

Data Sharing, Distribution and Updating Using Social Coding Community Github and L^AT_EX Packages in Graduate Research

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Integration of the Education and Science: Challenges of the Modern World

Kazakh-Russian International University

Aktobe, Kazakhstan

Polina Lemenkova

pauline dot lemenkova at gmail dot com

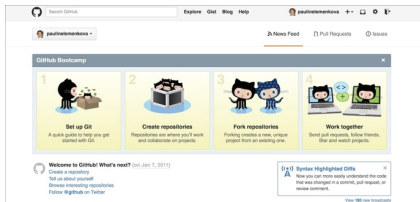
May 13, 2015



Outline

1. Introduction
 - GitHub. What Does it Mean?
 - GitHub: Shared Creativity
 - GitHub: Creative Sharing
2. Advantages of Web-Service GitHub
 - L^AT_EX: Advantages over Traditional Text Editors
3. How to Create Personal Repository ?
 - Step 1: Key Generation
 - Step 2: User Registration
 - Step 3: Generating Project
 - Step 4: Maintaining Project Push and Update
4. Typesetting Thesis in L^AT_EX
5. Why Using GitHub ?
 - Functionality of GitHub
 - Advantages of GitHub in Academia
 - System of Control and Revision
 - Maintained Privacy
 - Online Feature of GitHub: Data-Sharing
6. A Case Study of Using GitHub
 - Project Interface in the Github Environment
 - Example of Research Progress
 - Adding New Data to the Project
 - Access to the Project
7. Popularization
8. Conclusion
9. Discussion
10. Résumé
11. Thanks
12. Bibliography

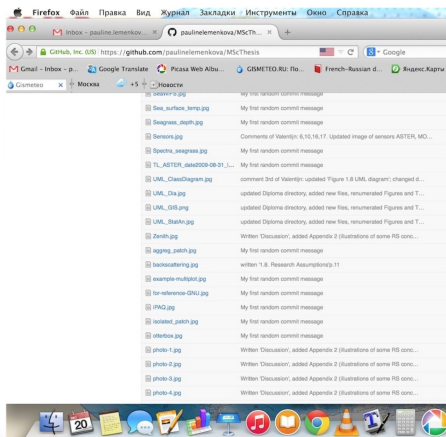
Some Facts



- Octocat (Octopus + Cat) is a symbol of GitHub. It symbolizes sharing a project.
- GitHub is available for free which is useful for students and researchers
- Slogan of GitHub: 'Social Coding', i.e. 'let's code it together'.
- It refers to the programming, but in this presentation I show using GitHub for MSc thesis

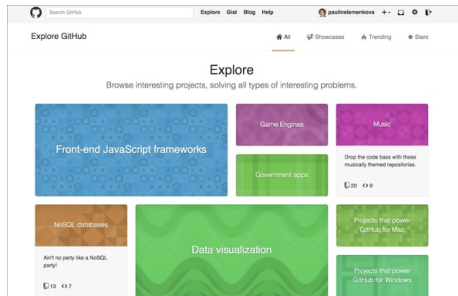
- GitHub - a web-service for hosting (i.e. serving and maintenance) of IT-projects online, as well as their development by multiple authors (incl. graduate projects development).
- GitHub is initially aimed at version control system Git (used in programming)
- GitHub is written in the programming language "Erlang" and "Ruby", a framework Ruby on Rails
- GitHub was created by GitHub, Inc, USA. The first private repository was established in 2008.

GitHub: Creative Sharing



- Github allows adding various data types: code, graphics, etc.
- Github allows control latest changes, discuss and discuss work with students, post any comments directly into the text, add online comments
- Github allows registered users to add current version changes to the repository of the current project.
- Github keeps all update versions in the current projects online
- Github gives the opportunity for data sharing
- Github enables coworking

Advantages of Web-Service GitHub



- Online repositories
- Possibilities for co-authorship
- Creating PhD/MSc/BSc theses
- Presenting research works
- Writing and updating articles
- Archive of scientific works
- Sharing with colleagues
- Notification of current updates

