Complejidad en Cognición, Computación y Lógica

Joost J. Joosten

Viernes 25 de setiembre
Osuna

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- Hijos: Paco, Anrés, Lucas

- Lógica de Demostrabilidad

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- Intuitionistic Logic and semantics for Sub-Intuitionistic Logics

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- At the Limits of the Central Limit Theorem.

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  Interpretability logic of all reasonable arithmetical theories.

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- Rules: MP + Nec

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- Project: classify this logic of all reasonable arithmetical theories by stretching the principle of Obis to the extreme
- This is not in particular a research line I would like to pursue a lot further.

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- However, many natural theories do not live in this space:

$$\mathrm{PRA} \equiv (\mathrm{EA})^1_\omega \quad \omega \text{ times iterated } <1>$$

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- Alternative proof of Solovay's Theorem?

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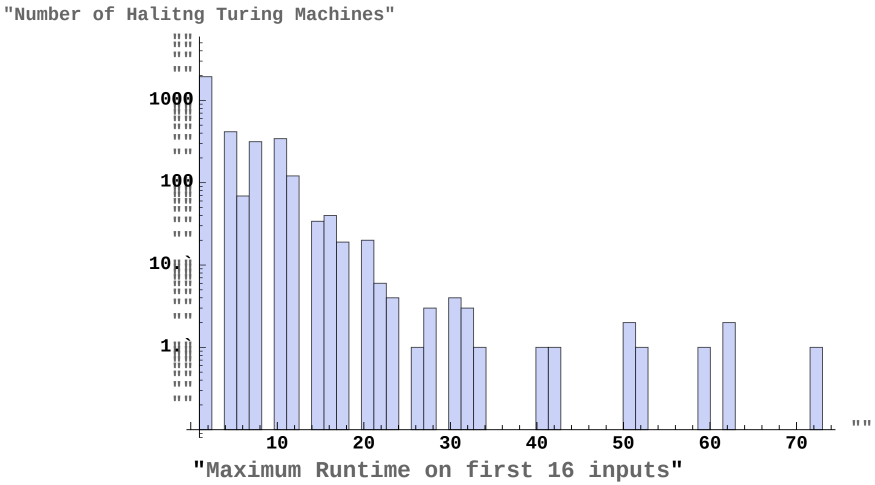
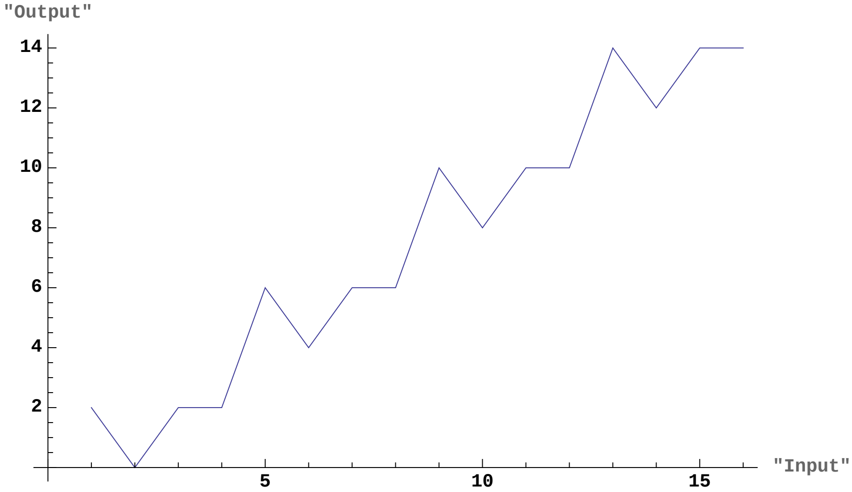
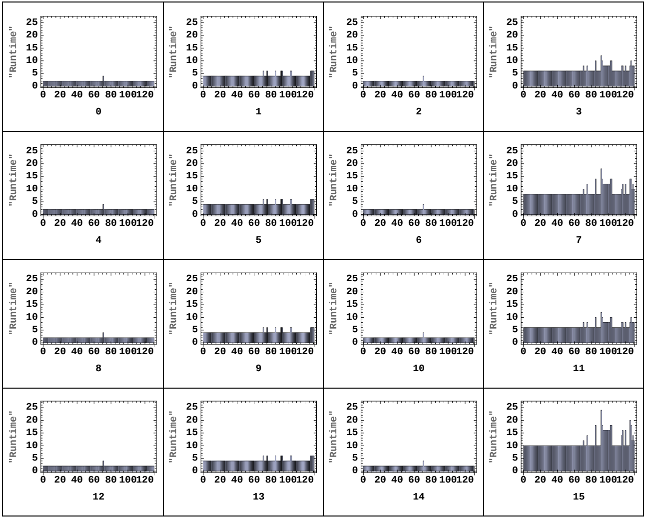
- See what functions they compute and if there are functions that are not sped-up when computed on larger TM's



