

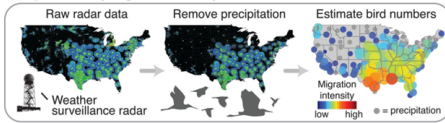
# Minireferáty I

2024

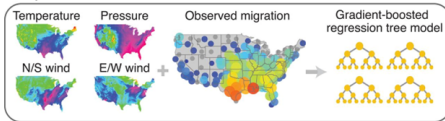
- příroda:  
*Borošová, Blažek, Benko, Balko*
- stavby, doprava:  
*Juharová, Bořil, Koutenský, Haba, Horák J.*
- lidé:  
*Halmazňa, Dražkovec P., Dang, Horák V.*
- modelování pomocí sítí:  
*Hudec, Linartová, Dražkovec M.*
- vesmír a buňky:  
*Licko, Kolaříková, Kasprzaková*

# BirdCast

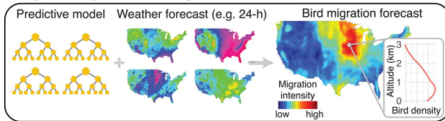
Step 1. Quantify migration intensity at 143 weather radar stations



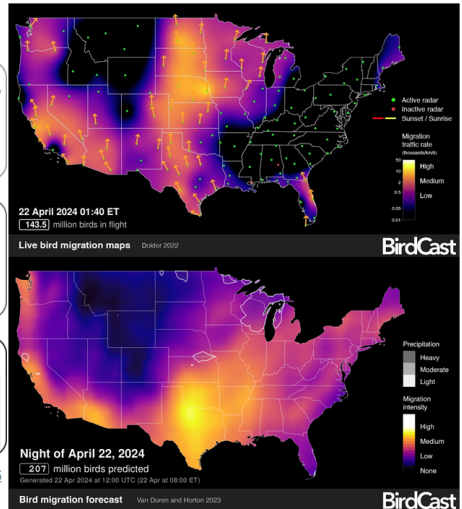
Step 2. Learn associations with weather conditions

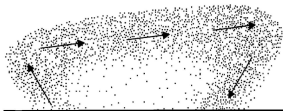


Step 3. Make predictions using weather forecasts

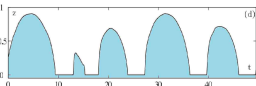
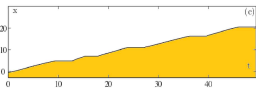
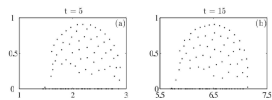
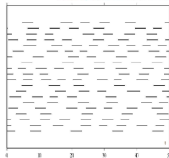
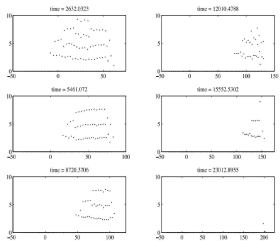
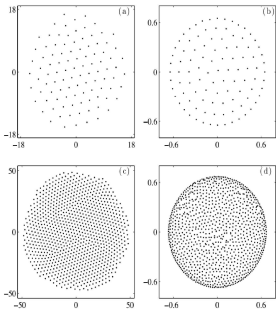


<https://www.science.org/doi/full/10.1126/science.aat7526>  
<https://birdcast.info/>

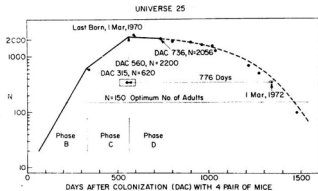




Active Motion and Swarming



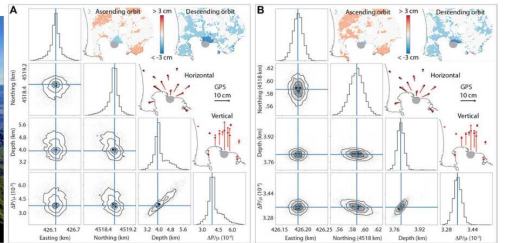
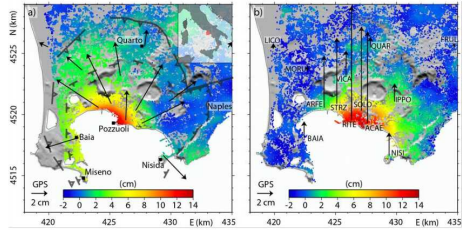
Topaz, C., Bernoff, A., Logan, S. et al.  
 A model for rolling swarms of locusts. *Eur. Phys. J. Spec. Top.* 157, 93-109 (2008).  
<https://doi.org/10.1140/epjst/e2008-00633-y>



