

Technologijos atviram mokslui

Python, Jupyter, WebApi ir Blockchain

Aidis Stukas, 2017-10-23



Apie mane

Anksčiau

- Medijų filosofija
- Lietuvos jaunųjų mokslininkų sąjungos ir Eurodoc
- KTU kokybė

Dabar

- PyCon ir Agile Tour org
- *Scraping* / informacijos gavyba iš interneto

1. Python



Python, paprasta, lengvai skaitoma ir rašoma programavimo kalba.

119897 modulių

Eight of the top 10 U.S. computer science departments, and 27 of the top 39 (69 percent) use the language to teach the fundamentals of Computer Science.

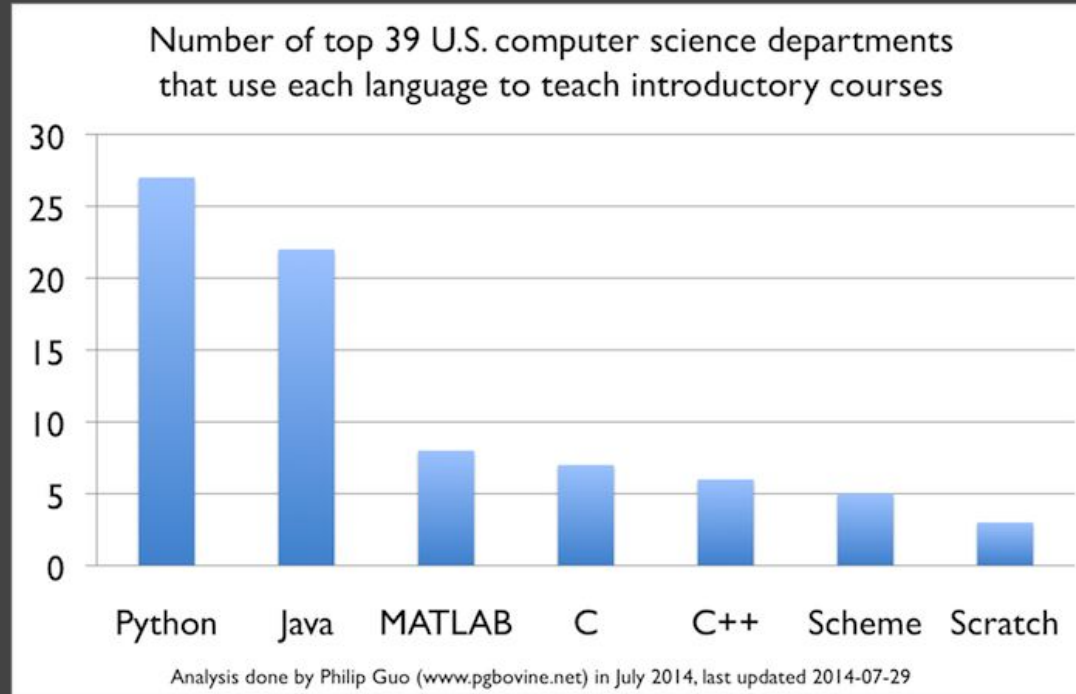
```
print("Hello world!")
```

Jau naudojama mokslininkų

Numeric and Scientific

- » **NumPy** - <http://www.numpy.org/> -- Numerical Python adds a fast, compact, multidimensional array facility to Python. **NumPy** is the successor to both Numeric and Numarray.
 - » **Deprecated: Numeric** -- Numerical Python adds a fast, compact, multidimensional array language facility to Python. (Note: superseded by **NumPy**)
 - » **Deprecated: NumArray** - <http://stsdas.stsci.edu/numarray/index.html> -- Numarray is a reimplementaion of Numeric which adds the ability to efficiently manipulate arrays by **NumPy**
- » **SciPy** - <http://www.scipy.org/> SciPy is an open source library of scientific tools for Python. **SciPy** supplements the popular **NumPy** module, gathering a variety of high level modules for linear algebra, optimization, integration, special functions, signal and image processing, statistics, genetic algorithms, ODE solvers, and others.
- » **Numba** - <http://numba.pydata.org/> Numba is an open source, **NumPy**-aware Python compiler specifically suited to scientific codes.
- » **ad** is an open-source Python package for transparently performing first- and second-order automatic differentiation calculations with any of the base numeric types (int, float, complex) and optimization routines.
- » **APM Python** - <http://apmonitor.com/wiki/index.php/Main/PythonApp> APMonitor is a nonlinear programming and optimization environment with an interface to Python. The solution of large-scale mathematical programming problems.
- » **SymPy** - <http://www.sympy.org/> **SymPy** is a symbolic manipulation package, written in pure Python. Its aim is to become a full featured CAS in Python, while keeping the code extensible.
