

Ένωση Πληροφορικών Ελλάδας

Σύνταξη και συγγραφή
επιστημονικών-τεχνικών κειμένων

Χάρης Γεωργίου (MSc, PhD)

Ένωση Πληροφορικών Ελλάδας

Στόχοι:

- Πρώτος “καθολικός” φορέας εκπροσώπησης πτυχιούχων Πληροφορικής.
- Αρμόδιος φορέας εκπροσώπησης επαγγελματιών Πληροφορικής.
- Αρμόδιος επιστημονικός “συμβουλευτικός” φορέας για το Δημόσιο.
- Αρωγός της Εθνικής Ψηφιακής Στρατηγικής & Παιδείας της χώρας.

<https://www.epe.org.gr>



Τομείς παρέμβασης

Ποιοι είναι οι κύριοι τομείς παρεμβάσεων της ΕΠΕ;

- ① Εθνική Ψηφιακή Στρατηγική & Οικονομία
- ② Εργασιακά (ΤΠΕ), Δημόσιος & ιδιωτικός τομέας
- ③ Παιδεία (Α', Β', Γ')
- ④ Έρευνα & Τεχνολογία
- ⑤ Έργα & υπηρεσίες ΤΠΕ
- ⑥ Ασφάλεια συστημάτων & δεδομένων
- ⑦ Ανοικτά συστήματα & πρότυπα
- ⑧ Χρήση ΕΛ/ΛΑΚ
- ⑨ Πνευματικά δικαιώματα
- ⑩ Κώδικας Δεοντολογίας (ΤΠΕ)
- ⑪ Κοινωνική μέριμνα (ICT4D)





Harris Georgiou (MSc, PhD) – <https://github.com/xgeorgio/info>

- R&D: Associate post-doc researcher and lecturer with the University Athens (NKUA) and University of Piraeus (UniPi)
- Consultant in Medical Imaging, Machine Learning, Data Analytics, Signal Processing, Process Optimization, Dynamic Systems, Complexity & Emergent A.I., Game Theory
- HRTA member since 2009, LEAR / scientific advisor
- HRTA field operator (USAR, scuba diver)
- Wilderness first aid, paediatric (child/infant)
- Humanitarian aid & disaster relief in Ghana, Lesvos, Piraeus
- Support of unaccomp. minors, teacher in community schools
- Streetwork training, psychological first aid & victim support
- 2+4 books, 170+ scientific papers/articles (and 5 marathons)

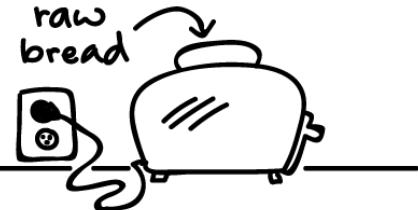
Επισκόπηση

- Περιεχόμενα:
 - Τι είναι τα επιστημονικά-τεχνικά κείμενα;
 - Γιατί είναι σημαντική η οργάνωση και η τεκμηρίωση;
 - Τι είναι το peer-review και ποια είναι τα προβλήματα-περιορισμοί στην εφαρμογή του;
 - Επιστημονικές μελέτες και δημοσιεύσεις:
 - Conferences, magazines, journals, open-access repositories.
- Αναφορές:
 - «Εισαγωγή στη Μηχανική Μάθηση και στην Αναλυτική Δεδομένων», Χ. Γεωργίου, Α' κύκλος ανοικτών μαθημάτων ΕΠΕ – <https://youtu.be/mlU4SvyfRqA>
 - «Εφαρμογές της Τεχνητής Νοημοσύνης στον πραγματικό κόσμο», Χ. Γεωργίου, Α' κύκλος ανοικτών μαθημάτων ΕΠΕ – <https://youtu.be/d2HnIWyQse4>
 - «Particle Swarm Optimization and RBF Neural Networks for public transport arrival time prediction using GTFS data», E. Chondrodima, H. Georgiou, N. Pelekis, Y. Theodoridis. *International Journal of Information Management Data Insights (IJIMDI)*, Vol. 2, Issue 2, Nov. 2022, 100086 ([doi: 10.1016/j.jjimei.2022.100086](https://doi.org/10.1016/j.jjimei.2022.100086))

Μέρος Ι: Οργάνωση & Έρευνα

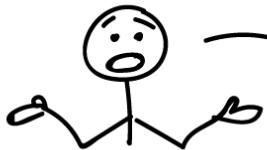
1. Τι είναι η Επιστημονική Μεθοδολογία;
2. Γιατί είναι σημαντική;
3. Τι είναι το πειραματικό πρωτόκολλο;
4. Πως οργανώνουμε τη μελέτη;





① Observation:

The toaster won't toast!



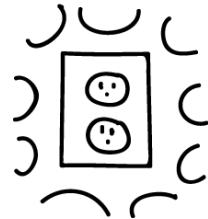
② Question:

Why won't my
toaster toast?



③ Hypothesis:

Maybe the
outlet is
broken.



④ Prediction:

If I plug the toaster into a different outlet, then it will toast the bread.



⑤ Test of prediction:

Plug the toaster into a different outlet & try again.

And the result is...



My bread toasts!

Hypothesis is
supported.



My bread still
won't toast.

Hypothesis is
not supported.

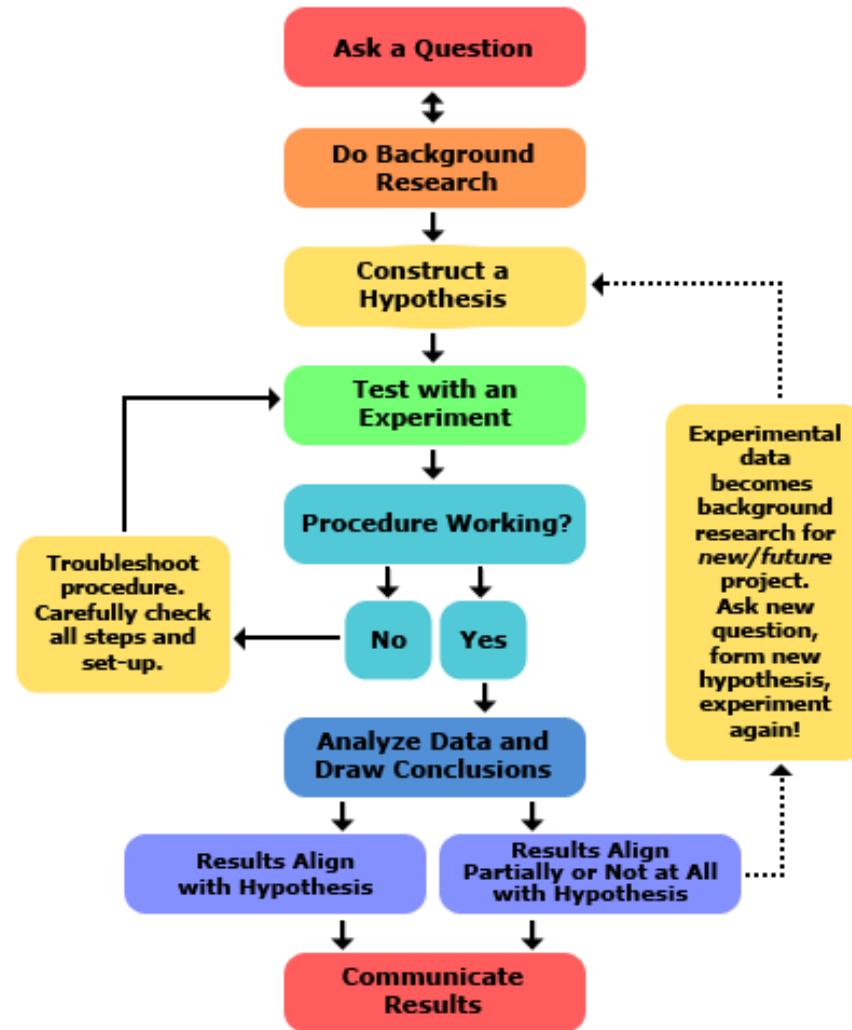
⑥ Iteration time!

But what is
actually wrong
with that outlet?

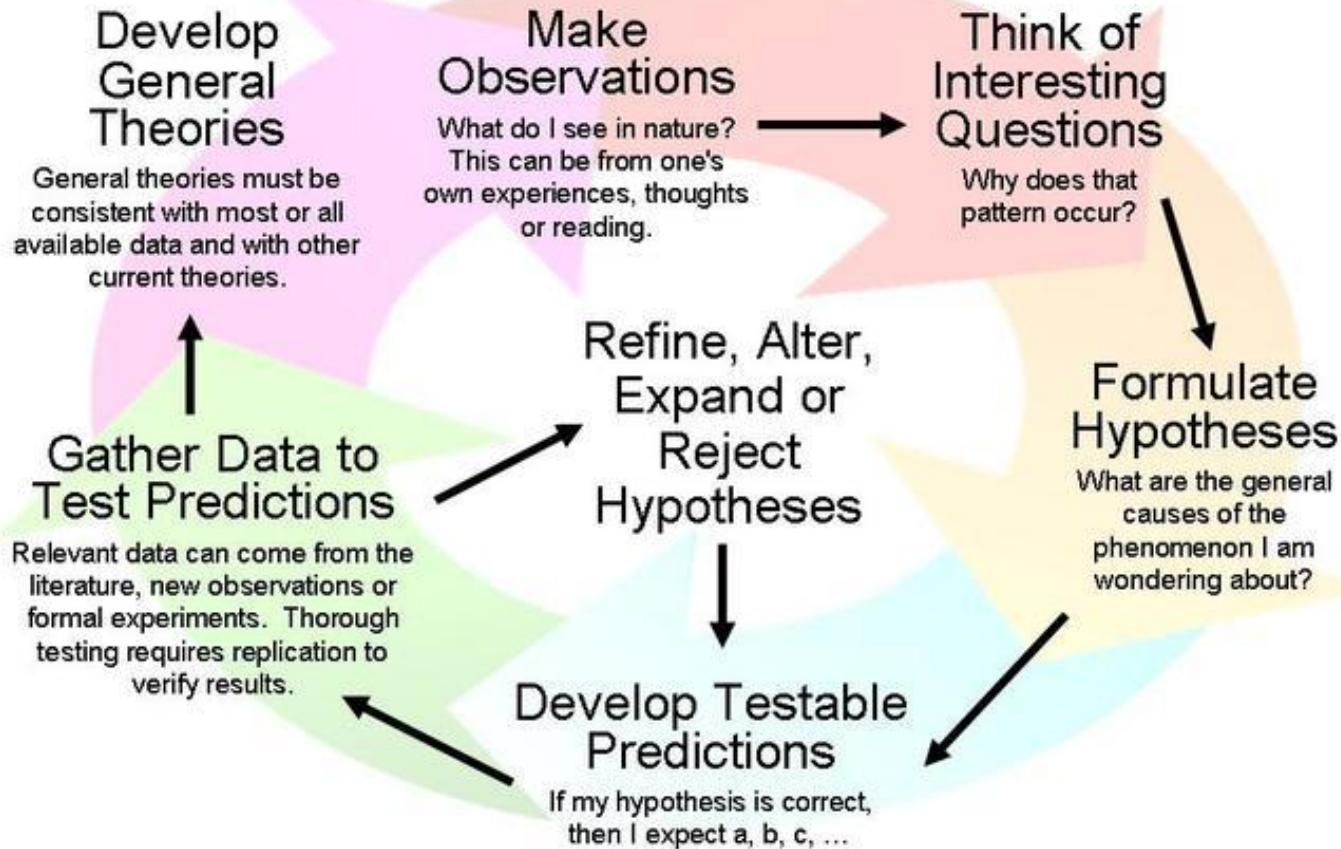
Hmm... maybe
there is a broken
wire in the toaster.