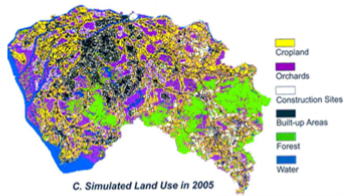
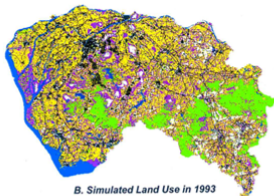
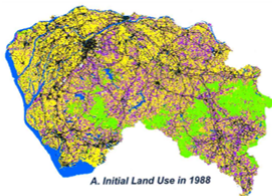
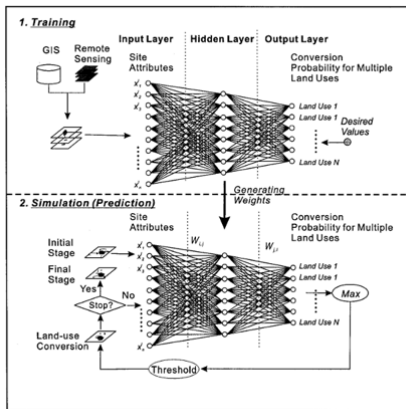
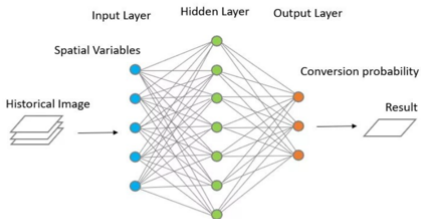
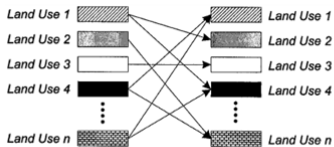
**Fig 2** History of population of mice in a closed Utopian universe. Broken line represents an estimate of numbers made about 700 days after colonization on the basis of observed mortality to that time. Observed points after Day 1000 are slightly lower than projected due to removal of about 150 mice for other studies. A final point was added to the graph for Day 1471 when the population had decreased to 100. At final editing of this paper on November 13, 1972 (Day 1588) the inexorable decline brought the population to 27 (23 females and 4 males, the youngest of which exceeded 987 days of age)

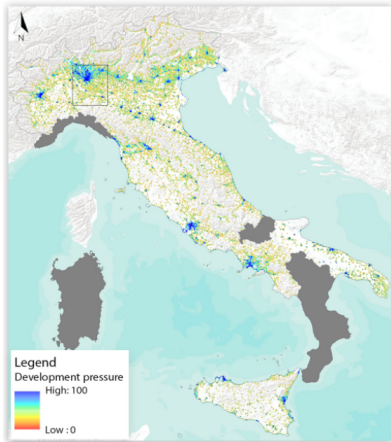
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<https://www.physicsoflife.pl/dict/pic/calhoun/calhoun-experiment-daig-001.jpg>

