbook
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,IMG00001.GIF,,/doc/test
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,IMG00002.GIF,,/doc/test
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,IMG00003.GIF,,/doc/test
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,logo.gif,,/doc/test
2001-07-09 23:39:54 +0100,3216b428b87523b6b9247bd9d84c36c2ded3a3fa,egamma <egamma>,logo.gif,,/junit/run
2001-07-09 23:16:13 +0100,4b4c3992e4547b4d00ea490f03398f2d0e5c8f7e,egamma <egamma>,,.vcm_meta,,,NEW,-1,
2001-07-08 20:42:20 +0100,2fd22847241b16be7d79a1f9de02957168aa13b9,egamma <egamma>,test.jar,,/junit/test
2001-05-21 21:09:24 +0100,8076b782f8c9ac1df6569bbfa479db2da9e6cbcfc,egamma <egamma>,Version.java,,/junit
:

Project External Libraries

- doc
- history
- lib
- pmip
- src
- target
- hamcrest-all-1.0.jar
- epl-v10.html
- junit.iml
- CONTRIBUTING.md
- README.md
- .classpath
- .gitignore
- .project
- acknowledgements.txt
- BUILDING
- CODING_STYLE.txt
- LEGACY_CODING_ST
- LICENSE-junit.txt
- NOTICE.txt
- to-do.txt
- pom.xml
- .travis.yml

m junit x

project

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.13-SNAPSHOT</version>
    <name>JUnit</name>
    <description>JUnit is a unit testing framework for Java, developed by Erich Gamma, Achim Rückert, and Kai Wurmbach</description>
    <url>http://junit.org</url>
    <inceptionYear>2002</inceptionYear>
    <organization>
        <name>JUnit</name>
        <url>http://www.junit.org</url>
    </organization>
    <licenses>
        <license>
            <name>Eclipse Public License 1.0</name>
            <url>http://www.eclipse.org/legal/epl-v10.html</url>
            <distribution>repo</distribution>
        </license>
    </licenses>

```

Project + ⌂ ⚙ ⌛

junit

project

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.13-SNAPSHOT</version>
    <name>Code History Mining</name>
    <description>junit-file-events.csv</description>
    <url>Current File History Stats</url>
    <inceptionYear>Amount of Files in Project</inceptionYear>
    <organization>Read Me (page on GitHub)
        <name>JUNIT</name>
        <url>http://www.junit.org</url>
    </organization>
    <licenses>
        <license>
            <name>Eclipse Public License 1.0</name>
            <url>http://www.eclipse.org/legal/epl-v10.html</url>
            <distribution>repo</distribution>
        </license>
    </licenses>
```

Code History Mining

Grab Project History

Code History Stats

Current File History Stats

Amount of Files in Project

Read Me (page on GitHub)

JUNIT

http://www.junit.org

Eclipse Public License 1.0

http://www.eclipse.org/legal/epl-v10.html

repo

External Libraries

Code History ... Change size: 0/80 00:00 Activity tracker: on 4:5 LF+ UTF-8 Git: master 3 784 of 1981M

Project pom.xml External Libraries

junit

project

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.13-SNAPSHOT</version>
    <name>junit</name>
    <description>junit-file-events.csv</description>
    <url>https://github.com/junit-team/junit</url>
    <inceptionYear>2004</inceptionYear>
    <organization>
        <name>JUnit</name>
        <url>http://www.junit.org</url>
    </organization>
    <licenses>
        <license>
            <name>Eclipse Public License - v 1.0</name>
            <url>http://www.eclipse.org/legal/epl-v10.html</url>
            <distribution>repo</distribution>
        </license>
    </licenses>

```

Code History Mining
Grab Project History
junit-file-events.csv
Current File History Stats
Amount of Files in Project
Read Me (page on GitHub)
<name>JUNIT</name>
<url>http://www.junit.org</url>
</organization>
<licenses>
<license>
<name>Eclipse Public License - v 1.0</name>
<url>http://www.eclipse.org/legal/epl-v10.html</url>
<distribution>repo</distribution>
</license>
</licenses>

All Visualizations
Open Script Editor
Code Churn Chart
Amount Of Committers Chart
Amount Of Commits By Committer
Amount Of TODOs Chart
Amount Of Files In Commit Chart
Amount Of Changing Files Chart
Change Size By File Type Chart
Changes Treemap
Files In The Same Commit Graph
Committees Changing Same Files Graph
Commit Time Punchcard
Commit Messages Word Chart
Commit Messages Word Cloud

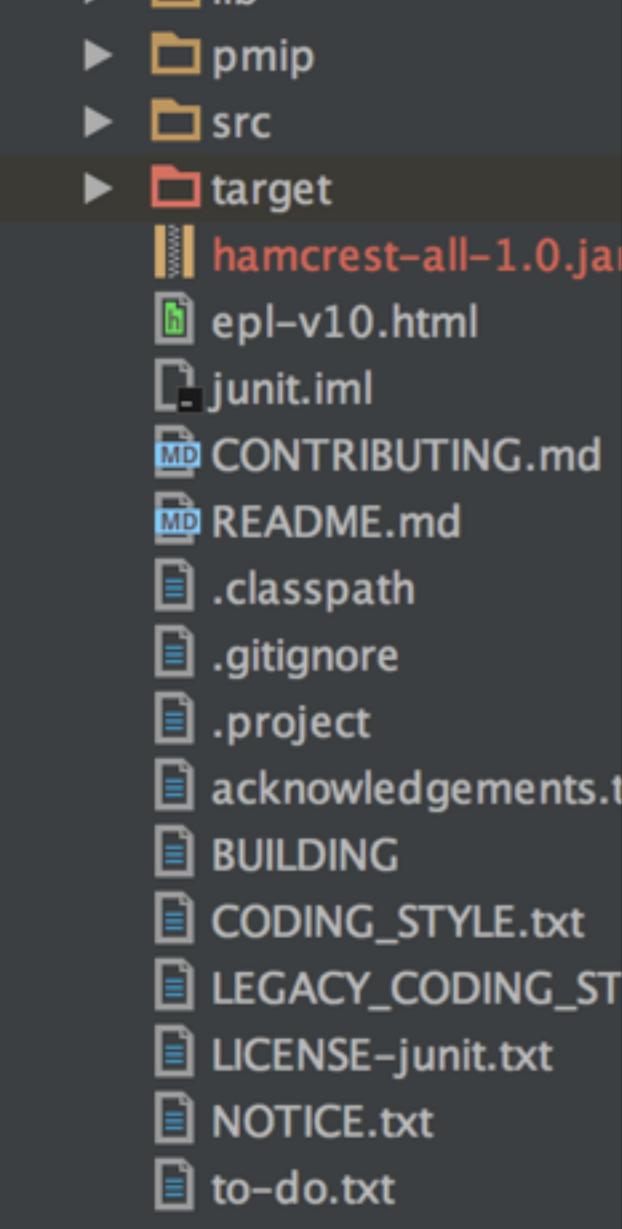
Code History ... Change size: 0/80 00:00 Activity tracker: on 4:5 LF 981M



m junit x **G** junit-file-events x

✓

```
// To run the script use alt+shift+E (or "Run Code History Scr
// For more details about scripts and examples see GitHub wiki
// https://github.com/dkandalov/code-history-mining/wiki/Code-
data.size()
```



The screenshot shows the IntelliJ IDEA interface with the following details:

- Title Bar:** junit-file-events - junit - [~/IdeaProjects/junit] - IntelliJ IDEA (Minerva) IU-145.969.6
- Toolbar:** Project, New, Open, Settings, Help, 7306 (notification icon).
- Project Structure:** Shows the 'junit' project structure with subfolders like .idea, .settings, doc, history, lib, pmip, src, and target, along with files hamcrest-all-1.0.jar, epl-v10.html, junit.iml, CONTRIBUTING.md, README.md, .classpath, and .gitignore.
- Code Editor:** The 'junit-file-events' file is open, displaying the following code:

```
// To run the script use alt+shift+E (or "Run Code History Script")
// For more details about scripts and examples see GitHub wiki
// https://github.com/dkandalov/code-history-mining/wiki/Code-History-Scripts

data.size()
```

Event Log



13:33:55 7306



>>

m junit x G junit-file-events x

```
// To run the script use alt+shift+E (or "Run Code History Script" in the context menu)
// For more details about scripts and examples see GitHub wiki
// https://github.com/dkandalov/code-history-mining/wiki/Code-History-Script-Runner

data.take(10)
```

junit-result179 - junit - [~/IdeaProjects/junit] - IntelliJ IDEA (Minerva) IU-145.969.6

m junit × G junit-file-events × junit-result179 ×