L^AT_EX : Advantages over Traditional Text Editors

There are a number of drawbacks when using traditional programs for writing theses (e.g., MS Word). These difficulties are essential when writing a thesis:

- Continuous numbering of the text and illustrations breaks when changing or adding new ones in the middle of the text (which must be corrected manually)
- In case of MS Word, student has to double-check all references to literary sources again, which complicates the work and leads to mechanical difficulties and lengthy monotonous corrections.
- L^AT_EX has a built-in flexible system of bibliographic cross-referencing in the list of references, which enables making automatic linking to the bib sources, as well as updating links.
- L^AT_EX has a built-in BibTeX package that enables compiling bibliography in active mode and leaves hyper refs and live links to references, i.e. Instantly editable if necessary.

Step 2: User Registration

git config - global user.email 'you@example.com'
 git config - global user.name 'Your Name' set up
 user's account default identity

```

1. bash
Run
git config --global user.email "you@example.com"
git config --global user.name "Your Name"

to set your account's default identity.
Dmit --global to set the identity only in this repository.

polinas-mbp:TeX_CV pauline$ git config --global user.email "pauline.lernenkova@gmail.com"
polinas-mbp:TeX_CV pauline$ git config --global user.name "paulinelernenkova"
polinas-mbp:TeX_CV pauline$ git commit -a -m "update 2014"
Dmiter 20141002 update 2014
1 file changed, 220 insertions(+), 218 deletions(-)
polinas-mbp:TeX_CV pauline$ git push
warning: push.default is unset; its implicit value is changing in
Git 2.0 from 'matching' to 'simple'. To squelch this message
and maintain the current behavior after the default changes, use:

  git config --global push.default=unmatching

To squelch this message and adopt the new behavior now, use:

  git config --global push.default=simple

When push.default is set to 'matching', git will push local branches
to the remote branches that already exist with the same name.

In Git 2.0, Git will default to the more conservative 'simple'
behavior, which only pushes the current branch to the corresponding
remote branch that 'git pull' uses to update the current branch.

See 'git help config' and search for 'push.default' for further information.
(the 'simple' mode was introduced in Git 1.7.11. Use the similar mode
'current' instead of 'simple' if you sometimes use older versions of Git)

Warning: Permanently added the RSA host key for IP address '192.30.252.131' to the list of known hosts.
Permission denied (publickey).
  
```

```

1. bash
Last login: Sun Dec 7 15:41:28 on console
polinas-mbp:~ pauline$ cd Documents
polinas-mbp:Documents pauline$ cd DOCUMENTS
polinas-mbp:DOCUMENTS pauline$ cd CURRICULUM_VITAE
polinas-mbp:CURRICULUM_VITAE pauline$ cd TeX_CV
polinas-mbp:TeX_CV pauline$ git diff
diff --git a/CV_Lernenkova.tex b/CV_Lernenkova.tex
index 076c390..fa3ad12 100644
--- a/CV_Lernenkova.tex
+++ b/CV_Lernenkova.tex
@@ -1,7 +1,10 @@
%!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! Document Setup !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
\documentclass[10pt]{article}
\usepackage{calc}
\usepackage{greek, english}[babel]
+%\usepackage{T2A,T1}[fontenc]
+\usepackage{utf8}[inputenc]
+\usepackage{polyglossia}
+\usepackage{russian,greek,english}[babel]
\makeatletter
\newlength{\bibhang}
\setlength{\bibhang}{1em}
@@ -20,9 +23,9 @@
\reversemarginpar
\usepackage{paper=letterpaper,
%!\includefoot, %! Uncomment to put page number above margin
marginparwidth=1.2in, %! Length of section titles
+ marginparwidth=0.75in, %! Length of section titles
marginparsep=.45in, %! Space between titles and text
marginwidth, %! Inch margin}
polinas-mbp:TeX_CV pauline$ git commit -a -m "updated CV, December 2014"
*** Please tell me who you are.

Run

git config --global user.email "you@example.com"
git config --global user.name "Your Name"

to set your account's default identity.
  