- » **ALGLIB** - <http://www.alglib.net/> - numerical analysis library in C++ and C#, with Python and **IronPython** interfaces.
- » **Python Data Analysis Library** - <http://pandas.pydata.org/> - pandas is a library providing high-performance, easy-to-use data structures and data analysis tools for the Python programming language.
- » **PyGSL** - <http://pygsl.sourceforge.net/> -- This project provides a python interface for the GNU scientific library (gsl).
- » **FuncDesigner** - <http://openopt.org/FuncDesigner> **FuncDesigner** is Python module to rapidly build functions and get their derivatives via automatic differentiation. Also you can analyze, solve eigenvalue problems, systems of linear/non-linear/ODE equations and numerical optimization problems coded in **FuncDesigner** by **OpenOpt**.
- » **OpenOpt** - <http://openopt.org> - a framework for numerical optimization and systems of linear/non-linear equations. Connects to dozens of solvers (some are C- or Fortran-based). Provides graphic output of convergence, [multifactor analysis tool](#) for scientific experiments planning and some more numerical optimization "MUST HAVE" features. Also available as a commercial yet, free for small-scaled academic and research purposes)
- » **SpaceFuncs** - <http://openopt.org/SpaceFuncs> - a tool for 2D, 3D, N-dimensional geometric modeling with possibilities of parametrized calculations, numerical optimization and automatic differentiation.
- » **INLOpt** - <http://ab-initio.mit.edu/inlopt> - another library for nonlinear optimization, including many local/global optimization algorithms written in C, with a Python interface.
- » **jHepWork** - <http://jwork.org/jhepwork> - a multiplatform data-analysis framework written in Java. The main programming language is Jython, a clone of Python written in Java. It contains scientific graphs. Contains an interactive Python prompt.

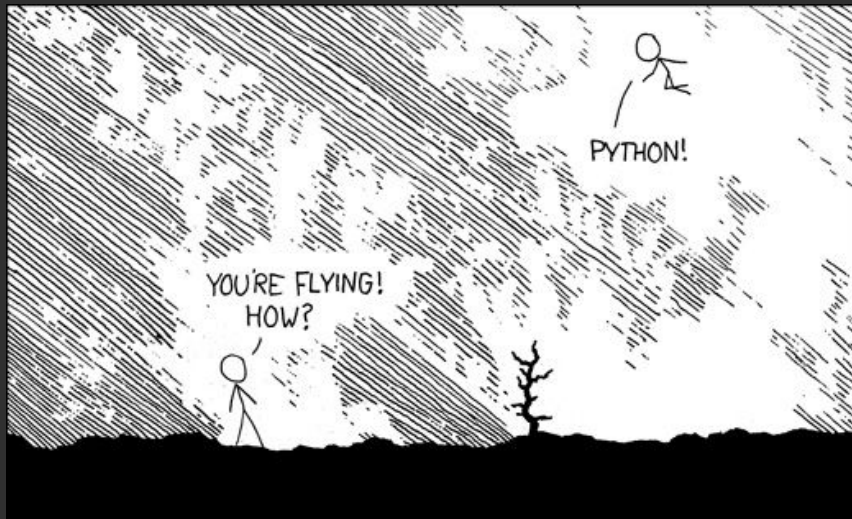
<https://wiki.python.org/moin/NumericAndScientific>



<https://cacm.acm.org/blogs/blog-cacm/176450-python-is-now-the-most-popular-introductory-teaching-language-at-top-u-s-universities/fulltext>

You're flying! How?

Python!



2. Jupyter



Project Jupyter exists to develop open-source software, open-standards, and services for interactive computing across dozens of programming languages.