```
commitTime, revision, author, fileNameBefore, fileName, packageNameBefore, packageName, fileChangeType, commitMessage
2016-04-18 21:45:19 +0100, fd691746a7d953c8e4a6855161437124071a49fb, Pascal Schumacher,, ReleaseNotes4.5.html, ,/
2016-04-18 21:45:19 +0100, fd691746a7d953c8e4a6855161437124071a49fb, Pascal Schumacher,, ReleaseNotes4.4.md, ,/do
2016-04-18 21:45:19 +0100, fd691746a7d953c8e4a6855161437124071a49fb, Pascal Schumacher,, ReleaseNotes4.4.html, ,/
2016-04-18 15:15:43 +0100, 0431f42c2f2502610719e0b45a28fd0dd51b2cb1, Alberto Scotto,, ParentRunner.java, ,/src/ma
2016-04-05 18:51:15 +0100, 82bea5dc259bb769fc590020fe42733c95e3cfa, Paul Duffin,, TestWatchmanTest.java, ,/src/t
2016-04-05 18:51:15 +0100, 82bea5dc259bb769fc590020fe42733c95e3cfa, Paul Duffin,, SimpleTest.java, ,/src/test/ja
2016-04-05 18:51:15 +0100, 82bea5dc259bb769fc590020fe42733c95e3cfa, Paul Duffin,, AllValidatorTests.java, ,/src/
2016-04-05 18:51:15 +0100, 82bea5dc259bb769fc590020fe42733c95e3cfa, Paul Duffin,, AllTheoriesTests.java, ,/src/t
2016-04-05 18:51:15 +0100, 82bea5dc259bb769fc590020fe42733c95e3cfa, Paul Duffin,, AllSamplesTests.java, ,/src/te
2016-04-05 18:51:15 +0100, 82bea5dc259bb769fc590020fe42733c95e3cfa, Paul Duffin,, AllRulesTests.java, ,/src/test
```

m junit x G junit-file-events x

```
// To run the script use alt+shift+E (or "Run Code History Script" in the context menu)
// For more details about scripts and examples see GitHub wiki
// https://github.com/dkandalov/code-history-mining/wiki/Code-History
```

```
data.collect{ it.author }.unique()
```

m junit x G junit-file-events x

```
// To run the script use alt+shift+E (or "Run Code History Script" in the context menu)
// For more details about scripts and examples see GitHub wiki
// https://github.com/dkandalov/code-history-mining/wiki/Code-History-Script-Template

data.collect{ it.author }.unique()
```

Event Log

Time	Author
13:45:10	Kristian Rosenvold
13:45:10	KentBeck
13:45:10	alanharder
13:45:10	watisdit
13:45:10	Jon Kean
13:45:10	James Abley
13:45:10	Mike Forsberg
13:45:10	kbeck
13:45:10	cmschmidt
13:45:10	clarkware
13:45:10	egamma
13:45:10	emeade
13:45:10	vbossica

DATA CLEANSING

“NON-ESSENTIAL” FILES

pom.xml

CHANGELOG

generated files

library source code

various binary artefacts

SUPERFICIAL CHANGES

VERSION CONTROL BOTS

**CHANGED COMMITTER NAME
AND PAIR PROGRAMMING**

OTHER DATA ISSUES

file move as delete/add

git rebase

mistakes in commits

corrupted repositories

HOW TO CLEAN?

check data manually

run analysis and check for sanity

visualize

DIY

READ FROM VERSION CONTROL

<https://github.com/dkandalov/vcs-reader>

<https://github.com/codeinn/vcs>

other VCS-specific libraries

parse CLI stdout

```
// setup project
def gitSettings = GitSettings.defaults()
def vcsRoot = new GitVcsRoot(
    "/tmp/junit",
    "https://github.com/junit-team/junit",
    gitSettings
)
def vcsProject = new VcsProject(vcsRoot)
```

```
// clone from GitHub
def cloneResult = vcsProject.cloneToLocal()
assert cloneResult.isSuccessful()

// log commits within date range
def logResult = vcsProject.log(
    date("01/01/2013"),
    date("01/01/2014")
)
assert logResult.commits().size() == 242
```

```
// read commit data
def commit = logResult.commits().last()
assert commit.revision == "0e1a559e1371aa9929ca4f61f87cf8f9a5923ce7"
assert commit.revisionBefore == "4e9f1a65ca8d794db54260b4f2e5b078d949fdda"
assert commit.time == dateTime("Fri Dec 27 18:54:49 GMT 2013")
assert commit.author == "Stefan Birkner"
assert commit.message.contains("Override toString()")
```

```
// read commit changes
def firstChange = commit.changes.first()
assert firstChange.type == MODIFIED
assert firstChange.filePath ==
    "src/main/java/org/junit/runners/model/FrameworkField.java"
assert firstChange.fileContent().value.contains("public class FrameworkField")
```

ANALYSE

general purpose languages

NumPy, pandas, R, etc.

neo4j?

```
def topCommitters = events
  .groupBy({ it.author }, { it.revision })
  .rollup(0){ it.size() }
  .findAll{ it.value > 100 }
  .sort{ -it.value }
  .take(10)*.key
```

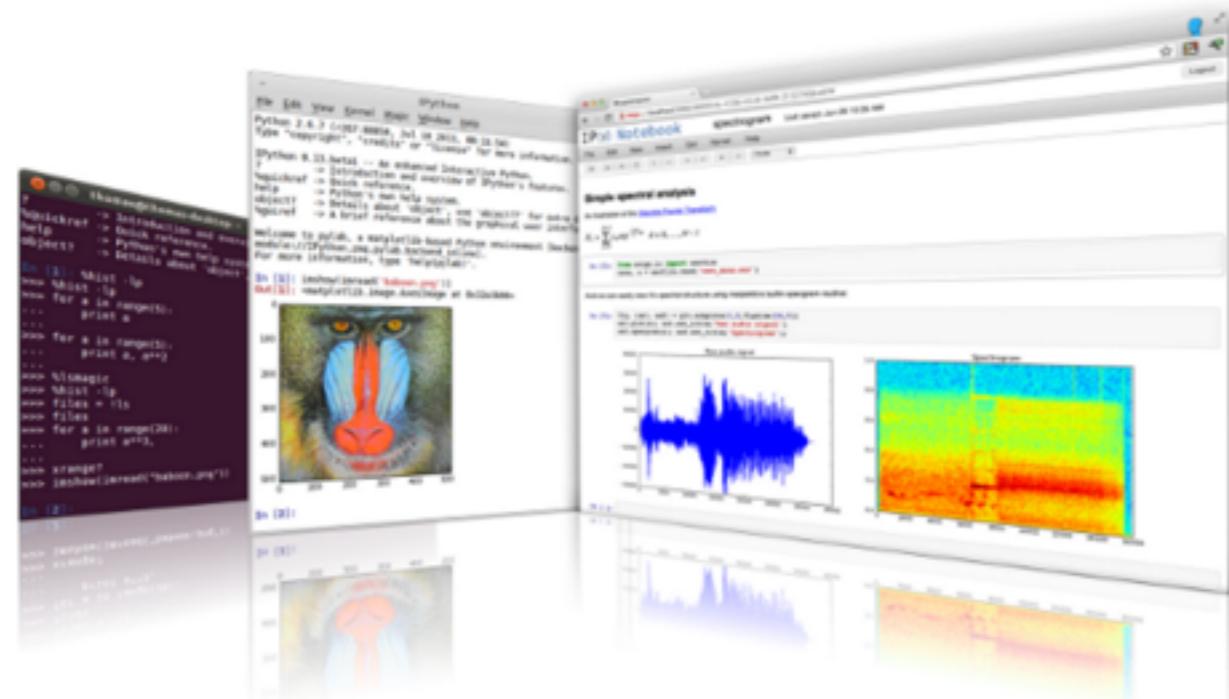
IP[y]: IPython

Interactive Computing

[Install](#) · [Documentation](#) · [Project](#) · [Jupyter](#) · [News](#) · [Cite](#) · [Donate](#)

IPython provides a rich architecture for interactive computing with:

- A powerful interactive shell.
- A kernel for [Jupyter](#).
- Support for interactive data visualization and use of [GUI toolkits](#).
- Flexible, [embeddable](#) interpreters to load into your own projects.
- Easy to use, high performance tools for [parallel computing](#).



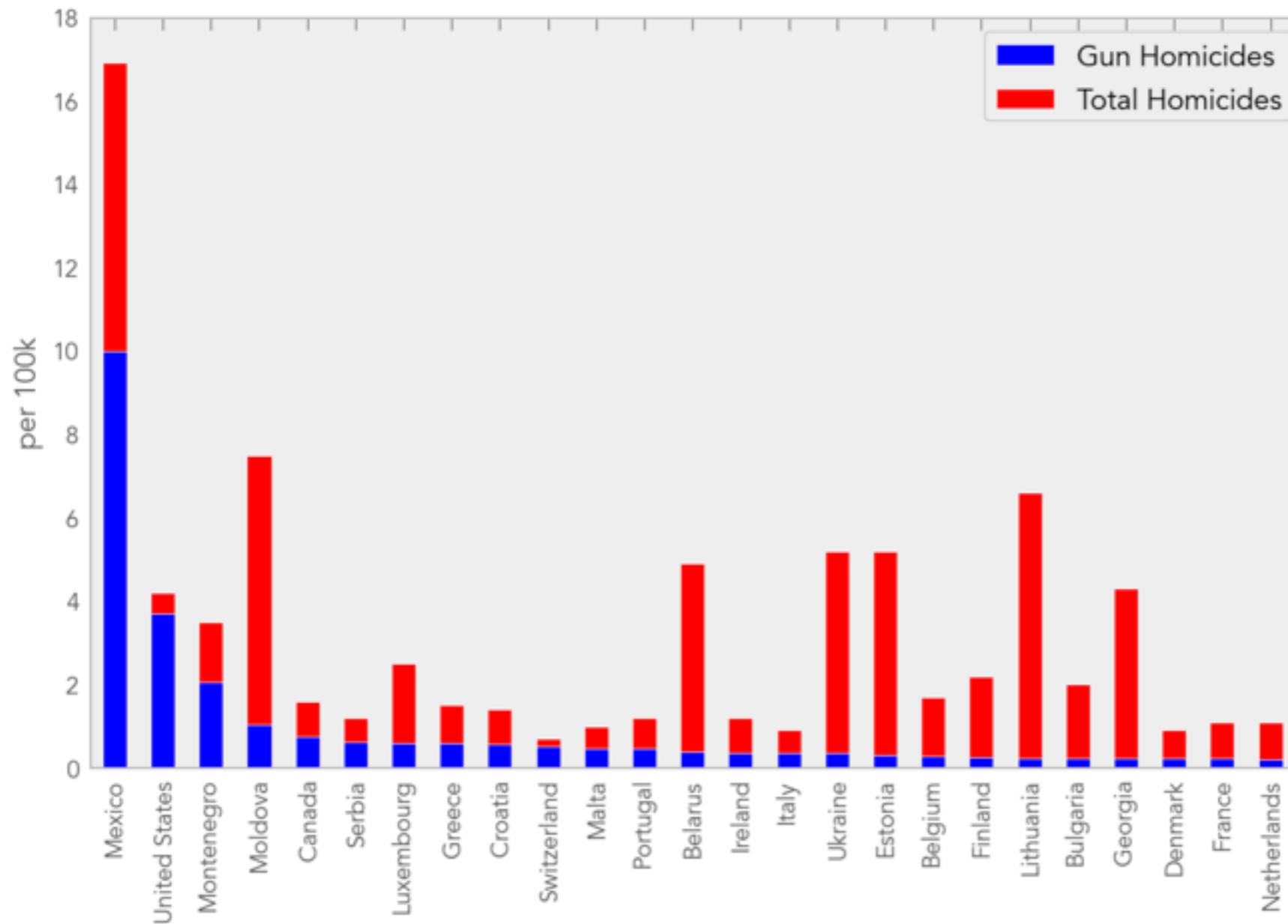
To get started with IPython in the Jupyter Notebook, see our [official example collection](#). Our [notebook gallery](#) is an excellent way to see the many things you can do with IPython while learning about a variety of topics, from basic programming to advanced statistics or quantum mechanics.