```

Step 3: Generating Project

Key Commands and Tools:

```

git init
git add files #all that I want to add
git commit -a -m "My first random commit message"
git diff
git remote add origin git@github.com:paulinelemenkova/CV.git
git push origin master
git add picture.jpg #may be something more to add
git commit -a -m "added my picture"
git push

touch .gitignore
echo "*.aux" >> .gitignore
echo "*.gz" >> .gitignore
echo "*.log" >> .gitignore
echo "*.out" >> .gitignore
echo "*.pdf" >> .gitignore
echo "*.synctex.gz" >> .gitignore

git diff
git status
git commit -a -m "changed ..."
git push

git diff
git commit -a -m "update statistics PASM 10"
git push

.gitignore file for LaTeX projects
*.glo
*.idx
*.log
*.toc
*.list
*.acn
*.acr
*.alg
*.bbl
*.bib
*.bvi
*.gls
*.gls
*.ind
*.lof
*.lot
*.maf
*.mtc
*.out
*.synctex.gz" >> .gitignore
, Lemenkova_CV_Log

```

'git init' - initiation project from scratch. 'git add files' - selecting all files for the project. (texts, tables, graphs, maps, figures).

```

iTerm Shell Edit View Profiles Toolbelt Window Help
i.bash
nothing added to commit but untracked files present
polinas-esp:TeX_CV pauline$ git diff
polinas-esp:TeX_CV pauline$ pwd
/users/pauline/Documents/DOCUMENTS/CURRENT/ML/VITAL/TeX_CV
polinas-esp:TeX_CV pauline$ ls -l
total 1568
-rw-r--r-- 1 pauline staff 3971 Dec 19 17:18 CV_Lemenkova.aux
-rw-r--r-- 1 pauline staff 6188 Dec 19 17:18 CV_Lemenkova.log
-rw-r--r-- 1 pauline staff 1824 Dec 19 17:18 CV_Lemenkova.out
-rw-r--r-- 1 pauline staff 337958 Dec 19 17:18 CV_Lemenkova.pdf
-rw-r--r-- 1 pauline staff 186172 Dec 19 17:18 CV_Lemenkova.synctex.gz
-rw-r--r-- 1 pauline staff 57776 Dec 19 17:18 CV_Lemenkova.tex
-rw-r--r-- 1 pauline staff 58789 Feb 16 2013 Photo_Lemenkova-rr.jpg
-rw-r--r-- 1 pauline staff 135533 Oct 13 2008 Photo_Lemenkova.jpg
-rw-r--r-- 1 pauline staff 15968 Feb 16 2013 Photo_Polina.jpg
polinas-esp:TeX_CV pauline$ ls -l
total 1592
drwxr-xr-x 14 pauline staff 476 Dec 28 18:41 .
drwxr-xr-x 29 pauline staff 986 Dec 28 18:41 ..
drwxr-xr-x 1 pauline staff 6148 Dec 28 18:41 .DS_Store
drwxr-xr-x 12 pauline staff 408 Dec 28 18:39 .git
-rw-r--r-- 1 pauline staff 76 Jan 8 2011 .gitignore
-rw-r--r-- 1 pauline staff 3971 Dec 19 17:18 CV_Lemenkova.aux
-rw-r--r-- 1 pauline staff 6188 Dec 19 17:18 CV_Lemenkova.log
-rw-r--r-- 1 pauline staff 1824 Dec 19 17:18 CV_Lemenkova.out
-rw-r--r-- 1 pauline staff 337958 Dec 19 17:18 CV_Lemenkova.pdf
-rw-r--r-- 1 pauline staff 186172 Dec 19 17:18 CV_Lemenkova.synctex.gz
-rw-r--r-- 1 pauline staff 57776 Dec 19 17:18 CV_Lemenkova.tex
-rw-r--r-- 1 pauline staff 58789 Feb 16 2013 Photo_Lemenkova-rr.jpg
-rw-r--r-- 1 pauline staff 135533 Oct 13 2008 Photo_Lemenkova.jpg
-rw-r--r-- 1 pauline staff 15968 Feb 16 2013 Photo_Polina.jpg
polinas-esp:TeX_CV pauline$ git log
commit 209166cc8e8014e304e1ca95c766e58f6ca-f3
Author: paulinelemenkova <pauline.lemenkova@gmail.com>
Date: Sat Dec 28 18:27:06 2014 +0300

    update 2014