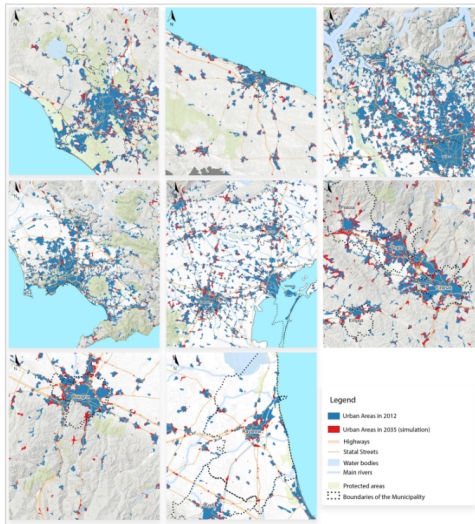


<https://www.frontiersin.org/articles/10.3389/feart.2022.917222/full>

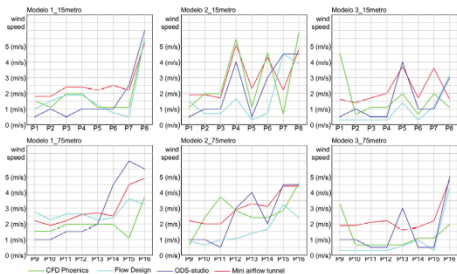
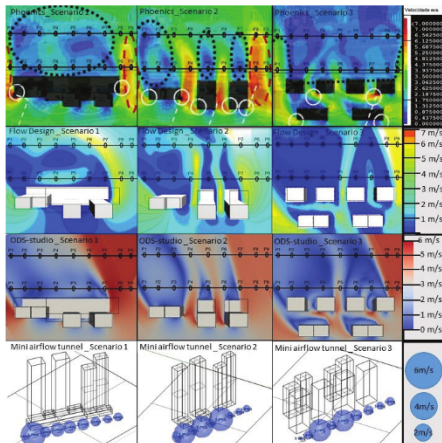
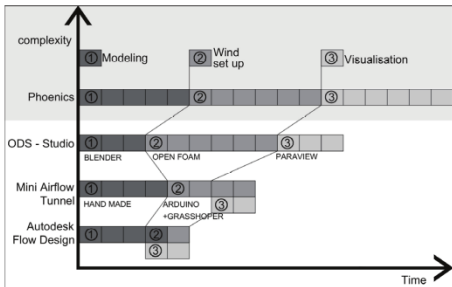




Claudia Cosentino, Federico Amato, Beniamino Murgante  
Population-Based Simulation of Urban Growth







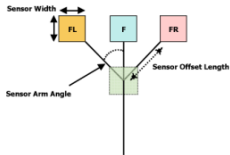
[https://papers.cumincad.org/data/works/att/sigradi2015\\_8.189.pdf](https://papers.cumincad.org/data/works/att/sigradi2015_8.189.pdf)

# Using slime mould for creating road networks



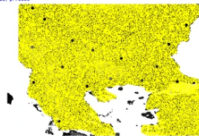
<https://www.nature.com/articles/s41598-017-06961-y>

- [Motor stage]
- Attempt move forwards in current direction
  - If (moved forwards successfully)
    - Deposit trail in new location
  - Else
    - Choose random new orientation
- [Sensory stage]
- Sample trail map values
  - if  $(F > FL) \ \&\& \ (F > FR)$ 
    - Stay facing same direction
    - Return
  - Else if  $(F < FL) \ \&\& \ (F < FR)$ 
    - Rotate randomly left or right by RA
  - Else if  $(FL < FR)$ 
    - Rotate right by RA
  - Else if  $(FR < FL)$ 
    - Rotate left by RA
  - Else
    - Continue facing same direction



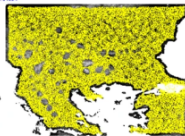
<https://arxiv.org/abs/1503.06579>

30, p.70020



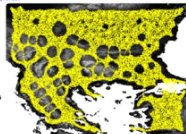
(a) t=20

30, p.91094



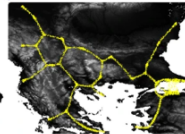
(b) t=88

36, p.37381

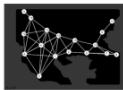


(c) t=165

3000, p.3884



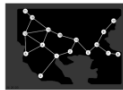
(d) t=20000



(a) w=1



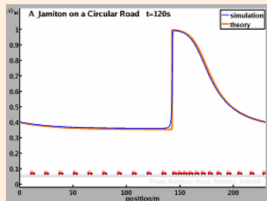
(j) w=10



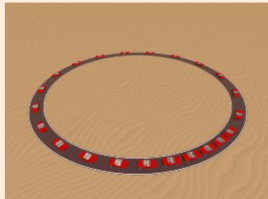
(t) w=20

<https://www.nature.com/articles/s41598-017-06961-y>

Large number of vehicles (22)

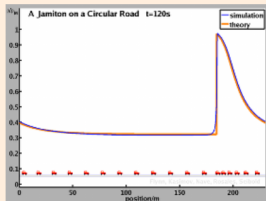


[Download Video side view](#) (divx, 4MB)

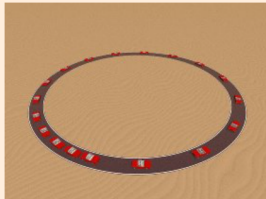


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Medium number of vehicles (18)