Summary:

1. Observation
2. Question
3. Hypothesis
4. Prediction (Model)
5. Verification (Test)
6. Iteration (Extend)



The Scientific Method as an Ongoing Process



A STANDERD PROTOCOL

This is the simple version of a complex protocol

Created by Name (abv1@unilac.ca) on October 2, 2017
Edited by John Smith (abv1@unilac.ca) on October 3, 2017
Last edit October 19, 2017

PROTOCOL

Step 1

[Time required 20 minutes]

• Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nam porta dui a fermentum varius. Aliquam cur-

- Then do the next thing

Step 2

[Time required 35 minutes]

Pellentesque habitant morbi tristique senectus

- Then do the next thing

Step 3

[Time required 40 minutes]

habitant morbi tristique senectus

- Then do the next thing
- Then do the next thing

Step 4

[Time required 25 minutes]

Ut quis orci luctus, efficitur sem vitae

- Do this using the method in the bib file (Einstein 1905)
- Then do the next thing

Step 5

[Time required 30 minutes]

orbi tristique senectus

- Then do the next thing
- Then do the next thing
- Then do the next thing

Step 6

[Time required 15 minutes]

ipsum dolor sit amet

- Then do the next thing as done by Einstein 1905
- Then do the next thing
- Then do the next thing
- Then do the next thing

LATEX

Protocol purpose

Laorem ipsum dolor sit amet, consectetur adipiscing elit. Nam porta dui a fermentum varius. Aliquam cur-

EQUIPMENT

(n) petri dishes Some things Stuff

other more used before (would do)

tweezers

CEMICALS

100% H₂O 25% H₂O

Some chemicals Some H₂SO₄

DANGERS

Chemicals	● ● ●
Physical	● ● ●
Environmental	● ● ●

PROTECTIVE GEAR

Laboratory Coat Gloves boots

SOURCES

References

- Knuth, Donald (n.d.). Knuth: Computers and Typesetting. URL: <http://www-cs-faculty.stanford.edu/~uno/abode.html>.
- Dirac, Paul Adrien Maurice (1981). *The Principles of Quantum Mechanics*. International series of monographs on physics. Clarendon Press. ISBN: 9780198520115.
- Knuth, Donald E. (1973). "Fundamental Algorithms". In: Addison-Wesley. Chap. 12.
- Einstein, Albert (1905). "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]". In: *Annalen der Physik* 322:10, pp. 891–921. DOI: <http://dx.doi.org/10.1002/andp.19053221004>.

WARNINGS

- Chemical The H₂SO₄ is bad for you
- Bugs The bugs will be attracted to the H₂O

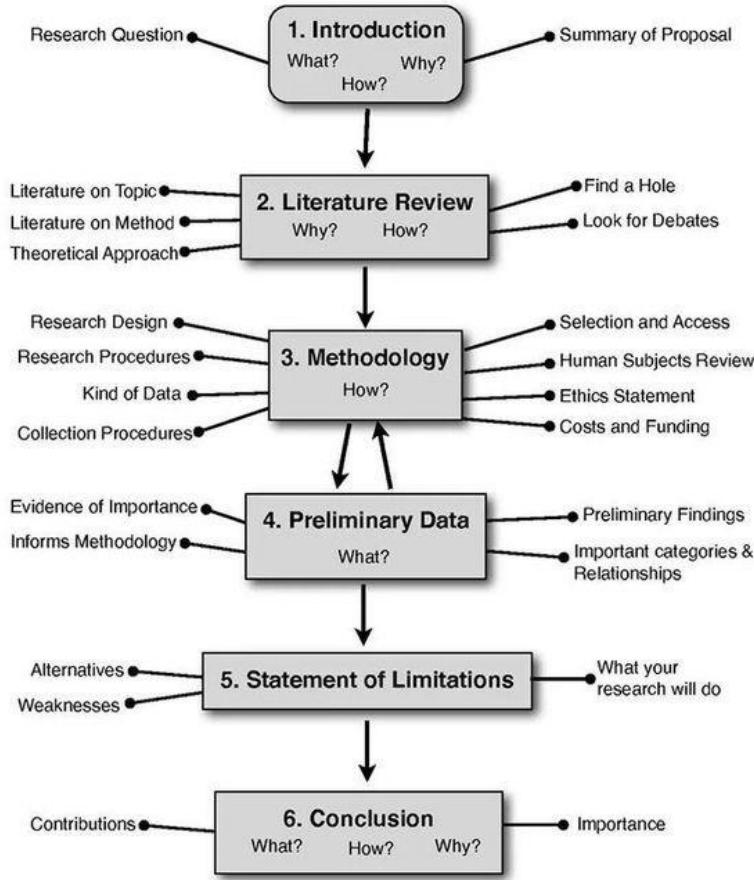
NOTES

-
-
-
-
-
-
-
-

PEOPLE TO CONTACT

Jame and Sam (about chemicals)

Research Proposal Flow Chart



Συνήθης οργάνωση συγγραφής μελέτης:

1. Ολοκλήρωση πειραματικού πρωτοκόλλου, επιβεβαίωση αποτελεσμάτων, επισήμανση σημαντικών συμπερασμάτων.
2. Επιλογή μέσου δημοσίευσης (+deadlines)
3. Προσαρμογή template (.docx/.tex)
4. Κατανομή έκτασης ανά section (%)
5. Ενημέρωση βιβλιογραφίας (.bib)
6. Μεθοδολογία + Πειράματα/Αποτελέσματα
7. “Related Work” + “Problem Statement”
8. Εισαγωγή + Συμπεράσματα + Abstract + Τίτλος
9. Tables/Figures/Artwork
10. Εσωτερικό review (2 ή 3 κύκλοι)

17 Equations That Changed the World

by Ian Stewart

1. Pythagoras's Theorem $a^2 + b^2 = c^2$ Pythagoras, 530 BC
2. Logarithms $\log xy = \log x + \log y$ John Napier, 1610
3. Calculus $\frac{df}{dt} = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h}$ Newton, 1668
4. Law of Gravity $F = G \frac{m_1 m_2}{r^2}$ Newton, 1687
5. The Square Root of Minus One $i^2 = -1$ Euler, 1750
6. Euler's Formula for Polyhedra $V - E + F = 2$ Euler, 1751
7. Normal Distribution $\Phi(x) = \frac{1}{\sqrt{2\pi\rho}} e^{-\frac{(x-\mu)^2}{2\rho^2}}$ C.F. Gauss, 1810
8. Wave Equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ J. d'Almbert, 1746
9. Fourier Transform $f(\omega) = \int_{-\infty}^{\infty} f(x)e^{-2\pi i x \omega} dx$ J. Fourier, 1822
10. Navier-Stokes Equation $\rho \left(\frac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v} \right) = -\nabla p + \nabla \cdot \mathbf{T} + \mathbf{f}$ C. Navier, G. Stokes, 1845
11. Maxwell's Equations $\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}$, $\nabla \cdot \mathbf{H} = 0$
 $\nabla \times \mathbf{E} = -\frac{1}{c} \frac{\partial \mathbf{H}}{\partial t}$, $\nabla \times \mathbf{H} = \frac{1}{c} \frac{\partial \mathbf{E}}{\partial t}$ J.C. Maxwell, 1865
12. Second Law of Thermodynamics $dS \geq 0$ L. Boltzmann, 1874
13. Relativity $E = mc^2$ Einstein, 1905
14. Schrodinger's Equation $i\hbar \frac{\partial}{\partial t} \Psi = H\Psi$ E. Schrodinger, 1927
15. Information Theory $H = -\sum p(x) \log p(x)$ C. Shannon, 1949
16. Chaos Theory $x_{t+1} = kx_t(1-x_t)$ Robert May, 1975
17. Black-Scholes Equation $\frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} + \frac{\partial V}{\partial t} - rV = 0$ F. Black, M. Scholes, 1990

NO. 4356 April 25, 1953

NATURE

737

equipment, and to Dr. G. E. R. Deacon and the captain and officers of H.M.S. *Discovery II* for their part in making the observations.

* Young, F. B., Gorstal, H., and Jeavons, W., *Phil. Mag.*, **40**, 149 (1930).

[†] Langton-Hunting, M. S., *Mon. Not. Roy. Astron. Soc., Geophys. Suppl.*, **5**, 149 (1936).

[‡] van Ark, W. S., Woods Hole Papers in Phys., Oceanog., Meteor., **11** (3) (1956).