```

Project Push and Update

```

1. bash
commit 33236a417e264fc6814438dc9db18372d5f06d
Author: paulinelemenkova <pauline.lemenkova@gmail.com>
Date: Sat Dec 28 18:27:06 2014 +0300

    update 2014

commit 3869343c4d370117b22e179e29ddb7ad1f1b0fff
Author: Паулина Леменкова <pauline@nve-0981.koleje.cuni.cz>
Date: Fri Jan 31 15:33:16 2014 +0100

    My CV update as of 31.01.2014

commit d45adf813437567ffc6fd2c30c801f922fc5812
Author: Pauline Lemenkova <pauline@para.g4.ntu.edu.tw>
Date: Thu Apr 11 14:50:53 2013 +0800

    updated my CV, Taiwan

commit e0e04c2e3dd5c427ea35a6f9938b14de6fcd7575
Author: Pauline Lemenkova <pauline@Pauline-Lemenkovas-MacBook-Pro.local>
Date: Wed Oct 24 17:36:37 2012 +0200

    current update of CV

pauline@mbp:TeX_CV pauline$ git show
commit 33236a417e264fc6814438dc9db18372d5f06d
Author: paulinelemenkova <pauline.lemenkova@gmail.com>
Date: Sat Dec 28 18:27:06 2014 +0300

    update 2014

diff --git a/CV_Lemenkova.tex b/CV_Lemenkova.tex
index 076e2b0..fa3ad12 100644
--- a/CV_Lemenkova.tex
+++ b/CV_Lemenkova.tex
@@ -1,7 +1,10 @@
\documentclass[10pt]{article}
\usepackage{calc}
\usepackage{greek, english}[label]

```

- `git commit -a -m 'name of update'`
- e.g.: `git commit -a -m 'added tables No 14, 15, 17'`
- 'git diff' - a key command of GitHub,
- 'git diff' - detects and recognizes all updates in the text
- 'git diff' highlights them green/red, respectively

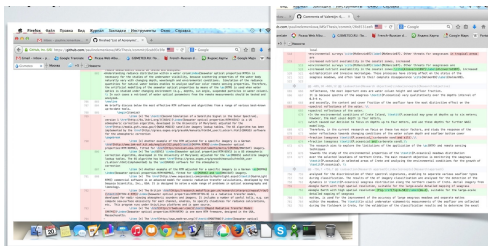
Advantages of GitHub in Academia

Time Monitoring

Using GitHub facilitates monitoring research progress and to assess the work done recently, to timely response to the comments and corrections of colleagues.

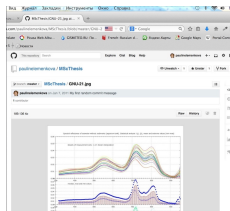
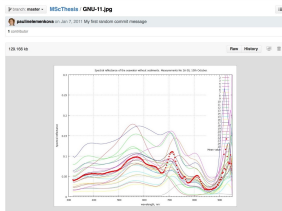
Retrospective Editing

Retrospective and comparative editing of texts in the Github environment allows to return to the old, previous version of the work, saved a while ago, to cancel updates.