```
In [13]: index = (data['Region'] == 'Europe') + \
             (data.index == 'United States') + \
             (data.index == 'Canada') + \
             (data.index == 'Mexico')
selected = data[index]

print "By Total Gun Homicides"
sys.stdout.flush()

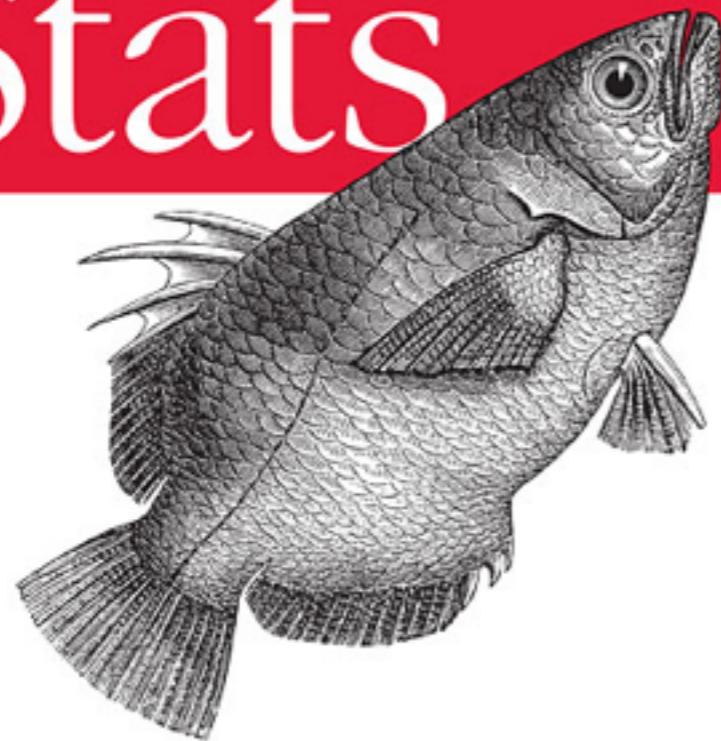
by_guns = selected.sort("Gun Homicides", ascending=False)
#by_guns['Gun Homicides'].plot(kind='bar')
plot_percapita(by_guns, limit=25)
display_relevant(selected, limit=None)
```

By Total Gun Homicides



Probability and Statistics for Programmers

Think Stats



O'REILLY®

Allen B. Downey

Bayesian Statistics in Python

Think Bayes



O'REILLY®

Allen B. Downey

VISUALISE

author,commits,changedFiles
David Saff,314,1225
dsaff,257,2226
kbeck,121,920
Stefan Birkner,109,288
Tibor Digana,100,169
Marc Philipp,86,233
Kevin Cooney,53,154
egamma,48,295
emeade,37,54
pimterry,36,113
Stephen Connolly,24,42
Arie van Deursen,23,24
Noel Yap,23,125
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Ricky,18,76
Matthew Farwell,18,117
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Alistair A. Israel,14,26
Arjan Wulder,13,326