*Elman, Y. W., *Arkiv. Mat. Astron. Fysik. (Stockholm)*, **2**(11) (1905).

is a residue on each chain every 3.4 Å. in the *z*-direction. We have assumed an angle of 36° between adjacent residues in the same chain, so that the structure repeats after 10 residues on each chain, that is, after 34 Å. The distance of a phosphorus atom from the fibre axis is 10 Å. As the phosphates are on the outside, cations have easy access to them.

The structure is an open one, and its water content is rather high. At lower water contents we would expect the bases to tilt so that the structure could become more compact.

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases. The planes of the bases are perpendicular to the fibre axis. They are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other chain, so that the two lie side by side with identical *z*-co-ordinates. One of the pair must be a purine and the other a pyrimidine for bonding to occur. The hydrogen bonds are made as follows: purine position 1 to pyrimidine position 1; purine position 6 to pyrimidine position 6.

If it is assumed that the bases only occur in the structure in the most plausible tautomereric forms (that is, with the keto rather than the enol configurations) it is found that only specific pairs of bases can bond together. These pairs are: adenine (purine) with thymine (pyrimidine), and guanine (purine) with cytosine (pyrimidine).

In other words, if an adenine forms one member of a pair, on either chain, then on these assumptions the other member must be thymine; similarly for guanine and cytosine. The sequence of bases on a single chain does not appear to be restricted in any way. However, if only specific pairs of bases can bond together, it follows that if the sequence of bases on one chain is given, then the sequence on the other chain is automatically determined.

It has been found experimentally^{3,4} that the ratio of the amounts of adenine to thymine, and the ratio of guanine to cytosine, are always very close to unity for deoxyribosylic nucleic acid.

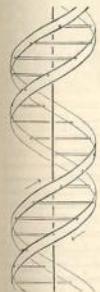
It is probably impossible to build this structure with a ribose sugar in place of the deoxyribose, as the extra oxygen atom would make too close a van der Waals contact.

The previously published X-ray data^{5,6} on deoxyribosylic acid are insufficient for a rigorous test of our structure. So far as we can tell, it is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against more exact results. Some of these are given in the following communications. We were not aware of the details of the results presented there when we devised our structure, which rests mainly though not entirely on published experimental data and stereochemical arguments.

It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

Full details of the structure, including the conditions assumed in building it, together with a set of co-ordinates for the atoms, will be published elsewhere.

We are much indebted to Dr. Jerry Donelson for constant advice and criticism, especially on interatomic distances. We have also been stimulated by a knowledge of the general nature of the unpublished experimental results and ideas of Dr. M. H. F. Wilkins, Dr. R. E. Franklin and their co-workers at



This figure is purely diagrammatic. The two ribbons symbolize the two phosphodiester-sugar chains. The helix is formed by the two pairs of bases holding the two chains together. The vertical line marks the fibre axis.

Οι επιστημονικές δημοσιεύσεις δεν είναι πάντα μεγάλες οι σύνθετες...

COUNTEREXAMPLE TO EULER'S CONJECTURE
ON SUMS OF LIKE POWERS

BY L. J. LANDER AND T. R. PARKIN

Communicated by J. D. Swift, June 27, 1966

A direct search on the CDC 6600 yielded

$$27^5 + 84^5 + 110^5 + 133^5 = 144^5$$

as the smallest instance in which four fifth powers sum to a fifth power. This is a counterexample to a conjecture by Euler [1] that at least n n th powers are required to sum to an n th power, $n > 2$.

REFERENCE

1. L. E. Dickson, *History of the theory of numbers*, Vol. 2, Chelsea, New York, 1952, p. 648.

Journal Impact Factor Calculation

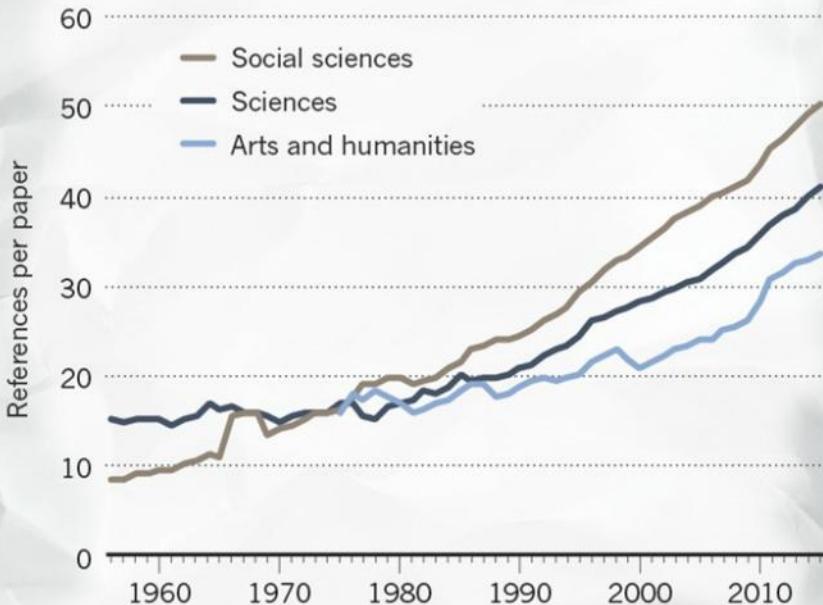
$$\begin{array}{l} \text{2017} \\ \text{Journal} \\ \text{Impact} \\ \text{Factor} \end{array} = \frac{357}{124} = 2.879$$

How is Journal Impact Factor Calculated?

$$\text{JIF} = \frac{\text{Citations in 2017 to items published in } \mathbf{2015 (197) + 2016 (160)}}{\text{Number of citable items in } \mathbf{2015 (55) + 2016 (69)}} = \frac{357}{124}$$

References on the rise

The number of references in papers has steadily risen over time, with papers in the sciences now including more than 40 on average.



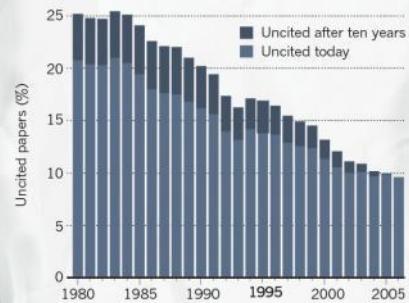
©nature

UNCITED SCIENCE

Data from the Web of Science give an incomplete picture of how much science is never cited: many papers it records as having no citations have actually been cited somewhere.

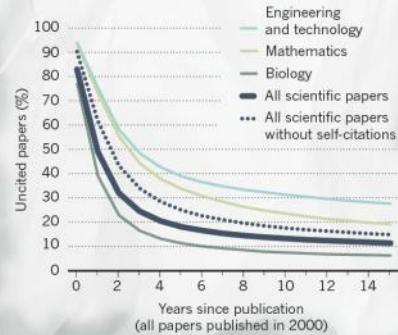
Downward trend

The share of scientific articles recorded as 'uncited' in each year is falling.



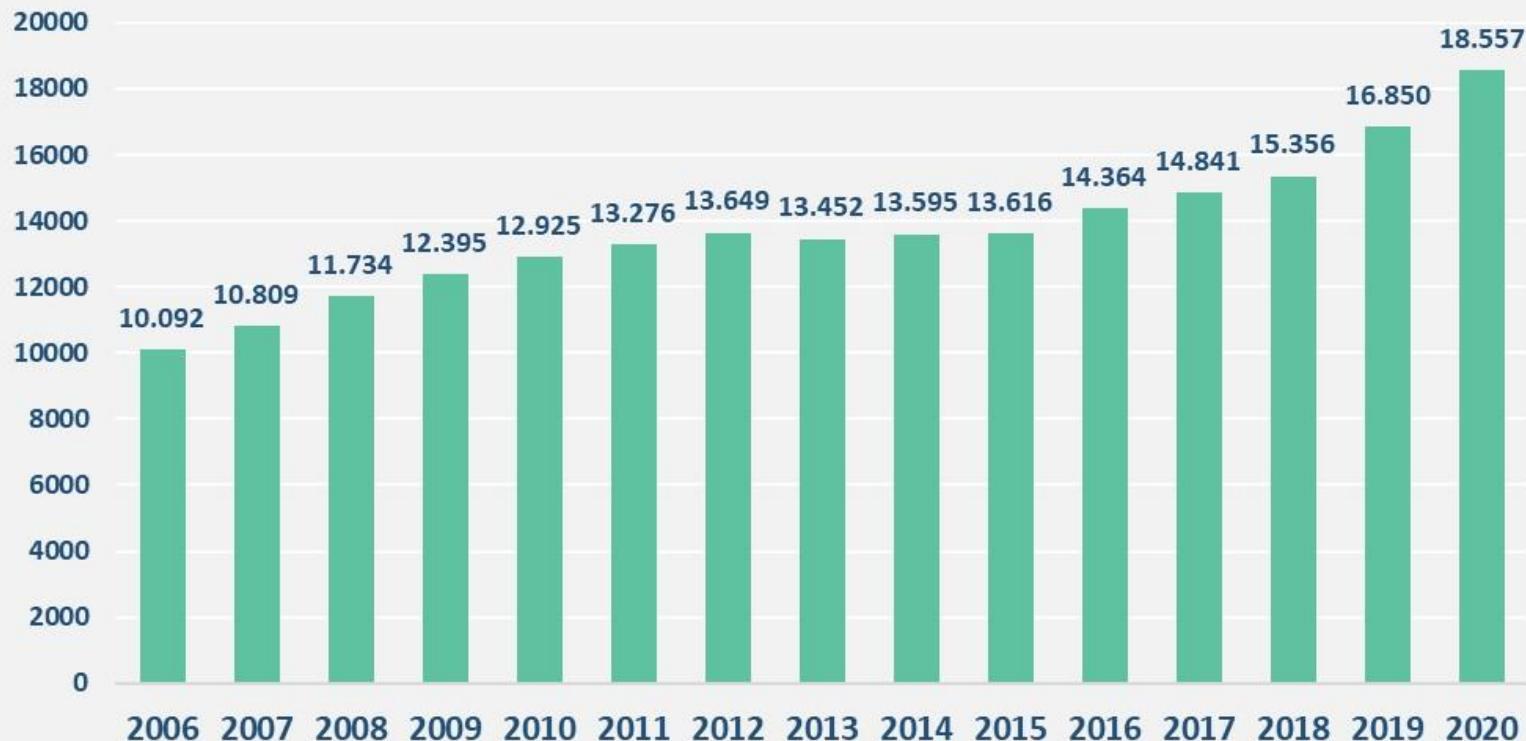
Disciplinary differences

The share of uncited papers from any year falls as time goes by, but at differing rates in different disciplines.