Unpublished Works

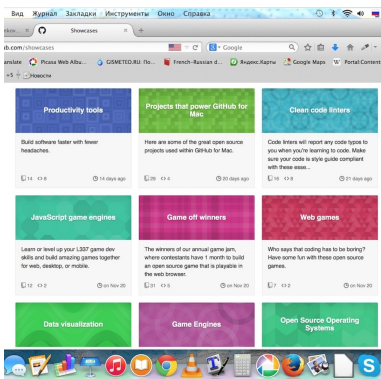
Both public and private repositories are maintained: the colleague/co-author/supervisors may receive private links to the current version of research and have access to the work.



```

1442 // receives data via recursive subroutines, using an array: images from previous, open();
1443 // replacement of array values through sorting at different angles, which allows very
1444 // detailed analysis and additional image manipulations, including image
1445 // expansion from the open scene (see file plotArea.js);
1446 // The current coverage of the image images is linear according to sequential images, but this can be refined
1447 // as well with an general providing smaller area coverage than sequential images, the image factor
1448 // images can be filtered by the external step of the sequential spatial analysis, using actual values in
1449 // Pattern for the next (ImageFactor) serial image grabbing process (File: ON2-11-02-00
1450 // File: ON2-11-02-00) which allows multiple processing of single images near the image scene area
1451 // use results and generate image results.
1452 // images are an extension by the external step of the accessible spatial analysis, using actual values in
1453 // Pattern for the next (ImageFactor) serial image grabbing process (File: ON2-11-02-00) which allows multiple
1454 // serial image grabbing process (File: ON2-11-02-00) which allows multiple processing of single images near
1455 // the image scene area and includes the generation image results.
1456 //
1457 // Subsection: Image processing using Erwin ImageProcessing (Image-4)
1458 // The analysis of the image of Erwin starts as based on the image classification and is aimed to
1459 // use the image processing process using Erwin ImageProcessing (Image-4)
1460 // before open: analyze surface, program and for each species including classification (Image-4), safety
1461 // program and and edges on each, results, make surface, use (File: ON2-11-02-00)
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```


Online Feature of GitHub: Data-Sharing



Github's use of the standard command line interface in programming

- Adding current version changes to the repository of the current project.
- Supports both a public repository and a closed one in limited access (private).
- Keeping closed unpublished works, with restricted access to coworkers.
- Successfully defended dissertations, master's projects and theses can be posted in open access.
- Access is configured for both the general public and the university archive.
- Data can be stored there for an unlimited time.

A Case Study of Using GitHub