Jesse Glick,13,21
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Adam Benesch,11,32
Dave Grant,9,9
Brett Chabot,9,13
Juan Cortez,9,16
Andreas Skoog,8,17

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htm,67

gif,47

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yml,4

zip,4

rb,3

fileName,fileChanges
"/src/test/java/org/junit/tests/AllTests.java",131
"/build.xml",120
"/src/main/java/org/junit/runners/ParentRunner.java",112
"/src/main/java/org/junit/runners/BlockJUnit4ClassRunner.java",101
"/src/main/java/junit/runner/Version.java",95
"/src/main/java/org/junit/runners/Parameterized.java",93
"/pom.xml",91
"/acknowledgements.txt",74
"/src/main/java/org/junit/experimental/theories/Theories.java",72
"/src/main/java/org/junit/runners/Suite.java",69
"/src/main/java/org/junit/runners/model/TestClass.java",69
"/src/main/java/org/junit/Assert.java",68
"/src/main/java/org/junit/rules/ExpectedException.java",62
"/src/main/java/org/junit/runner/Description.java",55
"/src/test/java/org/junit/tests/assertion/AssertionTest.java",54
"/src/main/java/org/junit/internal/runners/JUnit4ClassRunner.java",46
"/src/main/java/org/junit/experimental/max/MaxCore.java",46
"/doc/ReleaseNotes4.7.txt",46
"/src/main/java/org/junit/runners/model/FrameworkMethod.java",45
"/src/main/java/org/junit/runner/JUnitCore.java",44
"/src/main/java/org/junit/internal/runners/statements/FailOnTimeout.java",42
"/src/main/java/org/junit/runner/Request.java",40
"/src/test/java/org/junit/tests/experimental/max/MaxStarterTest.java",39
"/src/main/java/org/junit/experimental/categories/Categories.java",37

fileChanges, revision, author, message
378,478f7f9217cf5da219a7ba298e3a87f405378194,dsaff,"Merged with branch, Kent will
305,30f2b16525dabb477373be9ed3e76bb98b200806,Arjan Wulder,Issue #426 Applied new
249,8226e3e64a7d4ace29eb08ab6c9fc9d4055f20c9,dsaff,"- Moved src directory into tw
221,168fe0844e104a224a5899b02dfd3e0fb07a32e3,kbeck,Final changes for release
171,40cc52cf5f5dc1dd1ee513410536bdc11422307d,dsaff,"Created a separate src folder
71,6acc164b4125da775cccd4035c1b99e9d404bacd,dsaff,"- The hamcrest-core-1.1 library
59,0e1aca2c28858ac1ad77ef40f704ec1b610c9d65,Matthew Farwell,Fixes #67 no since jav