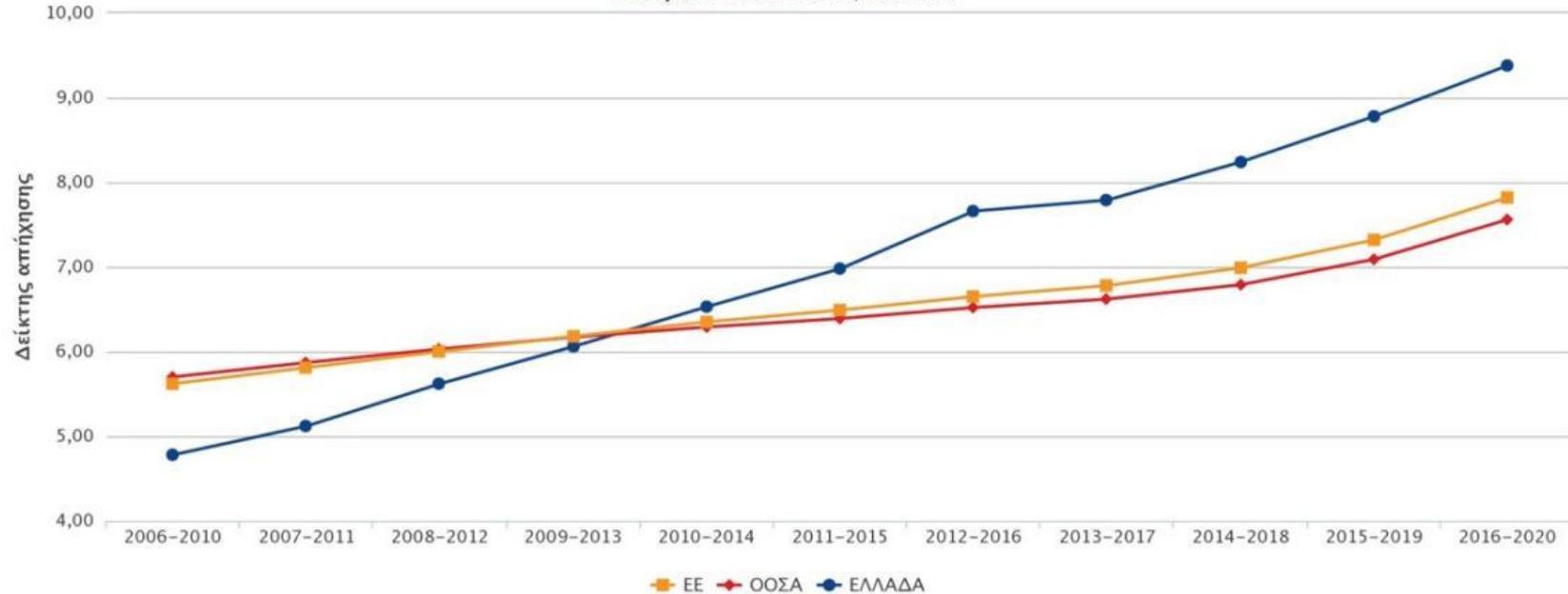
©nature

Αριθμός δημοσιεύσεων ελληνικών φορέων, ανά έτος, για την περίοδο 2006-2020



Δείκτης απήχησης των δημοσιεύσεων της Ελλάδας, των χωρών μελών της ΕΕ και των χωρών του ΟΟΣΑ, ανά πενταετία, για την περίοδο 2006-2020

Δεδομένα: Web of Science, 2006-2020



ΠΗΓΗ: EKT, Επιστημονικές Δημοσιεύσεις Ελληνικών Φορέων 2006-2020: Βιβλιομετρική ανάλυση δημοσιεύσεων σε διεθνή επιστημονικά περιοδικά - Web of Science, <http://report09.metrics.ekt.gr>



Η Ελλάδα στον «Ορίζοντα Ευρώπη»(Horizon Europe)



ΕΛΛΑΔΑ



ΣΥΝΟΛΟ ΕΕ27



ΜΕΡΙΔΙΟ (%)
ΕΛΛΑΔΑΣ
ΣΤΗΝ ΕΕ 27



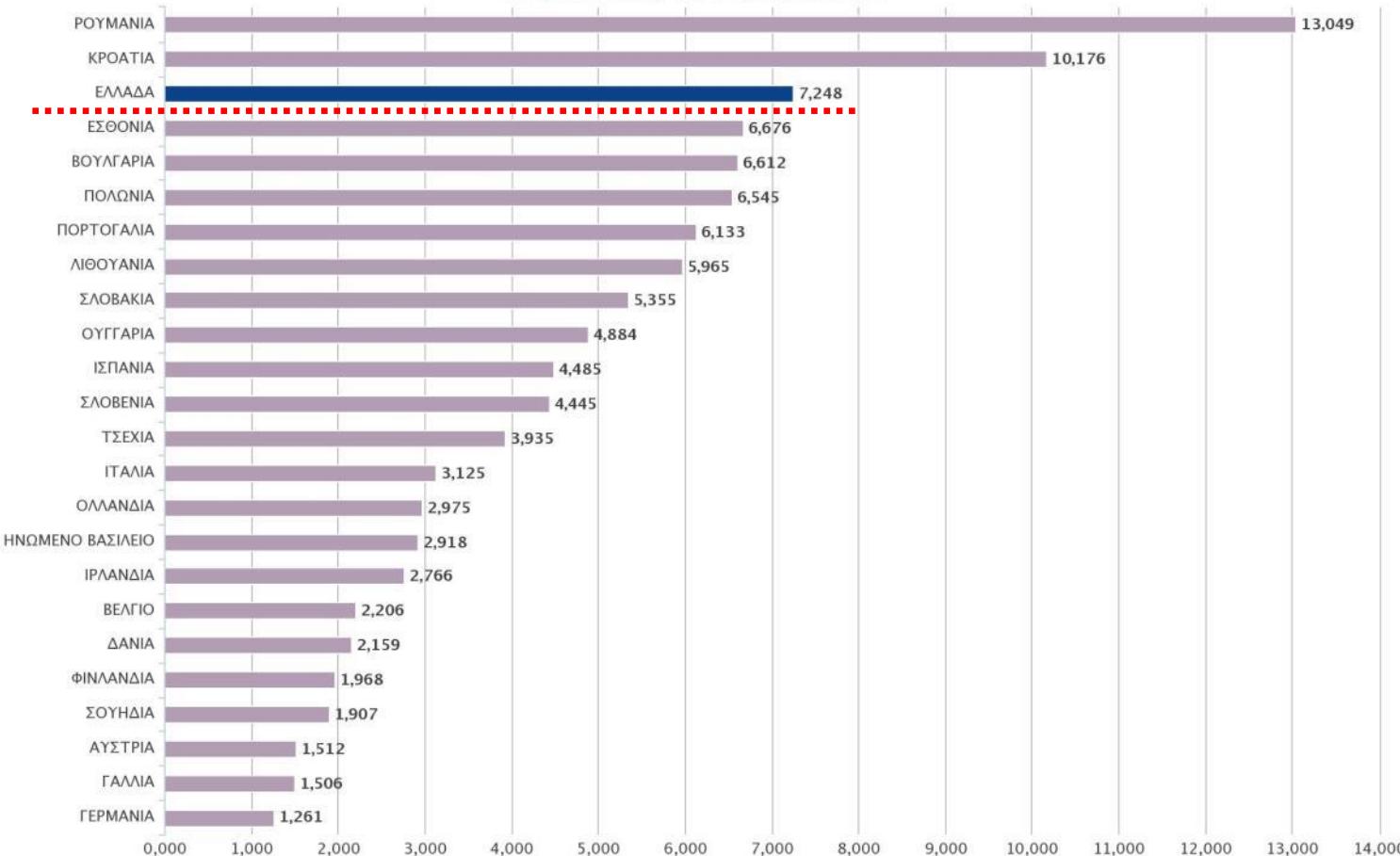
ΘΕΣΗ ΕΛΛΑΔΑΣ
ΣΤΗΝ ΚΑΤΑΤΑΞΗ
ΕΕ 27

Αριθμός εγκεκριμένων έργων	829	5.019	16.5%	7n
Αριθμός εγκεκριμένων έργων με συντονιστικό ρόλο	204	4.833	4.2%	8n
Αριθμός συμμετοχών σε έργα	1.716	32.193	5.3%	7n
Αριθμός μοναδικών φορέων σε έργα	505	11.306	4.5%	7n
Εγκεκριμένη χρηματοδότηση ΕΕ (εκατ. €)	644.72	14.431.85	4.5%	7n

ΠΗΓΗ: ΕΚΤ. Η ερευνητική δραστηριότητα των ελληνικών φορέων σε χρηματοδοτούμενα έργα. Πρόγραμμα «Ορίζοντας Ευρώπη», 2021-2022

**Αριθμός δημοσιεύσεων ανά εκατ. δαπανών για Έρευνα & Ανάπτυξη
στις χώρες της ΕΕ για το έτος 2014**

Δεδομένα: Eurostat, Web of Science, 2000-2014



Do You Want to Become an IEEE Author?