```

1807 1803 \begin{wrapfigure}{r}{0.4\textwidth}
1808 1804 \centering
1809 1805 - \includegraphics[scale=0.15]{fig-15.jpg}
1810 1806 - \caption{Reflectance spectra of Textit(Thalassia seagrass;  $R_{rs}(b)$  - subsurface  $R_S$  reflectance;
1811 1807  $R_{rs}$  b - the bottom
1812 1808 reflectance. Source:\cite{Yang10}\label{Yang10}. Pages: 5-5\paperref{page-213}=5,
1813 1809 5-5\paperref{page-223}=5, 5-5\paperref{page-543}=5}
1814 1810 - \label{fig2.6}
1815 1811 - \includegraphics[scale=0.30]{fig-14.jpg}
1816 1812 - \caption{Multispectral vs. hyperspectral band coverage. \\\ Source:\cite{Sabino97}\label{Sabino97}.
1817 1813 Pages: 5-5\paperref{page-203}=5, 5-5\paperref{page-183}=3}
1818 1814 + \label{fig2.5}
1819 1815 + \end{wrapfigure}
1820 1816
1821 1817 Another comparative analysis of the application of \href{http://www.itres.com/products/imagers/casi508}
1822 1818 (CASI), Landsat and \href{http://www.digitalglobe.com/index.php/RS/QuickBird}\label{QuickBird} imagery
1823 1819 \cite{Pinn08}\label{Pinn08}
1824 1820 @ -1872_8 -1867_17 @ \subsection{Seagrass global monitoring: history and perspectives}\index{concepts}
1825 1821
1826 1822 1990 an board Terra sensor\index{concepts}\index{remote sensing}\index{multispectral imagery}\index{terra sensor}, provides
1827 1823 high-resolution images of the Earth in 15 different bands of the
1828 1824 electromagnetic spectrum, ranging from visible to thermal infrared light (Fig.\ref{fig2.4}). It has diverse
1829 1825 subsystems for the \index{MODIS} with 15 n resolution, shortwave infrared \index{SWIR}, and
1830 1826 \index{LTR} wavelength regions \index{Kalinoski04}\label{Kalinoski04}. For each channel there is separate
1831 1827 on-board calibration \index{OBC} system, telescope with independent pointing and different detector technology
1832 1828 \index{Ara05}\label{Ara05}.
1833 1829 +\index{TR} wavelength regions \index{Kalinoski04}\label{Kalinoski04}.
1834 1830 +
1835 1831 +\begin{wrapfigure}{r}{0.4\textwidth}
1836 1832 + \centering
1837 1833 - \includegraphics[scale=0.15]{fig-15.jpg}
1838 1834 - \caption{Reflectance spectra of Textit(Thalassia seagrass;  $R_{rs}(b)$  - subsurface  $R_S$  reflectance;
1839 1835  $R_{rs}$  b - the bottom
1840 1836 reflectance. Source:\cite{Yang10}\label{Yang10}. Pages: 5-5\paperref{page-213}=5,
1841 1837 5-5\paperref{page-223}=5, 5-5\paperref{page-543}=5}
1842 1838 - \label{fig2.6}
1843 1839 + \includegraphics[scale=0.30]{fig-14.jpg}
1844 1840 + \caption{Multispectral vs. hyperspectral band coverage. \\\ Source:\cite{Sabino97}\label{Sabino97}.
1845 1841 Pages: 5-5\paperref{page-203}=5, 5-5\paperref{page-183}=3}
1846 1842 + \label{fig2.5}
1847 1843 + \end{wrapfigure}
1848 1844
1849 1845 +For each channel there is separate \index{OBC} system, telescope with independent pointing and different
1850 1846 detector technology \index{Ara05}\label{Ara05}.
1851 1847 This makes \index{ASTRON}\label{page-19} imagery especially suitable for the application towards detailed
1852 1848

```

A case study of using GitHub: my MSc thesis.

- MSc Thesis “Seagrass Mapping and Monitoring Along the Coasts of Crete, Greece”, defended in Netherlands, University of Twente, Faculty of GIS and Earth Observation, 2011.
- Written using text editor \LaTeX using GitHub
- Original source: on my [GitHub webpage](#).

The screenshot shows the GitHub interface for the repository 'paulinelemenkova / MScThesis'. At the top, there are navigation links for 'This repository', 'Search', 'Explore Git', 'Blog', and 'Help'. Below this, the repository name is displayed with options to 'Unwatch', 'Unstar', and 'Fork'. The main content area shows the repository title 'Seagrass mapping and monitoring along the coasts of Crete, Greece' and a list of commits. The 'Commits' tab is selected, showing a list of commits with their messages and dates. The sidebar on the right contains links for 'Code', 'Issues', 'Pull Requests', 'Wiki', 'Pulse', 'Graphs', and 'Settings'. At the bottom of the sidebar, there is a note about HTTPS clone URLs and a link to 'You can clone with HTTPS, SSH'.

Project Interface in the Github Environment

Opportunities

GitHub: excellent opportunities in academia for supervisors, students, lecturers, researchers.

Monitoring

The use of \LaTeX and Github provided timely access for the project's supervisors to monitor research progress

Examples

Updating Unlike traditional MS Word, combination of \LaTeX and Github allowed supervisors to check current progress on-line as updates, comments and corrections made.

Example of Research Progress

New text is highlighted in green, deleted paragraphs are highlighted in red.

```

Вид Журнал Закладки Инструменты Окно Справка
...
.com/paulinelemenkova/MScThesis/commit/d3a6c8020f
state Picasa Web Albums GIMETEO.RU: По... French-Russian d... Яндекс.Карты Google Maps Portal
+5 -1 Новости
1984 1984 \section{Appendix-1}{Label{app}}
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```