58,df00d5eced3a7737b88de0f6f9e3673f0cf88f88,Alex Yursha,"remove 'f' prefix from f
57,3b5085dec3f1fd578c5109114bd02370bea48fda,kbeck,Fixed two warnings
55,65a98b47a95ff6173c5190d0afff07c7265fe277,Paul Duffin,Clean up the test hierarchy
54,35f5f3a78cdc49954e9542dafaea86f13705fdf8,dsaff,Reorganize tests
50,4b1869ebb8002e5d0b82ab55460f6126043c9ec4,egamma,JUnit 3.5 candidate
49,86b71cb1b9784a9b87c86b4f3f12632ae6773d1f,egamma,finished support for no-arg co
47,d322fe6d909c929be5e637b2abbd7da8f9264b3a,dsaff,Reorganization of Theory design
38,b4e915892bef6d4885cbde7db91476a0a9138c4f,cmschmidt,Javadoc improvements: - code
37,a9815c0f1419e20b6282c3944195083bb38deaa9,kbeck,"4.5 release candidate minus jav
37,ee235bc8c5cf5d4345a690f1bd7e3fd1967ef8ea,dsaff,Re-organize theory packages
36,576377b9ad44028dc84c2f8487cfe8dbccb8c252,dsaff,"- Split links into their own pa
34,4e2455b1f142bdf8f07383082638718695e51224,David Saff,Rollback to hamcrest 1.1
34,e35fb32e07a4cf69dd86024a79d9cb3b9132e55,David Saff,Upgraded to Hamcrest 1.2
34,52e61a55e8ffcaab2586ea8fec28e4b01336cd30,David Saff,Upgraded to Hamcrest 1.2\n