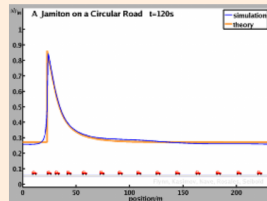


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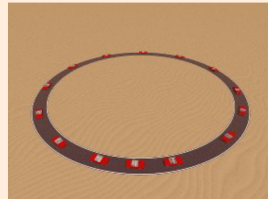


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Small number of vehicles (14)



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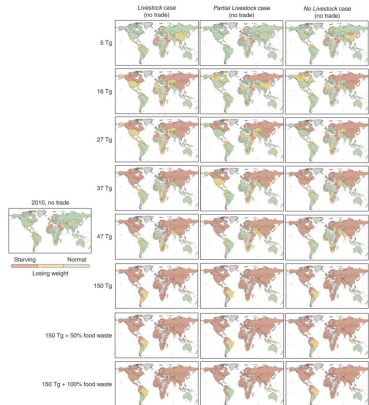
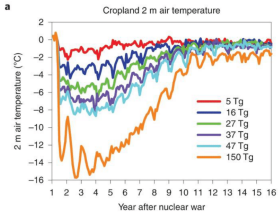
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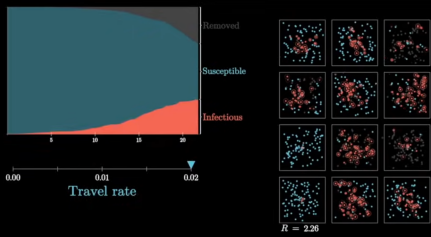
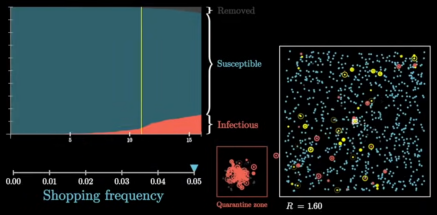
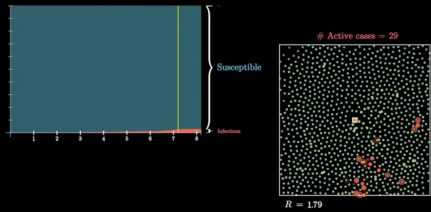
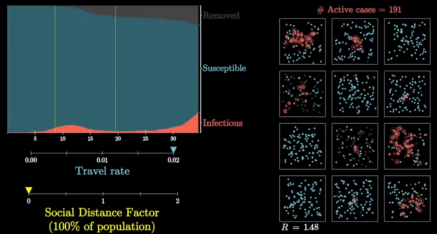
zdroj: [math.mit.edu/traffic](http://math.mit.edu/traffic)

# Nuclear war simulation

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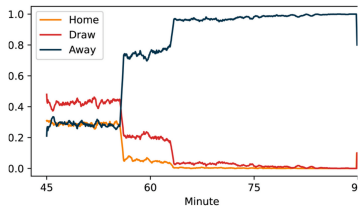
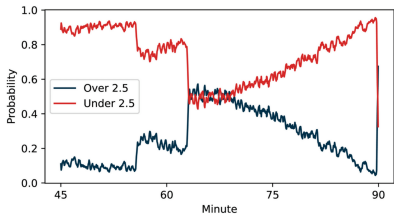
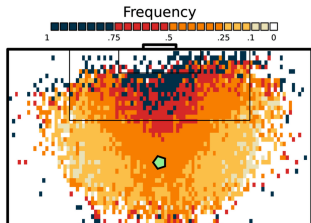
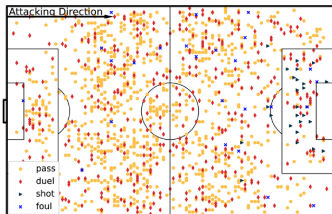
<https://www.nature.com/articles/s43016-022-00573-0>





<https://www.youtube.com/watch?v=gxAaO2r5dIs>

## Modelování fotbalového utkání



## SOCIAL MEDIA



**REACTIONS  
ARE REWARDS!**



**PERFORM  
THE ACTION**

(Write, Share, Post, Comment, etc.)