Current research progress can be easily monitored and specific project updates highlighted and commented

```

Вид Журнал Закладки Инструменты Окно Справка
...
.com/paulinelemenkova/MScThesis/commit/2fe8513eef
state Picasa Web Albums GIMETEO.RU: По... French-Russian d... Яндекс.Карты Google Maps Portal
+5 -1 Новости
952 952
953 953
954 954
955 955
956 956
957 957
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```

Adding New Data to the Project

The image displays two screenshots of GitHub commit pages for the repository 'paulinelemenkova / MScThesis'.

Left Screenshot: Shows a commit titled 'Comment 22 of Valentijn: Fig.4.5: added MERIS spectral bands as stripes'. The commit message includes 'added MERIS spectral bands as stripes'. Below the message, it states 'Showing 5 changed files with 5 additions and 5 deletions.' A preview of a plot is shown, titled 'Remote sensing reflectance (a⁻¹)' on the y-axis and 'wavelength (nm)' on the x-axis. The plot shows a blue curve with several vertical green and yellow shaded regions representing spectral bands.

Right Screenshot: Shows a commit titled 'updated Diploma directory, added new files, renumerated Figures and T...'. The commit message includes 'updated Diploma directory, added new files, renumerated Figures and T...'. Below the message, it states 'Showing 13 changed files with 3,885 additions and 0 deletions.' A preview of a plot is shown, titled 'Q-Q plot for v27' on the y-axis and 'Q-Q plot for v27' on the x-axis. The plot shows red data points following a blue diagonal line, indicating a normal distribution fit.

Access to the Project

Правка Вид Журнал Закладки Инструменты Окно Справка

updated Diploma director...

tps://github.com/paulinelemenkova/MScThesis/commit/5b7f4e8852

Google Translate Picasa Web Albu... GISMETEО.RU: По... French-Russian d... Яндекс.Карты Google Maps Portal Content

UML_StatAn.jpg View

1 comment on commit 5b7f4e8

paulinelemenkova commented on 5b7f4e8 on Jan 23, 2011

```

+usepackage{chngcntr}
+locounterwithin{figure}{section}
+locounterwithin{table}{section}

```

This commands enable to start anew reenumeration of Tables/Figures in each Chapter / section. Very useful thing for long documents (such as Diplomas & Dissers) in LaTeX | Both require "chngcntr" package (change counter).

Actuality of Using GitHub

Audience

Despite obvious advantages and prospects of the GitHub service, the majority of its users are programmers and IT specialists. Using GitHub in academia is still limited.

Popularization in Academia

There is an need to popularize and demonstrate the GitHub service and environment in the student and academic environment: in research centers, universities, institutes.

Examples

Geologists: Getting acquainted with GitHub would be of especial advantage for faculties of natural and Earth sciences, since they often have common fieldwork data and projects.

Conclusion

Current problem with GitHub and \LaTeX is their non-popularity in academia caused by following reasons.

Student Works

Some students are not informed about the \LaTeX or GitHub and do not know how to use them. The functionality of these tools, multifunctional environments should be popularized.

Difficulty of Learning Curve

GitHub and \LaTeX are sometimes regarded as difficult programs. The basics of using \LaTeX and GitHub should be initially studied for some time, but it is rewarding. Further advantages of using \TeX and GitHub are obvious and worth the efforts and time to master them.

Examples

Advantages: Joint combination of using \LaTeX and GitHub facilitates writing, typesetting and managing versions upgrades while working on a project.

Discussion

Opportunities

Traditional for IT industry and programmers, GitHub offers great opportunities for effective collaboration such as 'student-supervisor' or 'group of students' or 'group of colleagues'. Unlike traditional programs, the use of innovative technologies of text editors, such as \LaTeX and data archiving such as GitHub allows supervisor to monitor student's research progress.

Advantages

A great advantage of GitHub consists in its color syntax and maintaining history of updates versions. The presentation demonstrated conceptual principles of the Github and \LaTeX .

Possibilities

The possibilities for collaborative data sharing, research progress updating and creative works are illustrated. Current work is a technical illustration of using IT in education.

Résumé

Résumé

This work aimed to give an example of the effective use of the GitHub web service specifically in an academic environment. The case study was given to a MSc thesis that was written completely using \LaTeX and GitHub. The presentation illustrated how specifically one can apply new technologies and innovative approaches in the educational environment.

Highlights

Technical issues of running project, creating repositories, making updates, adding new files to the system are demonstrated with a series of screenshot illustrations of the process. Important conceptual features and advantages of using Github and \LaTeX in the academic environment are listed and discussed.

Thanks

Thank you for attention !

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