<http://nb.bianp.net/sort/views/>

jupyter Welcome to P

File Edit View Insert Cell

+

jupyter

Welcome to the

This Notebook Server was

WARNING
Don't rely on this server

Your server is hosted there

Run some Python code

To run the code below:

1. Click on the cell to select it
2. Press SHIFT+ENTER

A full tutorial for using the

```
In [ ]: %matplotlib inline

import pandas as pd
import numpy as np
import matplotlib
```

jupyter Lorenz Differential Equations (autosaved)

File Edit View Insert Cell Kernel Help

Python 3

Code Cell Toolbar: None

Exploring the Lorenz System

In this Notebook we explore the [Lorenz system](#) of differential equations:

$$\begin{aligned}\dot{x} &= \sigma(y - x) \\ \dot{y} &= \rho x - y - xz \\ \dot{z} &= -\beta z + xy\end{aligned}$$

This is one of the classic systems in non-linear differential equations. It exhibits a range of complex behaviors as the parameters (σ, β, ρ) are varied, including what are known as *chaotic solutions*. The system was originally developed as a simplified mathematical model for atmospheric convection in 1963.

```
In [7]: interact(Lorenz, N=fixed(10), angle=(0.,360.),
                 sigma=(0.0,50.0), beta=(0.,5), rho=(0.0,50.0))
```

angle 308.2

max_time 12

σ 10

β 2.6

ρ 28

Mokslininkai jau naudoja...

- Scientific computing and data analysis with the SciPy Stack
- General topics in scientific computing
- Social data
- Psychology and Neuroscience
- Machine Learning, Statistics and Probability
- Physics, Chemistry and Biology
- Economics and Finance
- Earth science and geo-spatial data
- Data visualization and plotting
- Mathematics
- Signal, Sound and Image Processing
- Natural Language Processing
- Pandas for data analysis

3. Web API/service

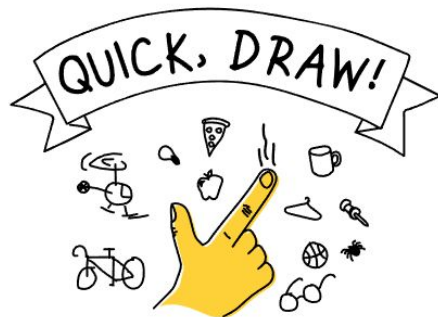
Mokslo sėkmės pagrindas yra
nuolatiniai ir greiti patikimos
informacijos mainai.

Google vision pavyzdys



Cloud Vision API

https://cloud.google.com/vision/https://unplu.gg/test_api.html



Can a neural network learn to recognize doodling?

Help teach it by adding your drawings to the [world's largest doodling data set](https://quickdraw.withgoogle.com/), shared publicly to help with machine learning research.

Let's Draw!

<https://quickdraw.withgoogle.com/>

You can create
this with python!

Python!

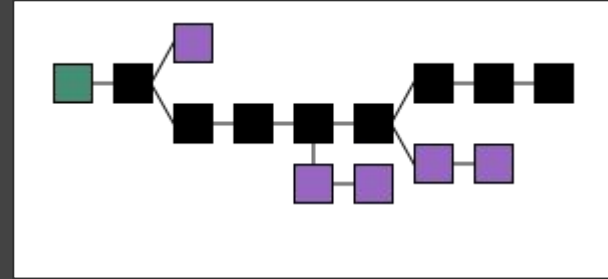


Flask

web development,
one drop at a time

django

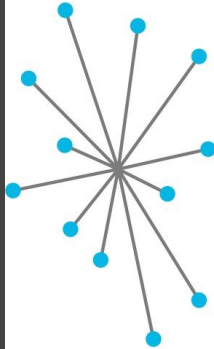
4. Blockchain



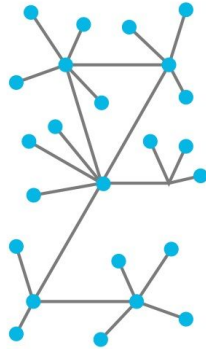
A blockchain – is a continuously growing list of records, called blocks, which are linked and secured using cryptography <...> By design, blockchains are inherently resistant to modification of the data. A blockchain can serve as "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way."

Kuris tinklas labiau atviras?