**WAITING FOR  
A REACTION**

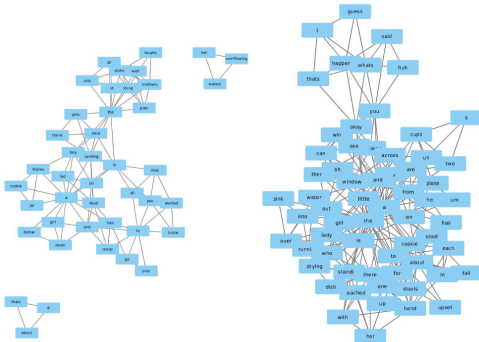
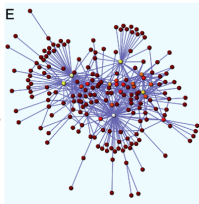
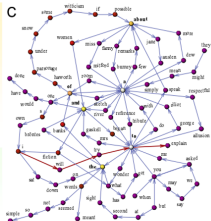
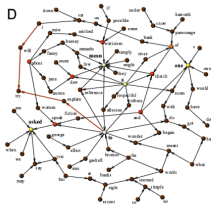
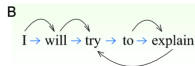
(Like, Comment, Thumbs up, etc.)

<https://www.youtube.com/watch?v=HjncIEhy960>  
<https://www.youtube.com/watch?v=3E7hkPZ-HTk>

# Complex and Language Networks

A "But, you may say, we asked you to speak about women and fiction - what has got to do with a room of one's own? I will try to explain. When you asked me to speak about women and fiction I sat down on the banks of a river and began to wonder what the words meant. They might mean simply a few remarks about Fanny Burney; a few more about Jane Austen; a Tribute to the Brontës and a Sketch of Harriet Martineau under snow; some witicism if possible about Miss Mitford; a respectful allusion to George Eliot; a reference to Mrs Gaskell and one would have done. But at second sight the words seemed not so simple."

- Virginia Woolf, *A Room of One's Own*



AD Graph

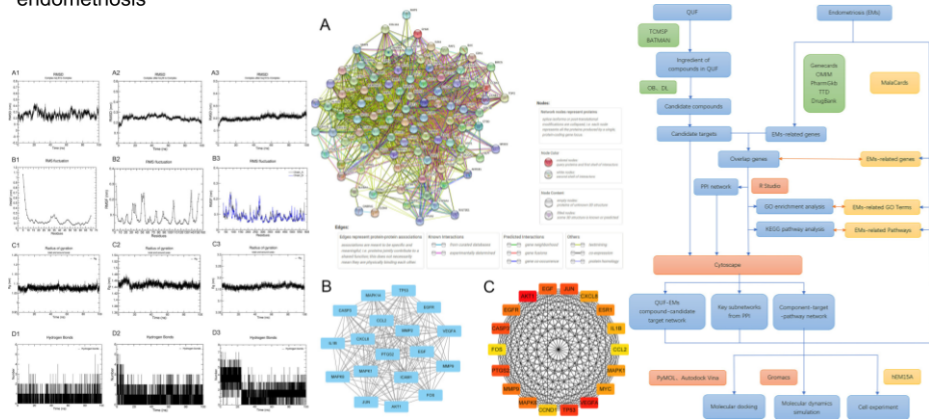
Control Graph

<https://www.frontiersin.org/articles/10.3389/fcomp.2021.649508/full>

<https://digital.csic.es/bitstream/10261/127923/1/Language%20Networks%20WP.pdf>



# A network pharmacology approach to explore Chinese herbal medicine in the treatment of endometriosis



Wu Y, Zhu Y, Xie N, Wang H, Wang F, Zhou J, Qu F. A network pharmacology approach to explore active compounds and pharmacological mechanisms of a patented Chinese herbal medicine in the treatment of endometriosis. *PLoS One*. 2022 Feb 7;17(2):e0263614. doi: 10.1371/journal.pone.0263614. PMID: 35130311; PMCID: PMC8820622.