Suppose you want to publish something that is as simple as

$$1 + 1 = 2 \quad (1)$$

This is not a very impressive. If you want your article to be accepted by IEEE reviewers, you have to be more abstract. So, you could complicate the left hand side of the expression by using

$$1 = \ln(e) \text{ and } 1 = \sin^2 x + \cos^2 x$$

The right hand side can be stated as

$$2 = \sum_{n=0}^{\infty} \frac{1}{2^n}$$

Therefore, Eq. (1) can be expressed more “scientifically” as:

$$\ln(e) + (\sin^2 x + \cos^2 x) = \sum_{n=0}^{\infty} \frac{1}{x^n} \quad (2)$$

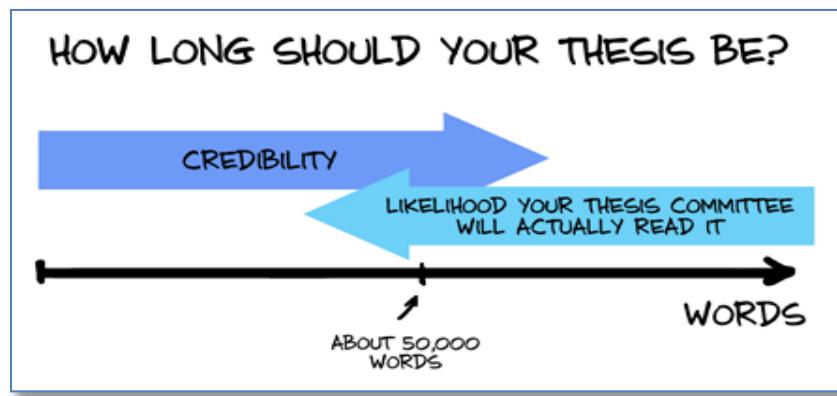
which is far more impressive. However, you should not stop here. The expression can be further complicated by using

$$1 = \cosh(y)\sqrt{1 - \tanh^2(y)} \text{ and } e = \lim_{z \rightarrow 0} \left(1 + \frac{1}{z}\right)^z$$

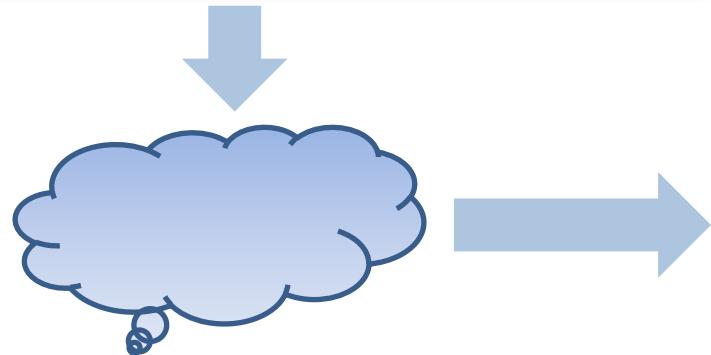
Eq. (2) may therefore be written as

$$\ln \left[\lim_{z \rightarrow 0} \left(1 + \frac{1}{z}\right)^z \right] + (\sin^2 x + \cos^2 x) = \sum_{n=0}^{\infty} \frac{\cosh(y\sqrt{1 - \tanh^2 y})}{2^n} \quad (3)$$

Note: Other methods of a similar nature could also be used to enhance your prestige, once you grasp the underlying principles.



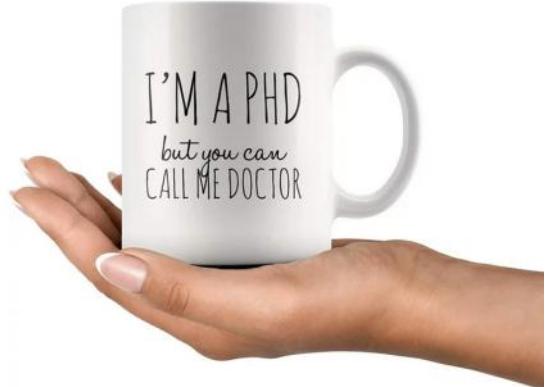
Bug



Feature



I'M A PHD
but you can
CALL ME DOCTOR



Μέρος II: Τεκμηρίωση & Δημοσίευση

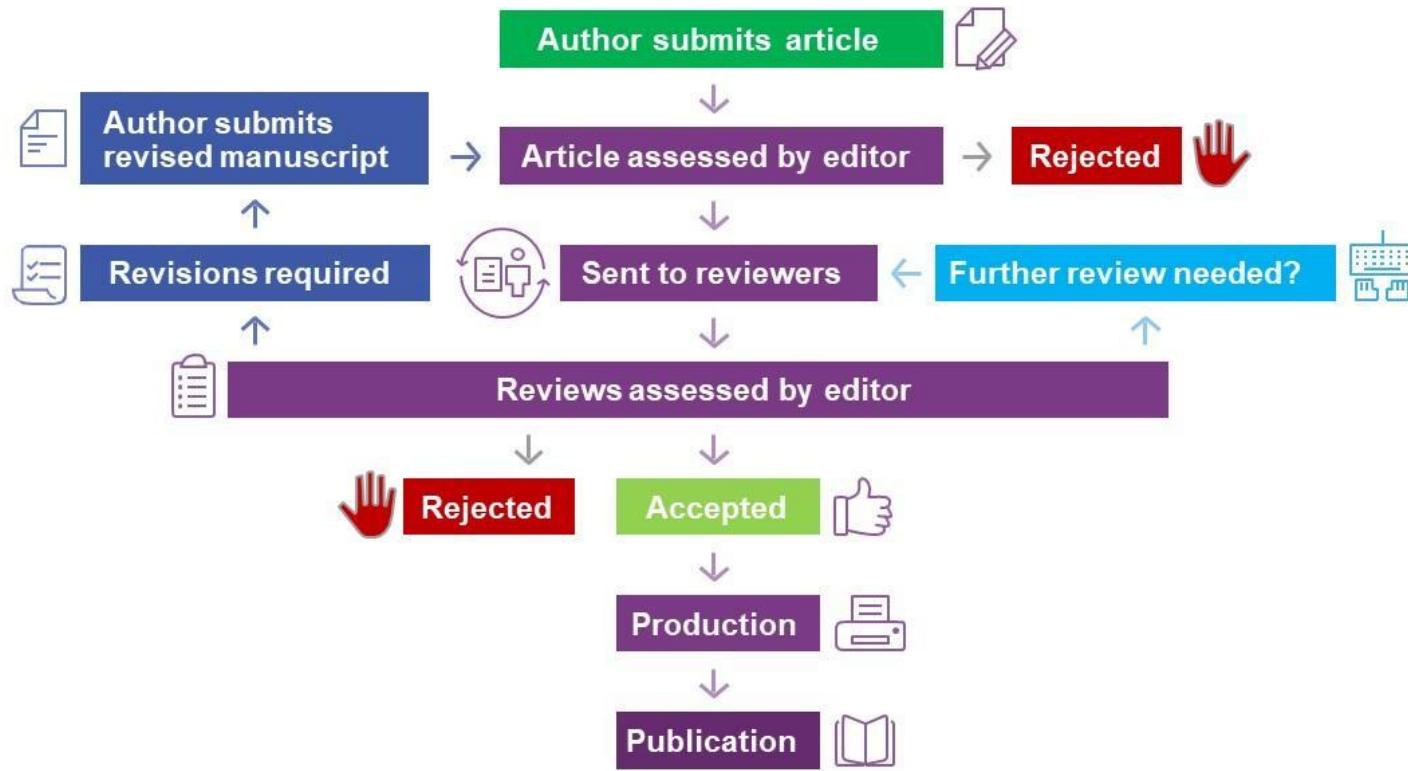
1. Τι είναι η διαδικασία του peer-review;
2. Ποια είναι τα προβλήματα-περιορισμοί του;
3. Πως δημοσιεύουμε τα αποτελέσματα;
4. Υπάρχουν διαθέσιμα εργαλεία online;



PEER REVIEW CRITERIA GUIDE



Peer Review Process





MIT CSAIL @MIT_CSAIL · 17h

...

19 years ago today MIT researchers got a computer-generated gibberish paper accepted to a predatory journal: bit.ly/SCIgenStory

Generate your own here: bit.ly/SCIgenCS

Rooter: A Methodology for the Typical Unification of Access Points and Redundancy

Jeremy Stribling, Daniel Aguayo and Maxwell Krohn

ABSTRACT

Many physicists would agree that, had it not been for congestion control, the evaluation of web browsers might never have occurred. In fact, few hackers worldwide would disagree with the essential unification of voice-over-IP and public-private key pair. In order to solve this riddle, we confirm that SMPs can be made stochastic, cacheable, and interoperable.

I. INTRODUCTION

Many scholars would agree that, had it not been for active networks, the simulation of Lamport clocks might never have occurred. The notion that end-users synchronize with the investigation of Markov models is rarely outdated. A theoretical grand challenge in theory is the important unification of virtual machines and real-time theory. To what extent can web browsers be constructed to achieve this purpose?

Certainly, the usual methods for the emulation of Smalltalk that paved the way for the investigation of rasterization do not apply in this area. In the opinions of many, despite the fact that conventional wisdom states that this grand challenge is continuously answered by the study of access points, we

The rest of this paper is organized as follows. For starters, we motivate the need for fiber-optic cables. We place our work in context with the prior work in this area. To address this obstacle, we disprove that even though the much-touted autonomous algorithm for the construction of digital-to-analog converters by Jones [10] is NP-complete, object-oriented languages can be made signed, decentralized, and signed. Along these same lines, to accomplish this mission, we concentrate our efforts on showing that the famous ubiquitous algorithm for the exploration of robots by Sato et al. runs in $\Omega((n + \log n))$ time [22]. In the end, we conclude.