Do these blocks correspond to classes? (2,2 TMs)

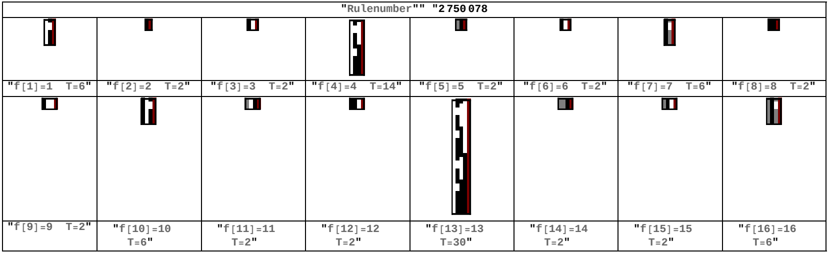


This function has 130 2,2 TMs that calculate it.

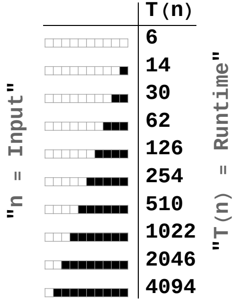


Not all these TMs have the same runtime.

But looking at minima, can we witness (non) speed-up?



We witnessed slow-down!



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- Work from here on. . .

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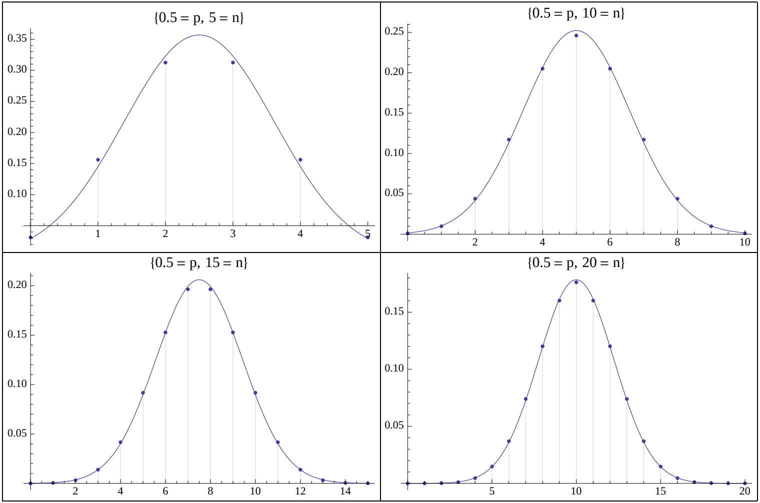
- Equivalently:

$$\lim_{n\to\infty} \frac{\Sigma_{i=1}^{n} X_i - \mu n}{\sigma\sqrt{n}} = N(0,1)$$