## Signatures of small-world and scale-free properties in large computer programs

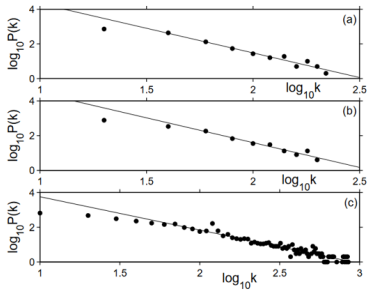
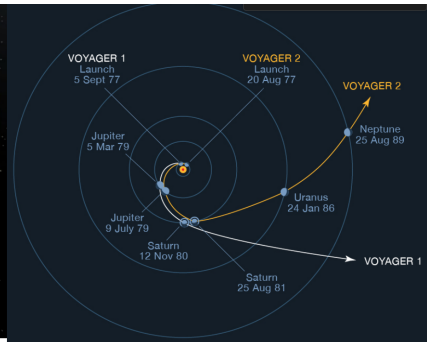
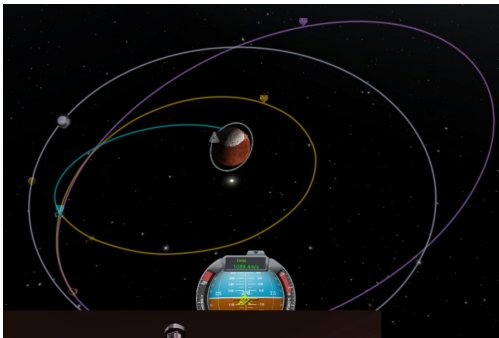


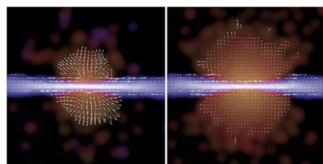
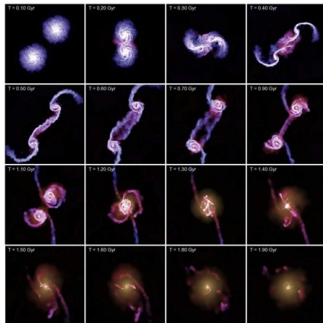
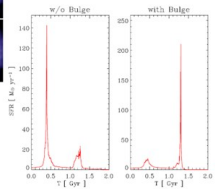
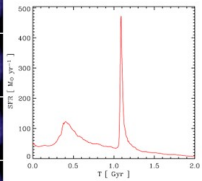
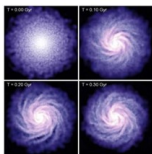
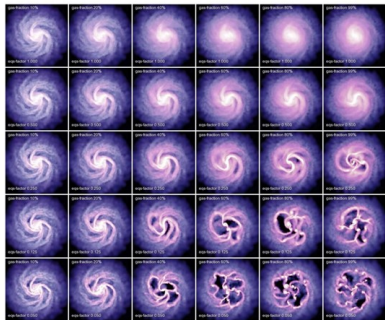
FIG. 1: Algebraic scaling behavior of the (non-normalized) probability  $P(k)$  of the underlying networks for widely used computer programs: (a) the Linux kernel, (b) XFree86, and (c) Mozilla.

TABLE I: Results for the networks corresponding to the four programs we have studied.  $N$  is the total number of nodes;  $\mu$  is the average number of links per node;  $C$  is the clustering coefficient, and  $C_{rand}$  is its value for an equivalent random network;  $L$  is the average shortest path, and  $L_{rand}$  is the same quantity for the corresponding random network.

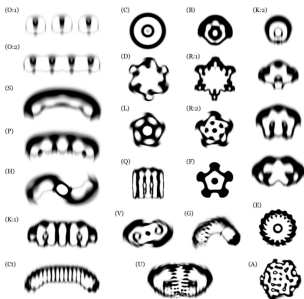
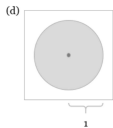
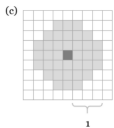
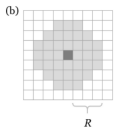
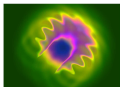
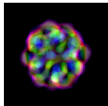
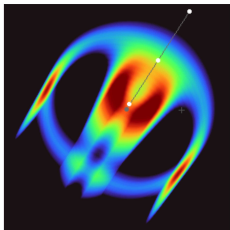
<i>program</i>	$N$	$\mu$	$C$	$C_{rand}$	$L$	$L_{rand}$
Linux kernel	1448	41.4	0.88	0.03	2.11	1.93
Mozilla	3803	76.6	0.81	0.02	2.49	1.87
XFree86	1465	33.0	0.81	0.02	2.56	2.05
Gimp	403	43.9	0.83	0.11	2.28	1.56



<https://science.nasa.gov/learn/basics-of-space-flight>  
<https://voyager.jpl.nasa.gov/mission/>  
[https://en.wikipedia.org/wiki/Kerbal\\_Space\\_Program](https://en.wikipedia.org/wiki/Kerbal_Space_Program)



<https://ui.adsabs.harvard.edu/abs/2005MNRAS.361..776S/a/abstract>



<https://chakazul.github.io/lenia.html>