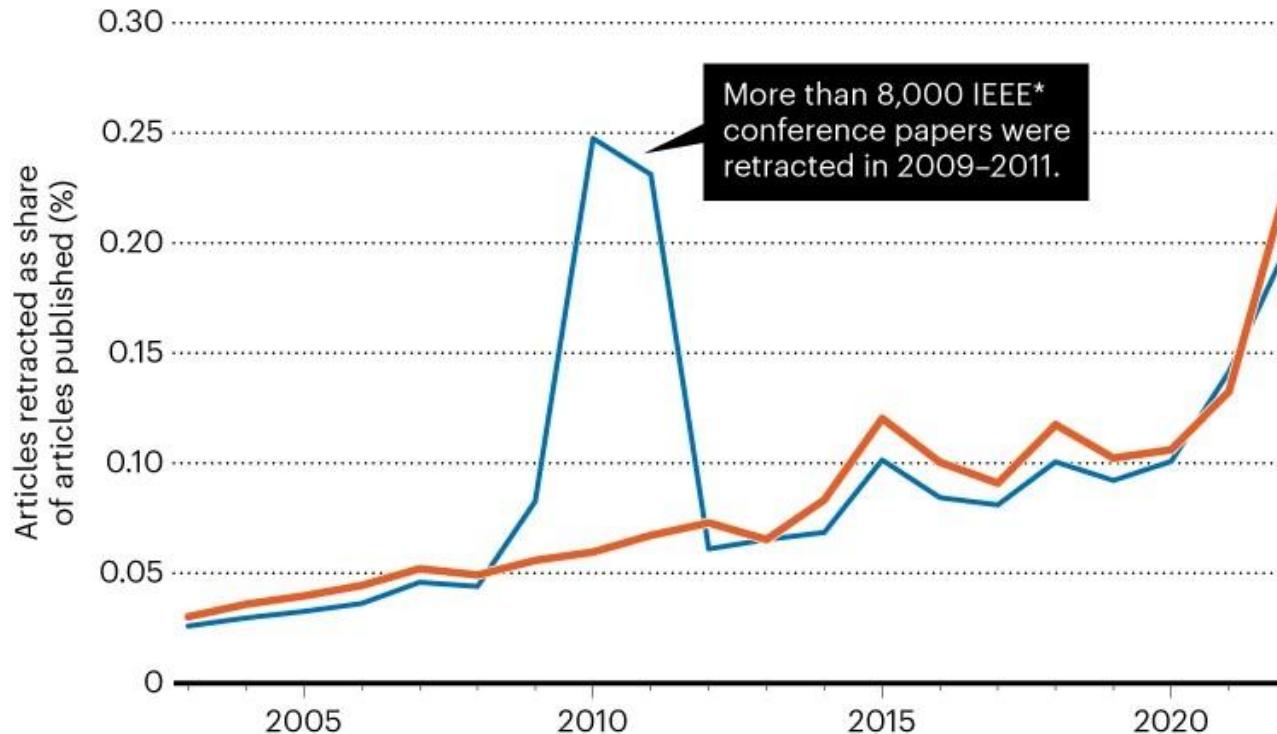
II. ARCHITECTURE

Our research is principled. Consider the early methodology by Martin and Smith; our model is similar, but will actually overcome this grand challenge. Despite the fact that such a claim at first glance seems unexpected, it is buffeted by previous work in the field. Any significant development of secure theory will clearly require that the acclaimed real-time algorithm for the refinement of write-ahead logging by Edward Feigenbaum et al. [15] is impossible; our application is no different. This may or may not actually hold in reality.

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The ratio of retracted papers to articles published has risen to above 0.2%.

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- Excluding conference papers

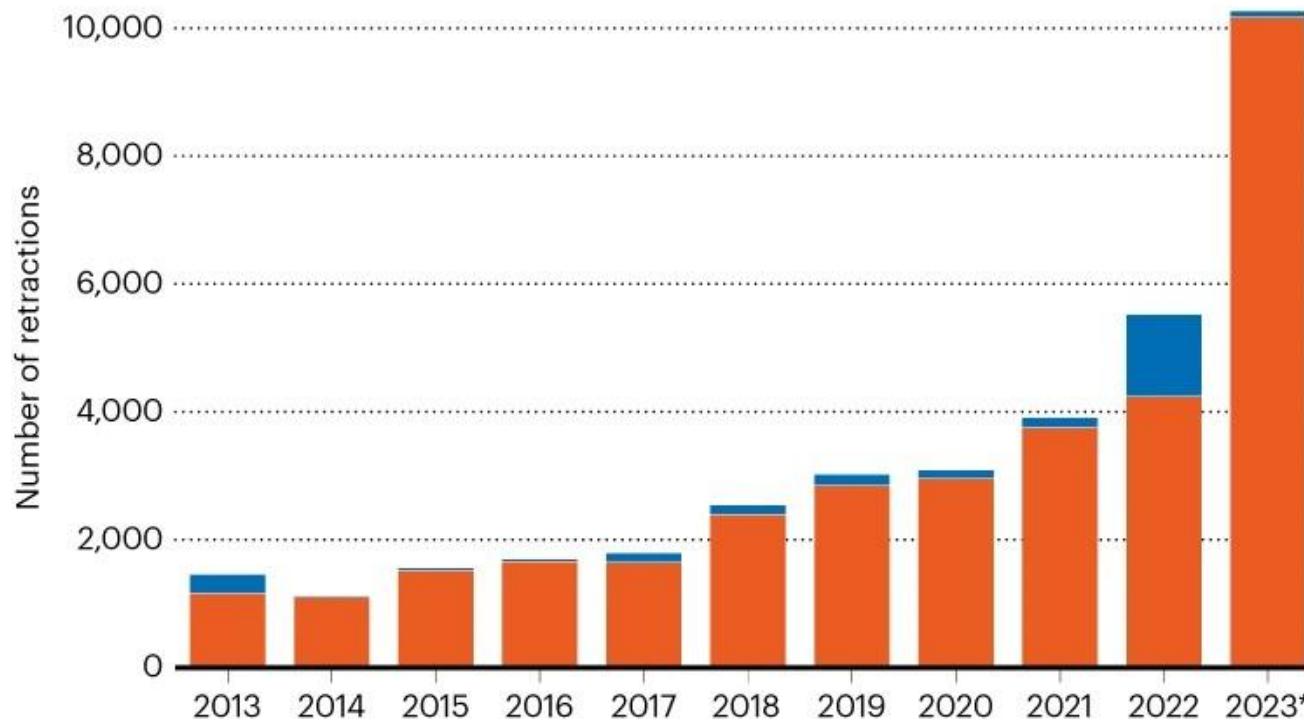


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A BUMPER YEAR FOR RETRACTIONS

Retraction notices in 2023 have passed 10,000, largely because of more than 8,000 retractions by Hindawi.

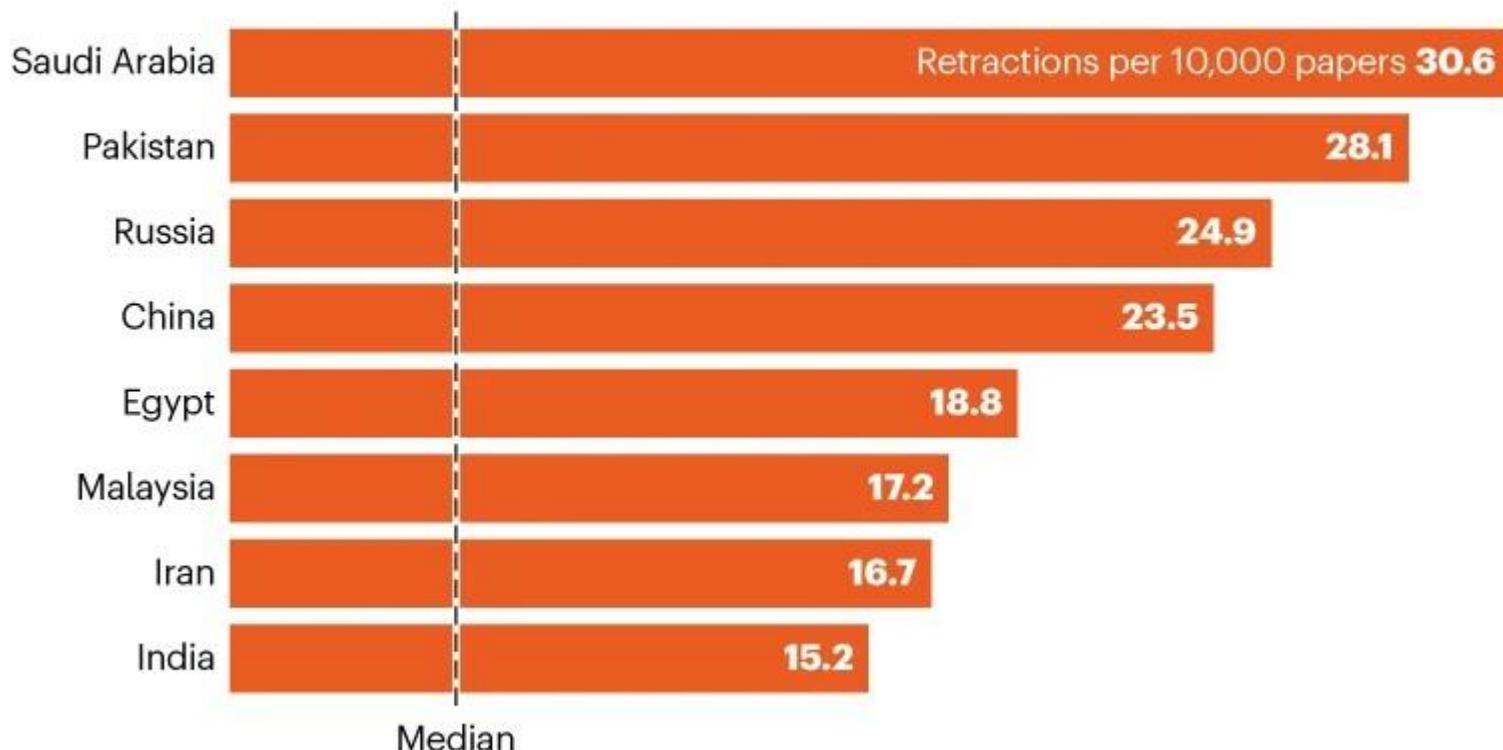
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Lessons from recent disaster events and new technologies for future USAR missions

Harris Georgiou¹ ; Alexios Vlachopoulos¹; Aspasia Tzeletopoulou¹; Anastasia Andriopoulou¹ Show affiliations

ABSTRACT

On October 17th-21th, 2022, Hellenic Rescue Team of Attica (HRTA) participated in the 2nd Pilot in Marseille (France), in the context of the INTREPID project (EU H2020). The purpose was to test new technologies developed in the INTREPID project, especially the individual improvements and modules integration during the last 12 months of that period. INTREPID aims to make the first hours of emergency and natural disaster for First Responders safer and more efficient by developing technologies that accelerate operational risk assessment capability by creating a unique platform. This paper presents a brief overview of these activities, under the scope of recent USAR mission deployments of our team that highlighted the importance and operational need for such technologies.