33,d9c908b9aab5f610e2f42aba1863ce25e36423f2,dsaff,API clean-up before 4.5 release
32,d9ccccce5034bb9876221d271914471b205220061,Marc Philipp,"Upgrade to Hamcrest 1.3

LIBRARIES

<https://d3js.org>

<http://nvd3.org>

<https://github.com/dc-js/dc.js>

<https://github.com/dkandalov/d3-components>

<http://stanford.edu/~mwaskom/software/seaborn/index.html>



Data-Driven Documents



D3.js is a JavaScript library for manipulating documents based on data. **D3** helps you bring data to life using HTML, SVG, and CSS. D3's emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.

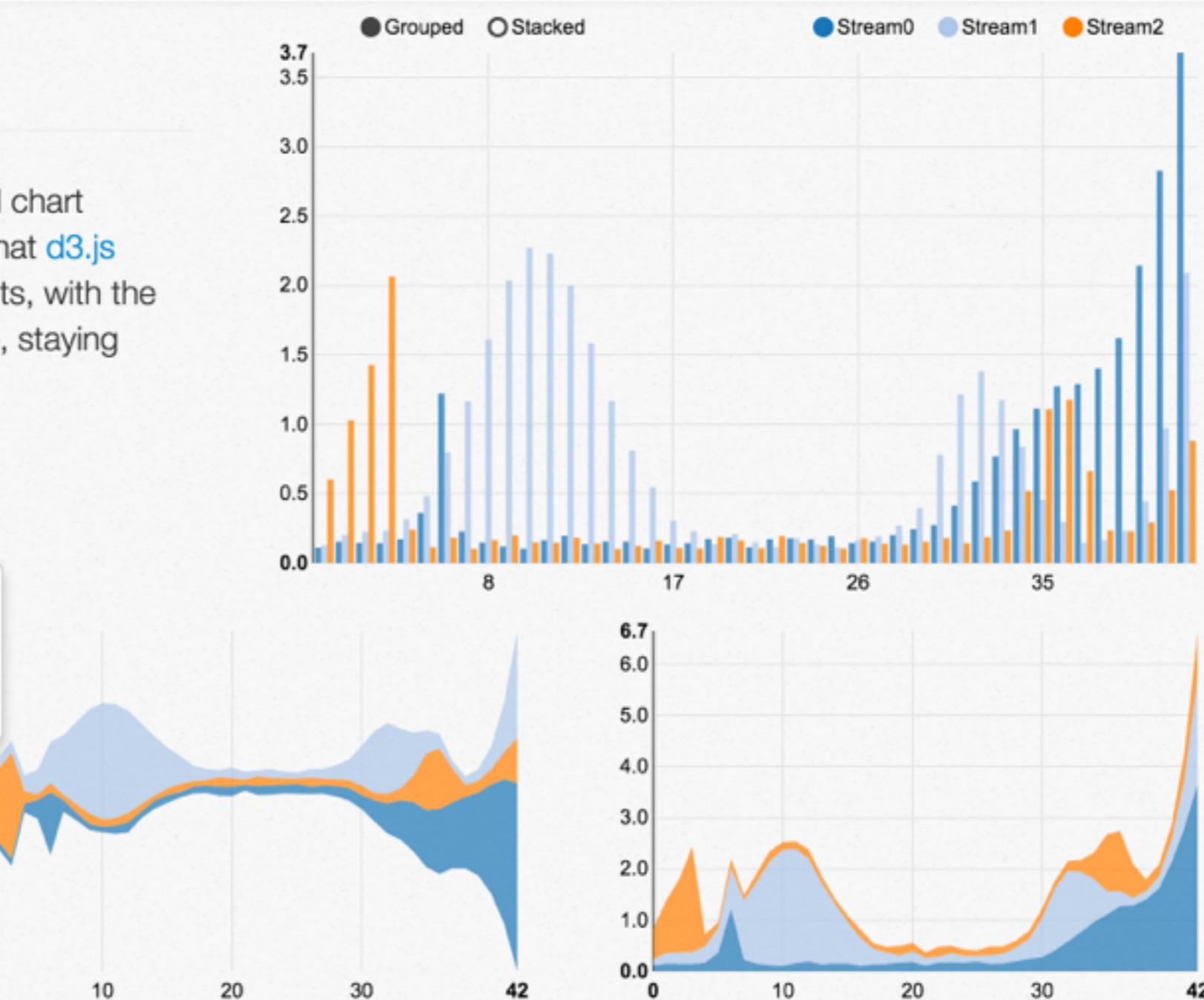
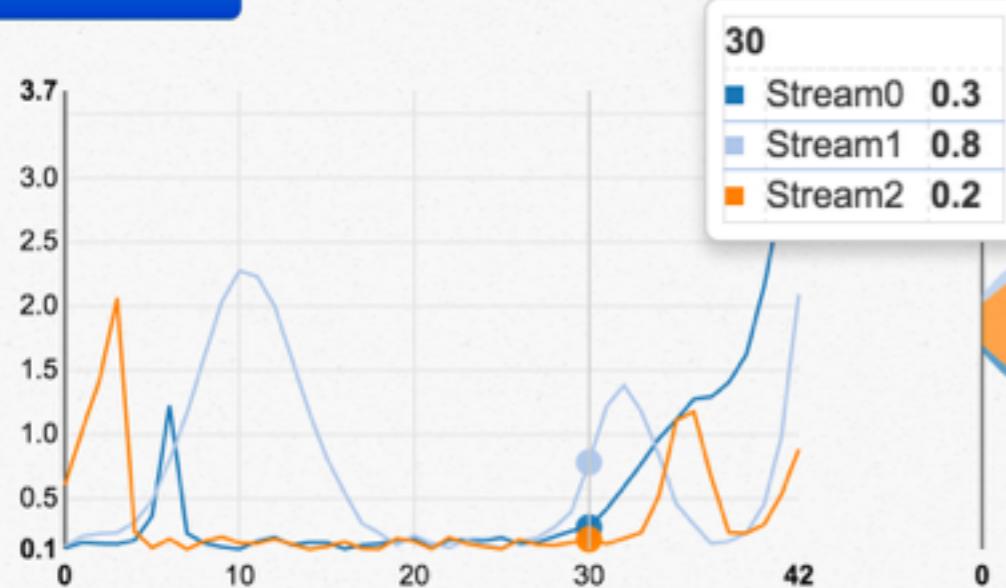


OMG WTF

Where do ziz colorz go? O_O

NVD3 Re-usable charts for [d3.js](#)

This project is an attempt to build re-usable charts and chart components for [d3.js](#) without taking away the power that [d3.js](#) gives you. This is a very young collection of components, with the goal of keeping these components very customizable, staying away from your standard cookie cutter solutions.

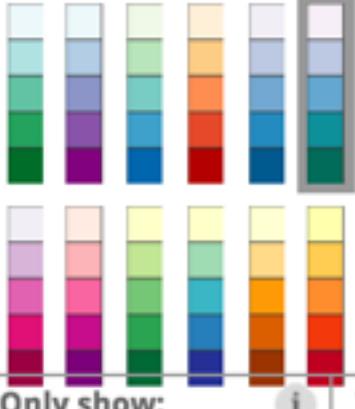
[View more examples »](#)[GitHub Repo](#)

BREW COLOURS