{0.5 = p, 5 = n}
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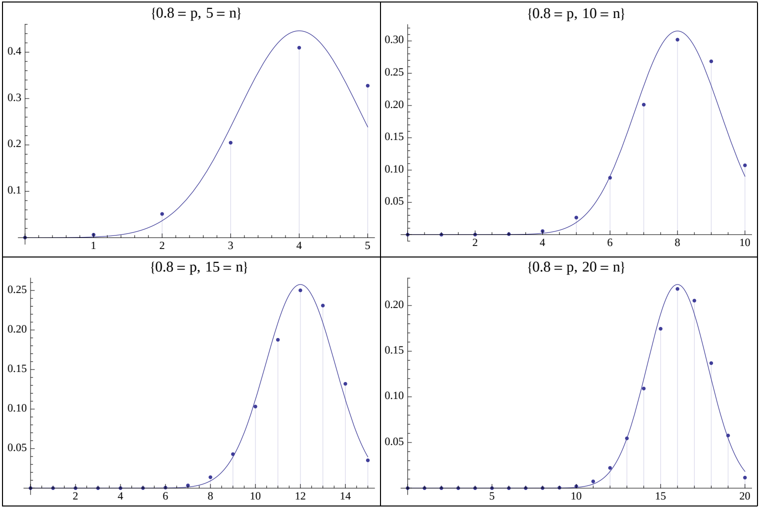
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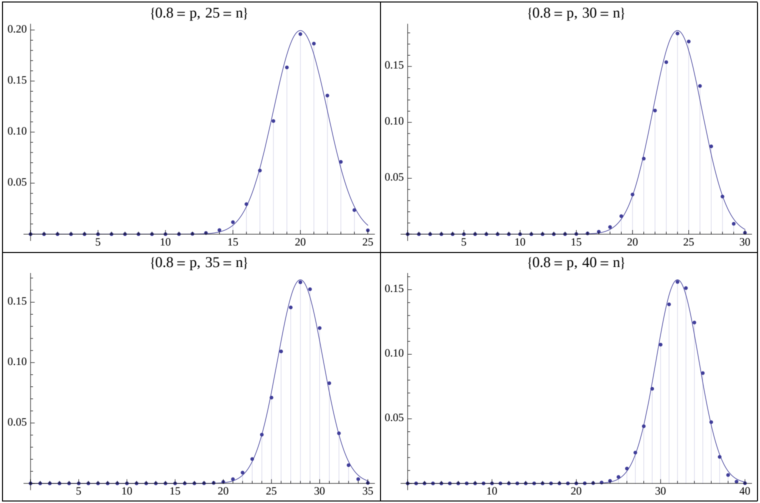
{0.8 = p, 25 = n}
{0.8 = p, 30 = n}
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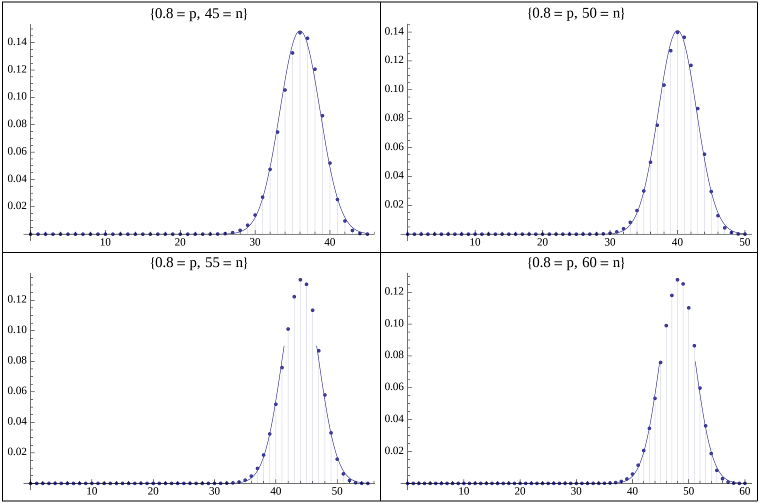
{0.8 = p, 45 = n}
{0.8 = p, 50 = n}
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- One can weaken the independence requirement

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- What was the original proof of de Moivre (without Taylor expansion?)?

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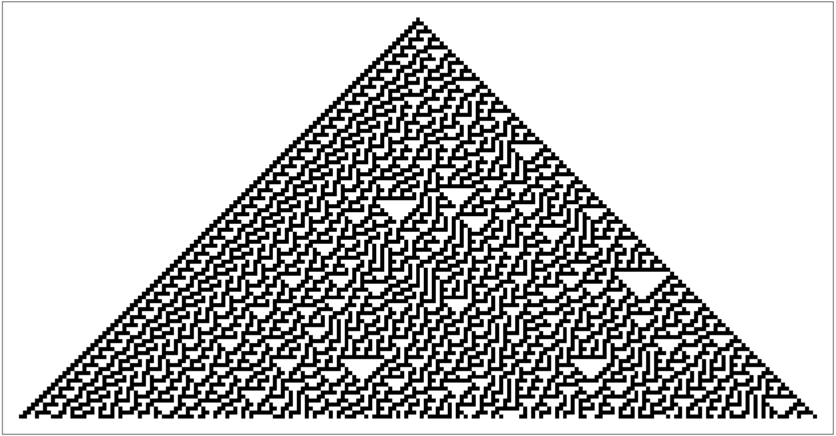
  Ain't that a coincidence?

Interesting and simple dynamical systems are cellular automata



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- The pictures they generate can be be given fractal dimensions
- Investigate the link between the dimensions and the computational complexity of the automata
- More in general: can complexity notions in one framework be formally linked to complexity notions in another framework?

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- Number Theory can be reduced to Logic

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