Keywords: Rescue, field tests, crisis management, security and safety, first responders.

Notes

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Estimating the intrinsic dimension in fMRI space via dataset fractal analysis - Counting the 'cpu cores' of the human brain

Harris V. Georgiou

Functional Magnetic Resonance Imaging (fMRI) is a powerful non-invasive tool for localizing and analyzing brain activity. This study focuses on one very important aspect of the functional properties of human brain, specifically the estimation of the level of parallelism when performing complex cognitive tasks. Using fMRI as the main modality, the human brain activity is investigated through a purely data-driven signal processing and dimensionality analysis approach. Specifically, the fMRI signal is treated as a multi-dimensional data space and its intrinsic 'complexity' is studied via dataset fractal analysis and blind-source separation (BSS) methods. One simulated and two real fMRI datasets are used in combination with Independent Component Analysis (ICA) and fractal analysis for estimating the intrinsic (true) dimensionality, in order to provide data-driven experimental evidence on the number of independent brain processes that run in parallel when visual or visuo-motor tasks are performed. Although this number is can not be defined as a strict threshold but rather as a continuous range, when a specific activation level is defined, a corresponding number of parallel processes or the casual equivalent of 'cpu cores' can be detected in normal human brain activity.

Comments: 27 pages, 10 figures, 2 tables, 47 references

Subjects: Artificial Intelligence (cs.AI); Computer Vision and Pattern Recognition (cs.CV); Neurons and Cognition (q-bio.NC); Machine Learning (stat.ML)

Report number: HG/AI.1014.27v1 (draft/preprint)

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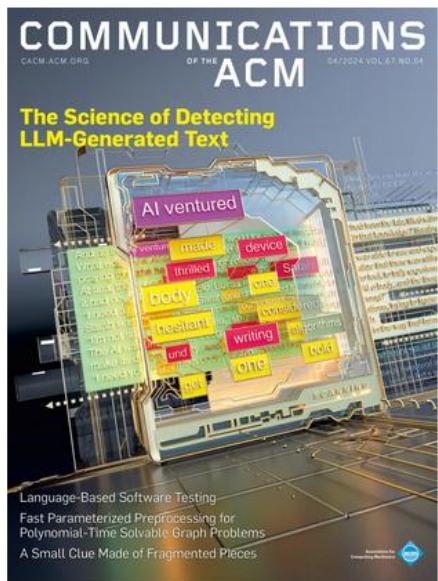
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April 2024 - Vol. 67 No. 4

Features



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Thoughts on AI Interoperability

While the core transport protocols of the Internet are binary in character, one could imagine a more text-oriented exchange protocol for inter-ML systems.

Vinton G. Cerf

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The conference theme takes a process-centric view on crisis management: "*Embracing the Crisis Management Lifecycle*". The theme emphasizes a holistic and integrated process view of crisis management

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ISIC-SIAW-MICCAI 2024	Oct 10, 2024 - Oct 10, 2024	Marrakesh, Morocco	Jul 3, 2024	<input type="checkbox"/>
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DMM&L 2024	Nov 7, 2024 - Nov 8, 2024	Braga, Portugal	Aug 10, 2024	<input type="checkbox"/>

Online LaTeX editor: Overleaf

The screenshot shows the Overleaf online LaTeX editor interface. The top navigation bar includes 'Menu', 'Upgrade', 'Review', 'Share', 'Submit', 'History', 'Layout', and 'Chat'. The left sidebar displays project files: 'figs', 'IEEEtran.cls', 'llncs.cls', 'main.tex' (selected), 'refs.bib', and 'splncs04.bst'. A 'File outline' section lists 'Introduction', 'Preprocessing static a...', 'Methodology', 'Experimental Study', and their sub-sections. The main workspace shows the LaTeX code for 'main.tex' with syntax highlighting. The right side of the screen displays the PDF preview of the document, which is titled 'Public Transport Arrival Time Prediction based on GTFS data'. The abstract, authors, and keywords are also visible.

OPTIMA_conf_LOD2021

Code Editor Visual Editor Normal text B I C Recompile

1 % This is samplepaper.tex, a sample chapter demonstrating the
2 % LLNCS macro package for Springer Computer Science proceedings;
3 % Version 2.20 of 2017/10/04
4 %
5 \documentclass[runningheads]{llncs}
6 %
7 \usepackage{graphicx}
8 % Used for displaying a sample figure. If possible, figure files
9 % should
10 % be included in EPS format.
11 % If you use the hyperref package, please uncomment the following
12 % line:
13 % \renewcommand\UrlFont{\color{blue}\rmfamily}
14 %
15 \usepackage{cite}
16 \usepackage{amsmath,amssymb,amsfonts}
17 \usepackage{algorithmic}
18 \usepackage{textcomp}
19 \usepackage{xcolor}
20 \usepackage[colorlinks]{hyperref}
21 \%usepackage[colorinlistoftodos]{todonotes}
22 \% \usepackage{color,soul} % used for colored highlights
23 \usepackage{nicefrac}
24
25
26 \begin{document}

Public Transport Arrival Time Prediction based on GTFS data

Eva Chondrodima¹[0000-0002-4433-0025], Harris Georgiou¹[0000-0003-3462-0740], Nikos Pelekis²[0000-0003-7285-5708], and Yannis Theodoridis¹[0000-0003-2540-7801]

¹ Dept. of Informatics, University of Piraeus, Piraeus, Greece
[evachou, igorgiou, ytheod]@upi.gr

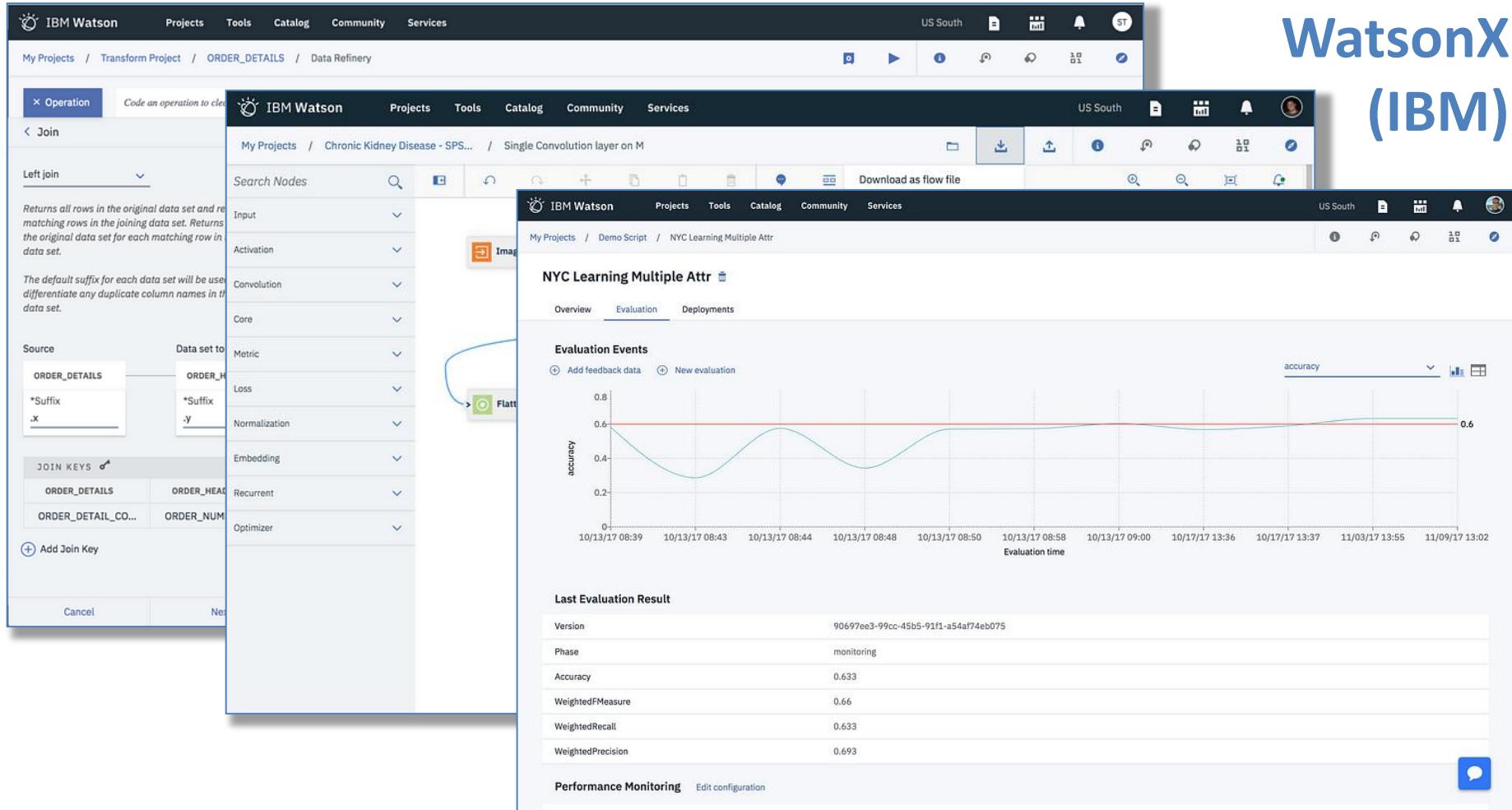
² Dept. of Statistics and Inf. Sci., University of Piraeus, Piraeus, Greece
npelekis@upi.gr

Abstract. Public transport (PT) systems are essential to human mobility. PT investments continue to grow, in order to improve PT services. Accurate PT arrival time prediction (PT-ATP) is vital for PT systems delivering an attractive service, since the waiting experience for urban residents is an urgent problem to be solved. However, accurate PT-ATP is a challenging task due to the fact that urban traffic conditions are complex and changeable. Nowadays thousands of PT agencies publish their public transport route and timetable information with the General Transit Feed Specification (GTFS) in the standard format. Such data provide new opportunities for using the data-driven approaches to provide effective bus information system. This paper proposes a new framework to address the PT-ATP problem by using GTFS data. Also, an overview of various ML models for PT-ATP purposes is presented, along with the insightful findings through the comparison procedure based on real GTFS datasets. The results showed that the neural network-based method outperforms its rivals in terms of prediction accuracy.