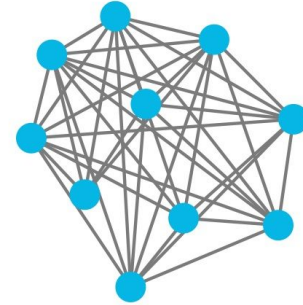
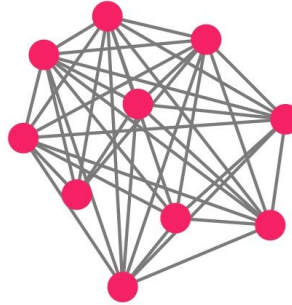
Centralized



Decentralized



Distributed Ledgers



The New Networks

Distributed ledgers can be public or private and vary in their structure and size.

Public blockchains

Require computer processing power to confirm transactions ("mining")

- Users (●) are anonymous

- Each user has a copy of the ledger and participates in confirming transactions independently

- Users (●) are not anonymous

- Permission is required for users to have a copy of the ledger and participate in confirming transactions

Bitcoin: A Peer-to-Peer Electronic Cash System


Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

Ar blockchain technologija galėtų
būti panaudota mokslinės
produkcijos ir jos reputacijos
saugojimui ir valdymui?

Idėjų jau yra...

A Proposed Currency System for Academic Peer Review Payments Using the BlockChain Technology

Michael Spearpoint^{1,2} 

¹ Department of Civil and Natural Resources Engineering, University of Canterbury, Christchurch, 8020, New Zealand; michael.spearpoint@canterbury.ac.nz

² Olsson Fire & Risk, Manchester M4 6WX, UK

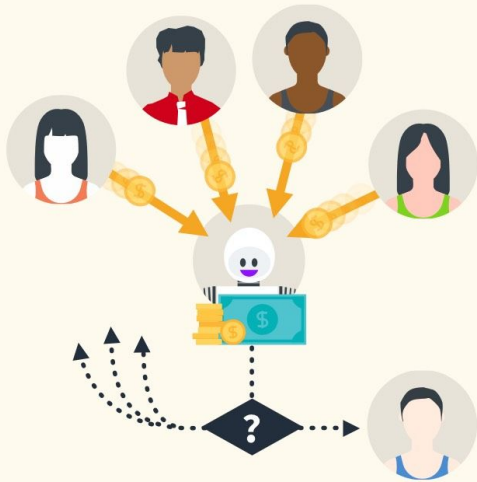
Academic Editor: Robert Campbell

Received: 23 May 2017; Accepted: 10 July 2017; Published: 14 July 2017

Abstract: Peer review of scholarly papers is seen to be a critical step in the publication of high quality outputs in reputable journals. However, it appears that there are few incentives for researchers to agree to conduct suitable reviews in a timely fashion and in some cases unscrupulous practices are occurring as part of the production of academic research output. Innovations in internet-based technologies mean that there are ways in which some of the challenges can be addressed. In particular, this paper proposes a new currency system using the BlockChain as its basis that provides a number of solutions. Potential benefits and problems of using the technology are discussed in the paper and these will need further investigation should the idea develop further. Ultimately, the currency could be used as an alternative publication metric for authors, institutions and journals.

Keywords: peer review; BlockChain; currency

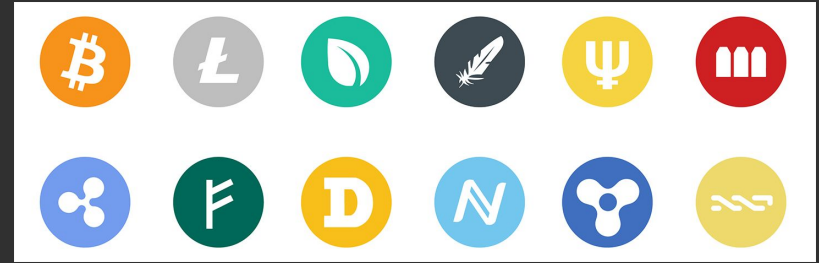
Bet tai dar ne viskas



<https://ethereum.org/crowdsale>

<https://ethereum.org/dao>

Anksčiau ar
vėliau, bet
blockchain bus
naudojamas





Ačiū!

Aidis Stukas

aidis.stukas@gmail.com

Klausimas auditorijai:
Kuri technologija
labiausiai sudomino?