Number of data classes: 7 how to use | updates | downloads | credits

Nature of your data: sequential diverging qualitative

Pick a color scheme:

Multi-hue: 

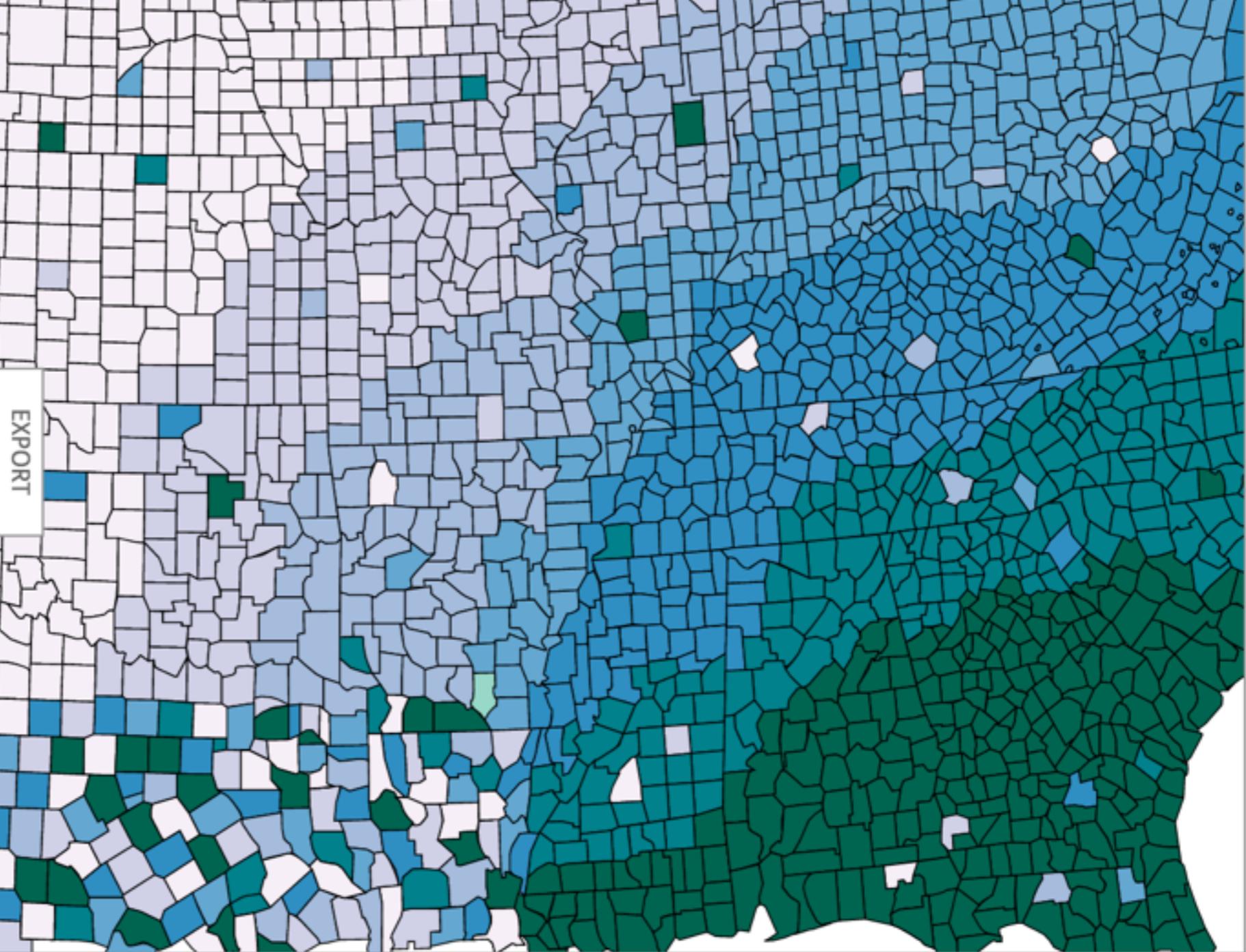
Single hue: 

Only show: colorblind safe print friendly photocopy safe 7-class PuBuGn    

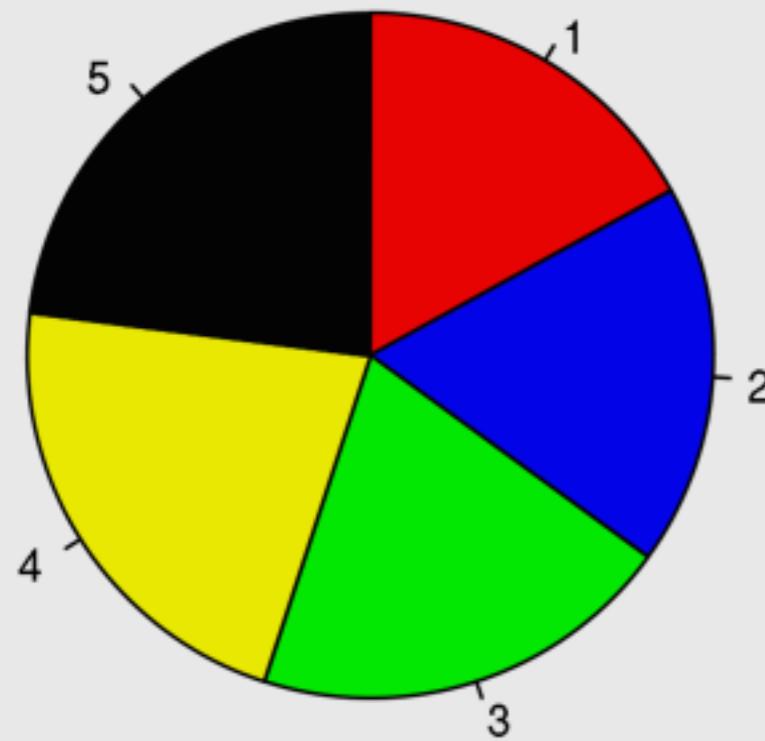
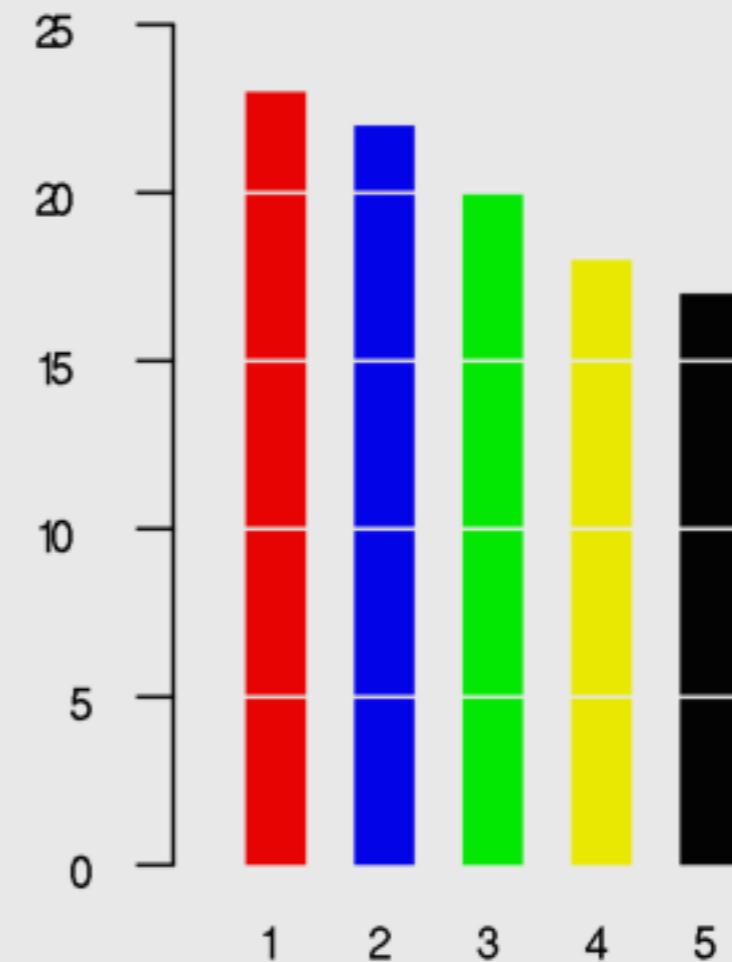
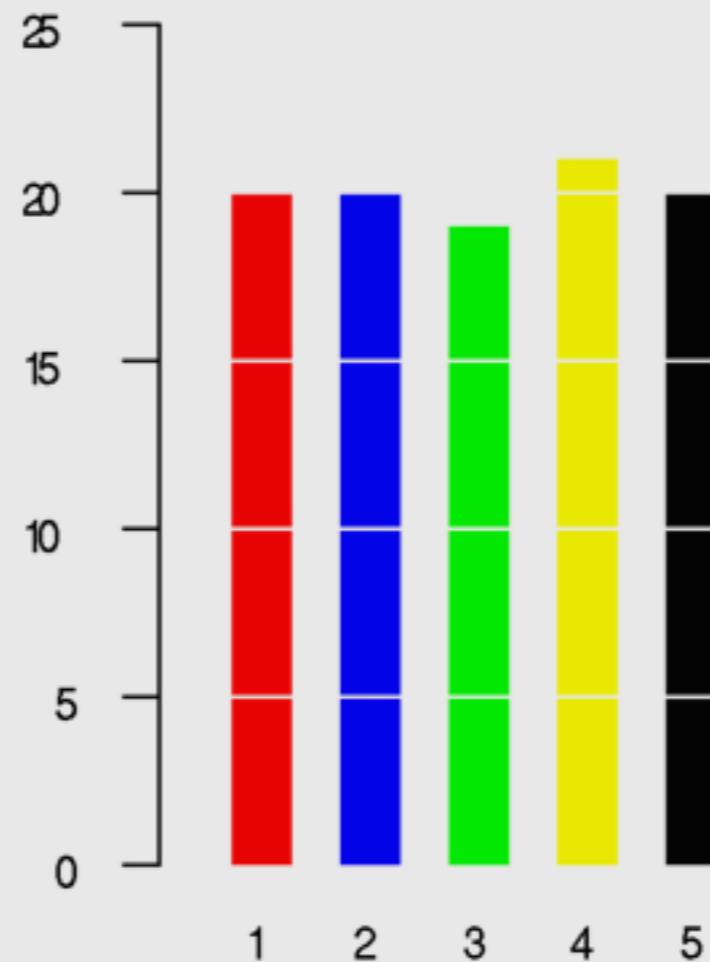
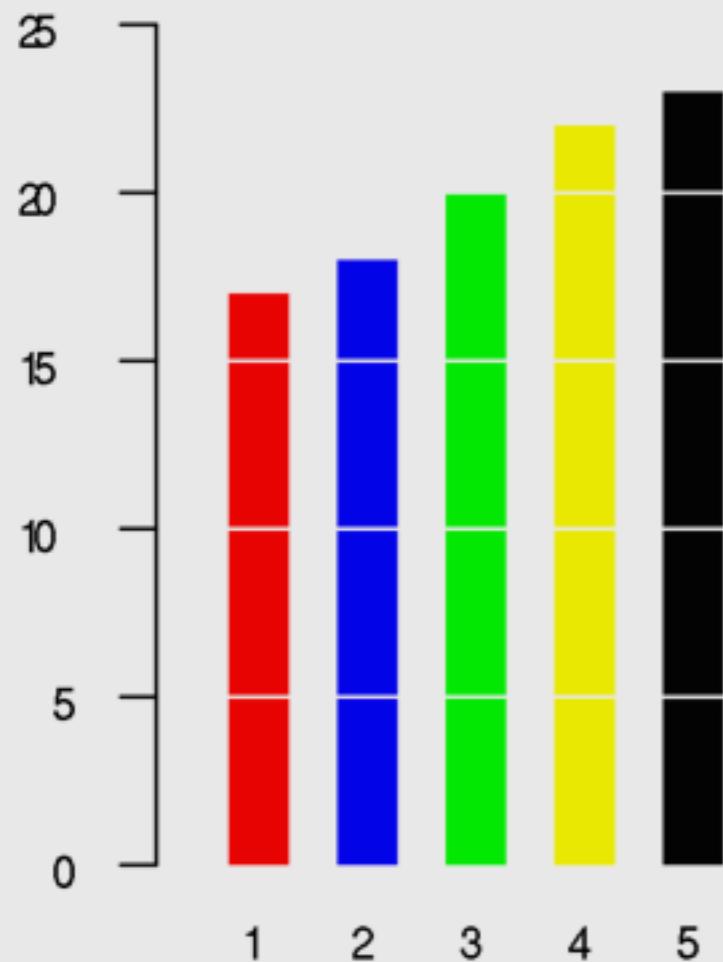
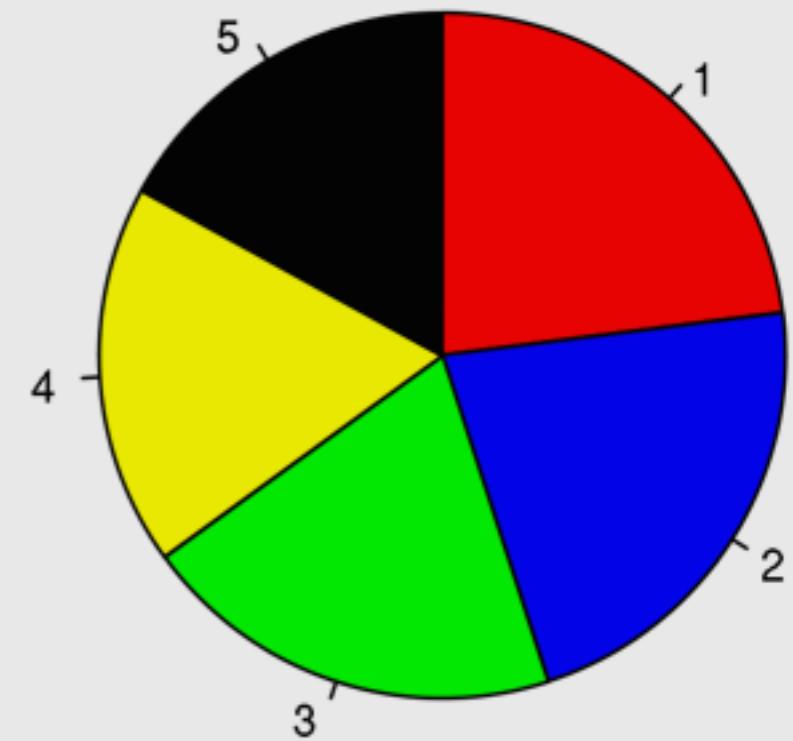
Context: roads cities borders solid color terrain color transparency

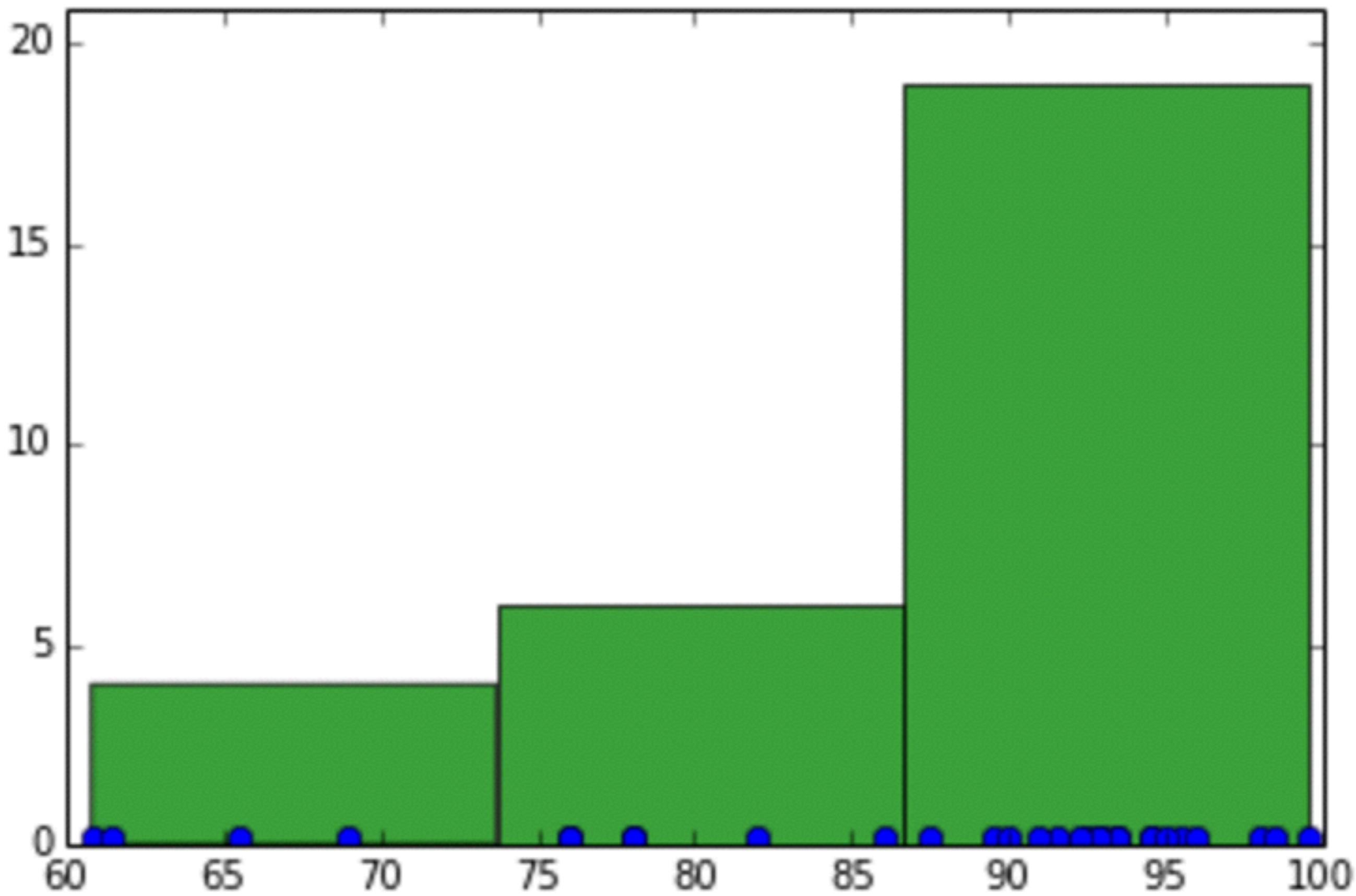
Background: solid color terrain color transparency

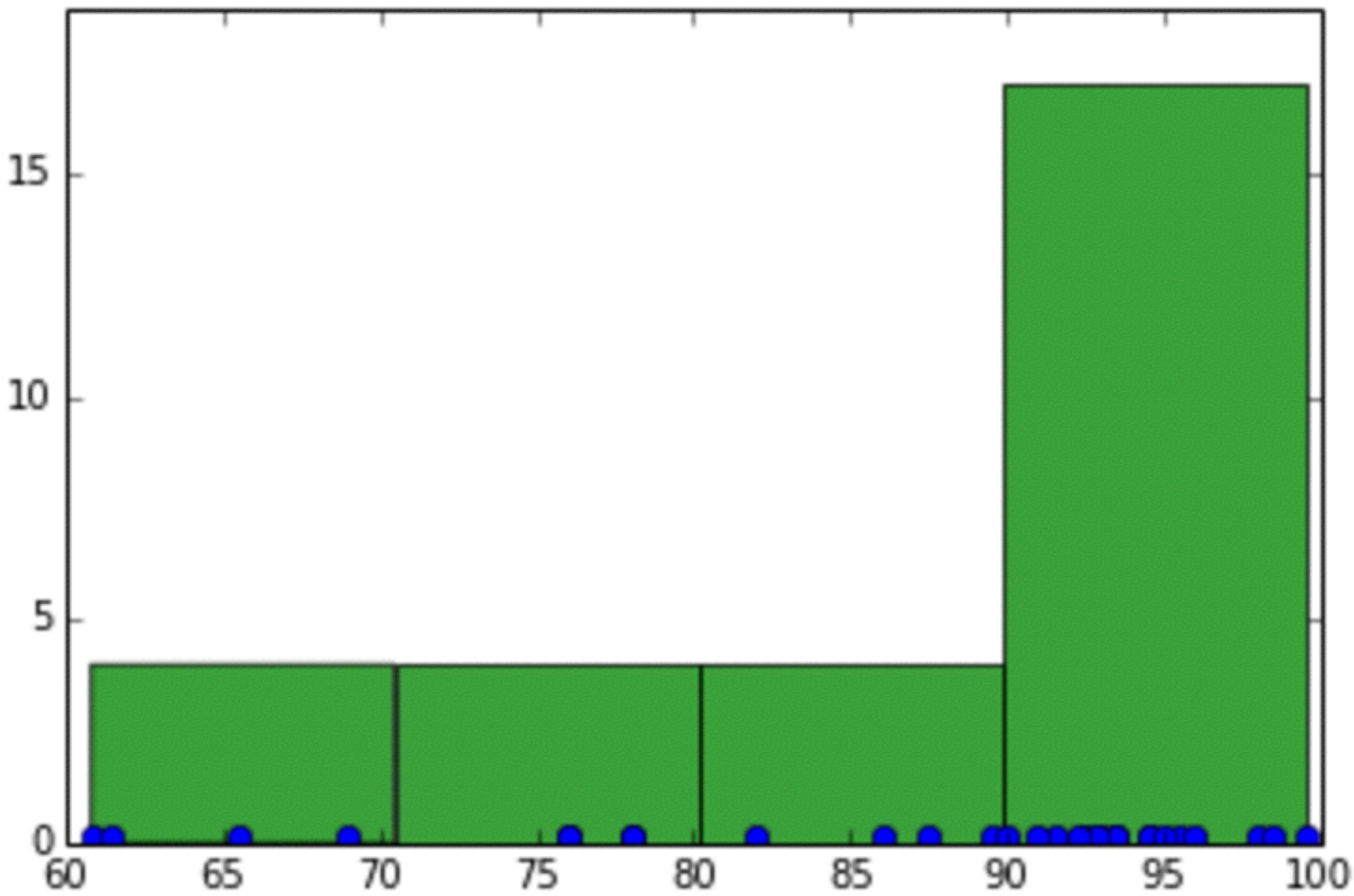
EXPORT

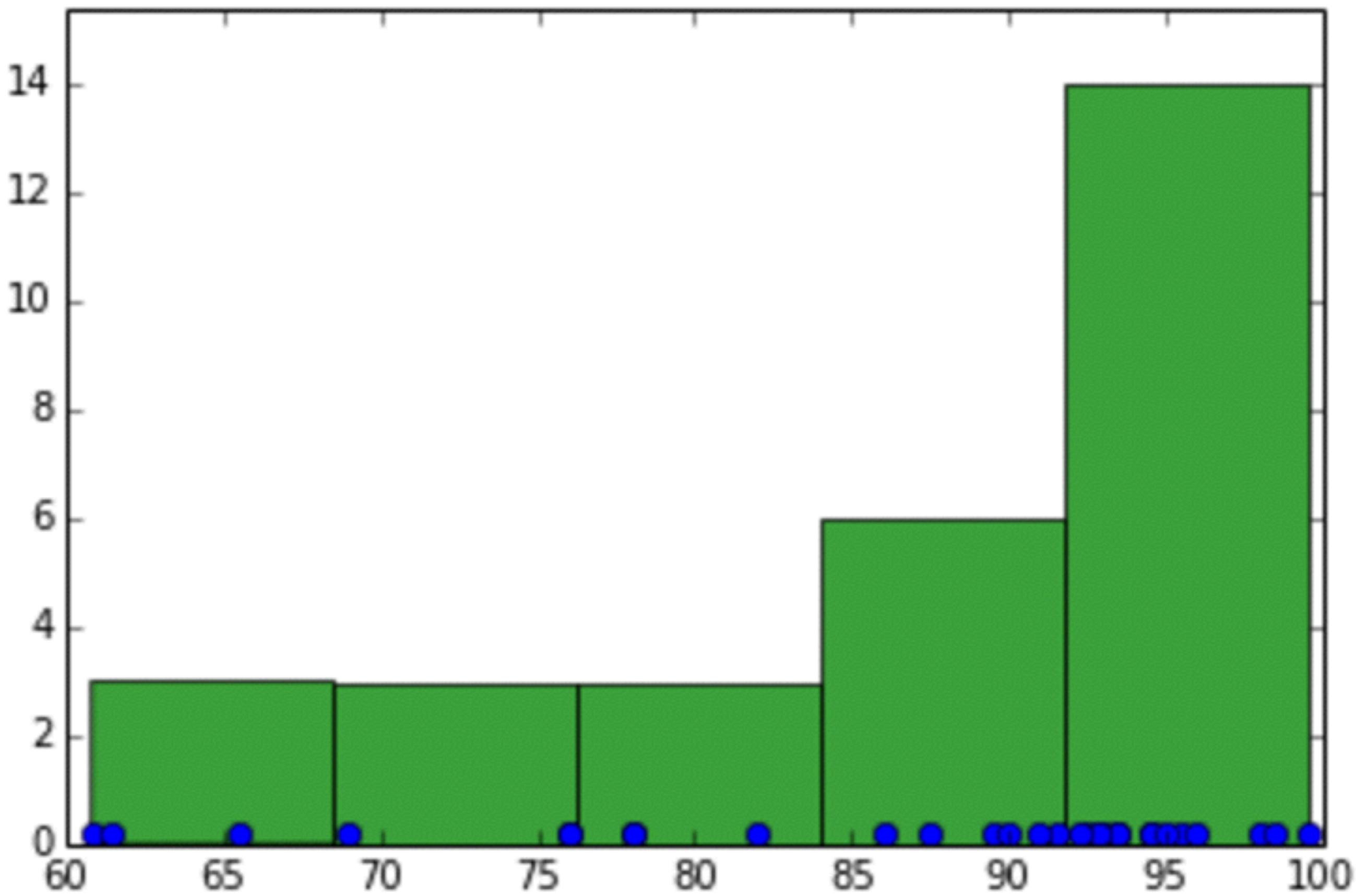


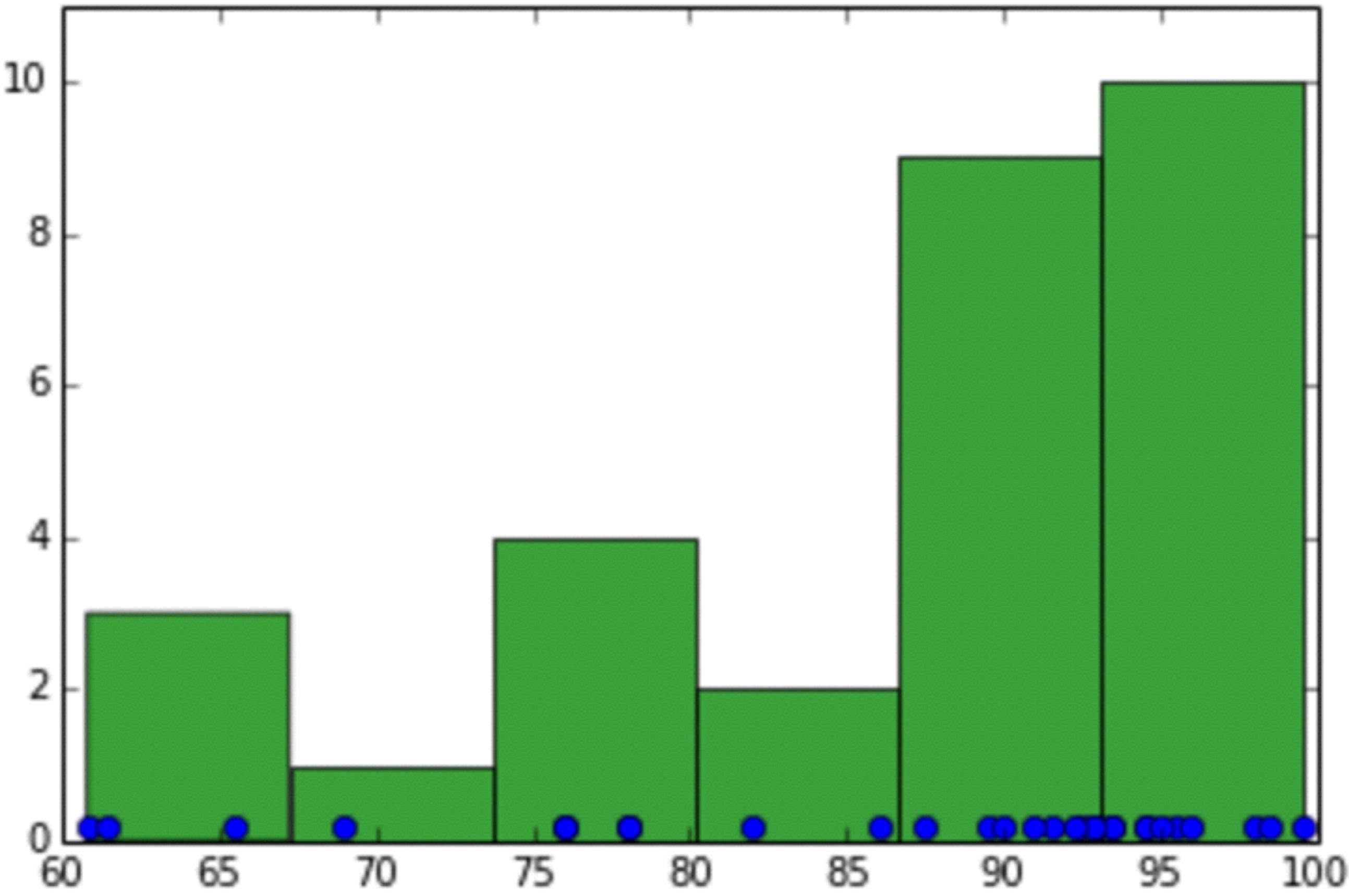
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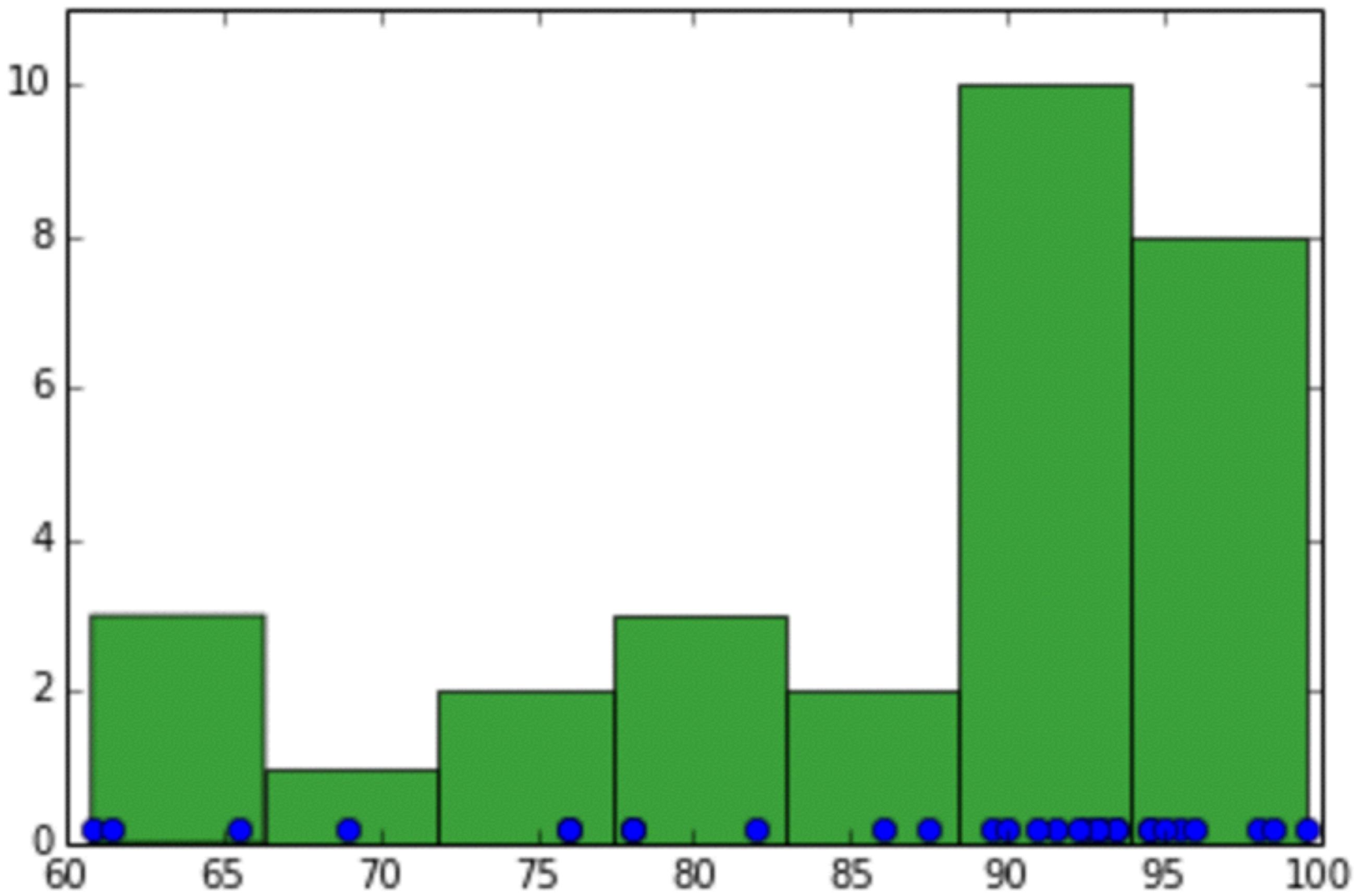
A**B****C**

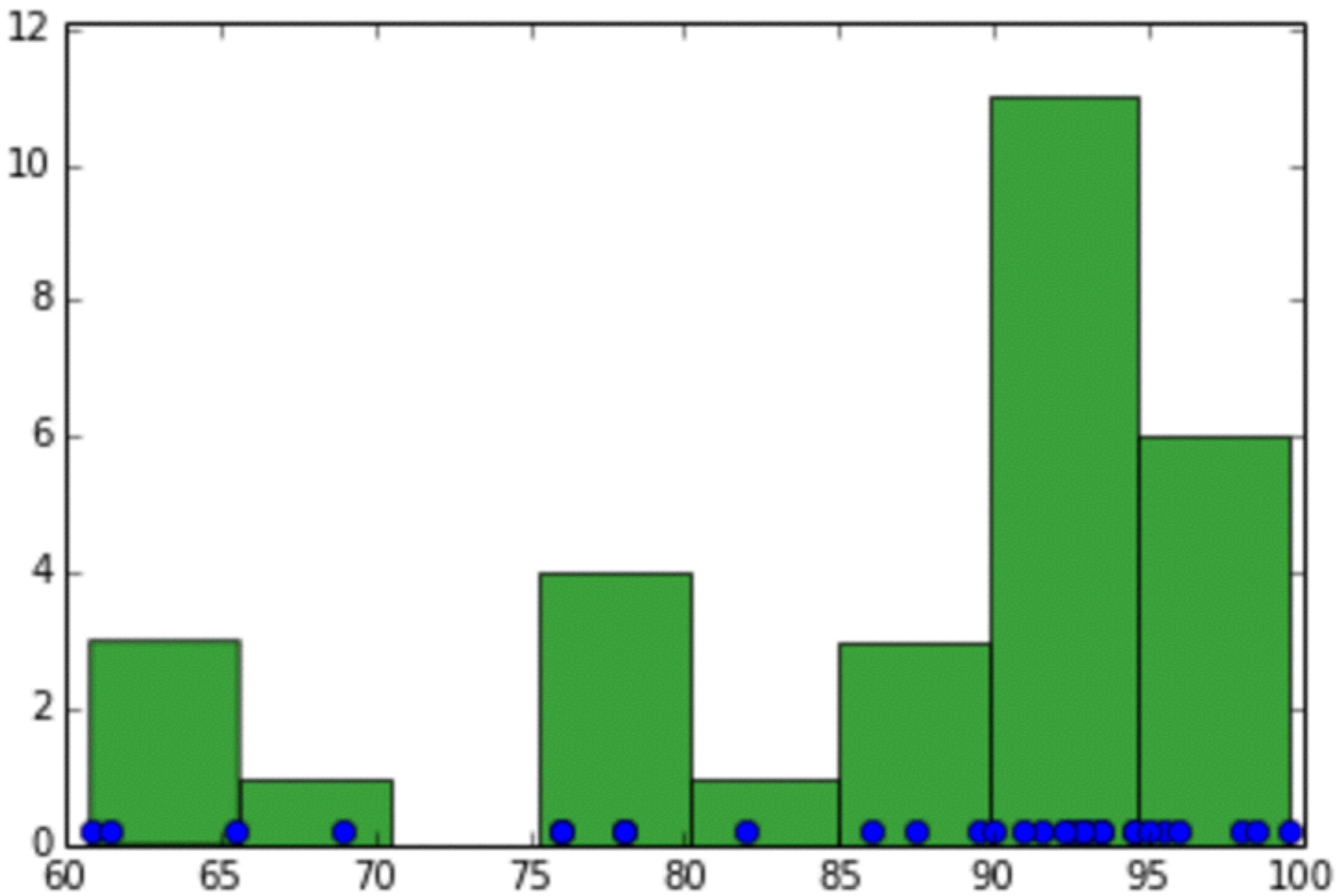












EXISTING TOOLS

SUMMARY

Code history is useful (and fun)

Data cleansing

DIY (by trying simple things)

THANK YOU.

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