Keywords: estimated time of arrival · GTFS · GTFS-RT · GTFS validation · machine learning methods · mobility data mining · neural networks · public transport

1 Introduction

Public transport (PT) offers significant social and environmental benefits. More specifically, high quality PT services lead to: (a) a considerable improvement on the quality of citizens' life, e.g. areas with access to public transportation help social inclusion, and (b) environmental benefits related to minimizing the CO₂ emissions of private vehicles. Public transportation goal is to provide efficient, reliable, and high quality services, in order to attract more passengers. The planning of high quality PT systems is a difficult task. PT networks are highly complex systems, due to the large number of passengers that are transported



Weka Explorer

Preprocess Classify Cluster Associate Select attributes Visualize

Open file... Open URL... Open DB... Generate... Undo Edit... Save...

Filter

Choose None

Current relation

Relation: breast-cancer Attributes: 10 Instances: 286 Sum of weights: 286

Attributes

All None Invert Pattern

No.	Name
1	age
2	menopause
3	tumor-size
4	inv-nodes
5	node-caps
6	deg-malig
7	breast
8	breast-quad
9	irradiat

Remove

Selected attributes

Name: age
Missing: 0

No. 1 2 3 4 5

Class: Class (Nom)

Start Stop

Test options

Use training set
 Supplied test set Set...
 Cross-validation Folds 10
 Percentage split % 66
More options...

Classifier output

Correctly Classified Instances 601 78.2552 %
Incorrectly Classified Instances 167 21.7448 %
Kappa statistic 0.4966
Mean absolute error 0.3063
Root mean squared error 0.3908
Relative absolute error 67.3928 %
Root relative squared error 81.9907 %
Total Number of Instances 768

==== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC
0	0.890	0.418	0.799	0.890	0.842	0.504
1	0.582	0.110	0.739	0.582	0.651	0.504
Weighted Avg.	0.783	0.310	0.778	0.783	0.775	0.504

==== Confusion Matrix ===

a	b	--- classified as
445	55	a = tested_negative
112	156	b = tested_positive

Status

OK

Log x 0



File Edit View Insert Cell Kernel Help

Python 3



Markdown

CellToolbar

```
In [1]: # setup the matplotlib graphics library and configure it to show
# figures inline in the notebook
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
```

```
In [2]: # make qutip available in the rest of the notebook
from qutip import *

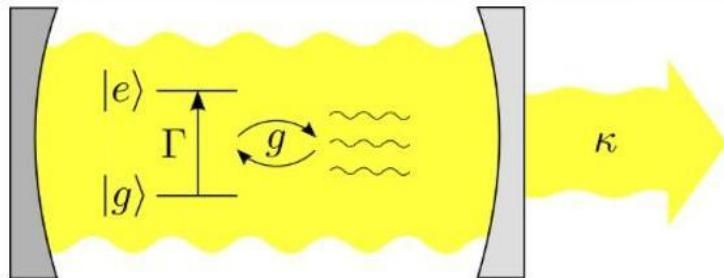
from IPython.display import Image
```

Introduction and model

Consider a single atom coupled to a single cavity mode, as illustrated in the figure below. If there atom excitation rate Γ exceeds the relaxation rate, a population inversion can occur in the atom, and if coupled to the cavity the atom can then act as a photon pump on the cavity.

```
In [3]: Image(filename='images/schematic-lasing-model.png')
```

Out[3]:



The image shows a Jupyter Notebook interface with several windows open:

- File Explorer:** Shows notebooks like "Untitled2.ipynb", "Name.ipynb", "Images.ipynb", "Data.ipynb", "Fasta.ipynb", "Julia.ipynb", and "Linear Regression.ipynb".
- Code Editor:** The "Linear Regression.ipynb" notebook is open, displaying code for plotting a scatter plot of maximum daily temperature against day number.
- Kernel Selection:** A dropdown menu shows "Python 3" selected, along with "R", "C/C++", "C/C++11", and "Julia".
- Output View:** A plot titled "Seattle Weather: 2012-2015" showing "Maximum Daily Temperature (C)" versus "Day Number".
- Launcher:** Shows icons for Python 3, R, C/C++, C/C++11, Julia, and R.
- Console:** Displays a session for "Julia.ipynb" with code related to numerical methods and matrix operations.
- Project Explorer:** Shows a file tree with "src" and "test" directories containing files like "main.jl", "main.c", "main.cpp", "main.R", "main.py", and "main.jl.jl".
- Help:** A sidebar with various help links and documentation sections.

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- [008] A. Walford, Guide to reference material, 3rd/ed. (Library Assoc., London: 1975).

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 - «Particle Swarm Optimization and RBF Neural Networks for public transport arrival time prediction using GTFS data», E. Chondrodima, H. Georgiou, N. Pelekis, Y. Theodoridis. *International Journal of Information Management Data Insights (IJIMDI)*, Vol. 2, Issue 2, Nov. 2022, 100086 ([doi: 10.1016/j.jijimi.2022.100086](https://doi.org/10.1016/j.jijimi.2022.100086))

```

MOVE 1 TO DATA-C(N-T).
ADD 1 TO N-CHANGED.
GO TO LOOP-SCAN.

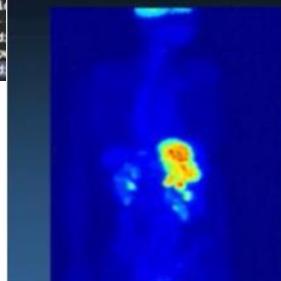
SELECT-CLZ.
ADD DATA-X(N-T) TO SUM2-X.
ADD DATA-Y(N-T) TO SUM2-Y.
ADD 1 TO N-CLZ.
IF DATA-C(N-T) EQUAL 2 GO TO LOOP-SCAN.
MOVE 2 TO DATA-C(N-T).
ADD 1 TO N-CHANGED.

```

```

LOOP-
  id : Integer := 0; -- target ID (counter)
  det : Integer := 0; -- detection slots in sequence
  pwr : Integer := 0; -- rel. power of detection
  pwr0 : Integer := detLimit; -- rel. power baseline (adapt
  disp : Boolean := False; -- target reporting (flag)
  begin
    -- process the FOV slots --
    for p in 1..(seekerData'Length)-1 loop
      -- rel. power is current detection 'step'
      pwr := abs(seekerData(p+1)-seekerData(p));
      if pwr >= detLimit then
        -- detection valid, continue analysis
        if pwr > pwr0 then
          -- strong new 'step' from baseline (new target)
          pwr0 := pwr; -- update the baseline
          det := 0; -- reset the run-length
          disp := False; -- enable target reporting
        end if;
      end if;
    end loop;
    det := 0;
    if
      if
        if
          if
            if
              if
                if
                  if
                    if
                      if
                        if
                          if
                            if
                              if
                                if
                                  if
                                    if
                                      if
                                        if
                                          if
                                            if
                                              if
                                                if
                                                  if
                                                    if
                                                      if
                                                        if
                                                          if
                                                            if
                                                              if
                                                                if
                                                                  if
                                                                    if
                                                                      if
                                                                        if
              end if;
            end if;
          end if;
        end if;
      end if;
    end if;
  end loop;
end;

```



Παραδειγμα τρισδιάστατης αναπτυσσόμενης μεντονής πλούτου (γύναικα) – Wikipedia.org

▶ ▶ ⏪ 12:40 / 2:00:20

- Εικόνα (2-D): Επικαυπτόμενες δομές ιστών
 - Τομογραφία (3-D): Όγκος πληροφοριών
 - Διαφορετικές τεχνολογίες απεικόνισης
 - Διαφορετικά διαγνωστικά χαρακτηριστικά
 - Η διαγνωστική πληροφορία συνήθως δεν είναι καλώς ορισμένη (θόρυβος, ασάφειες δομών)
 - Η διαγνωστική διαδικασία είναι συνήθως ασαφής, πολύπλοκη και βασίζεται στην εμπειρία (ιατρός)
- ⇒ Η χρήση Η/Υ επιτρέπει την αυτόματη επεξεργασία και ενσυνοίση (τομογραφία) μεγάλου όγκου δεδομένων απεικόνισης
- ⇒ ...αλλά εξακολουθεί να έχει σημαντικούς περιορισμούς ως προς τη σημασιολογική ερμηνεία τους (διαγνωστική πληροφορία)

- Hamming (7,4) error correction codes in **R**
- Kmeans clustering in **COBOL**
- Bi-directional Associative Memory (BAM) in **Arduino/C**
- Linear Regression in **SQL, Matlab**
- ...

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<https://github.com/xgeorgio>

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- ✓ Τα μαθήματα πραγματοποιούνται εξ ολοκλήρου διαδικτυακά, ζωντανά μέσω της πλατφόρμας Zoom.
- ✓ Η συμμετοχή σε όλα τα μαθήματα είναι ελεύθερη για οποιονδήποτε από οποιδήποτε στην Ελλάδα ή στο εξωτερικό.
- ✓ Δεν υπάρχει οικονομικό κόστος ή άλλες προϋποθέσεις συμμετοχής.
- ✓ Οι Εισιγητές είναι μέλη της Ένωσης Πληροφορικών Ελλάδας και πραγματοποιούν τα μαθήματα εθελοντικά.
- ✓ Τα μαθήματα μαγνητοσκοπούνται και παραμένουν διαθέσιμα για σύγχρονη παρακολούθηση στο Αρχείο Μαθημάτων.
- ✓ Η εκπαίδευση που παρέχεται μέσω των ανοικτών διαδικτυακών μαθημάτων είναι άτυπη και δεν παρέχονται βεβαιώσεις παρακολούθησης στους συμμετέχοντες.



Ερωτήσεις



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