Nieskończona liczba małp

Mariusz Wołoszyn
Infinite monkey theorem

One of the earliest postulation by French mathematician Émile Borel in 1913.


“Given infinite time (...) almost surely will produce any text.”
Almost surely?

“In probability theory, one says that an event happens almost surely (sometimes abbreviated as a.s.) if it happens with probability one.”*

1. Diagonals of the square are zero.
2. Probability hitting exactly on a diagonal is zero.
3. One almost never hit the diagonal (i.e. it will almost surely not hit the diagonal).
4. Nonetheless the set of points on the diagonals is not empty and a point on a diagonal is no less possible than any other point: the diagonal does contain valid outcomes of the experiment.**)

*) [https://en.wikipedia.org/wiki/Almost_surely](https://en.wikipedia.org/wiki/Almost_surely)
**) ibidem
Experiments

In 2003, lecturers and students from the University of Plymouth MediaLab Arts course used a £2,000 grant from the Arts Council to study the literary output of real monkeys. They left a computer keyboard in the enclosure of six Celebes crested macaques in Paignton Zoo in Devon in England for a month, with a radio link to broadcast the results on a website.\[11\]

Not only did the monkeys produce nothing but five total pages largely consisting of the letter S,\[12\] the lead male began bashing the keyboard with a stone, and the monkeys followed by soiling it. Mike Phillips, director of the university's Institute of Digital Arts and Technology (i-DAT), said that the artist-funded project was primarily performance art, and they had learned "an awful lot" from it. He concluded that monkeys "are not random generators. They're more complex than that. ... They were quite interested in the screen, and they saw that when they typed a letter, something happened. There was a level of intention there."\[11\]\[13\]

The full text created by the monkeys is available to read here.\[14\]

https://en.wikipedia.org/wiki/Infinite_monkey_theorem#Real_monkeys
Wirtualne małpy

Według artykułu w *The New Yorker* program komputerowy uruchomiony przez Dana Olivera ze Scottsdale w Arizonie, zwrócił 4 sierpnia 2004 roku następujący wynik: Po $42\times10^{28}$ lat jedna z grupy „małp” stworzyła tekst:

**VALENTINE. Cease toIdor:eFLP0FRjWK78aXzVOwm)-‘;8.t...**

Pierwszych 19 liter tej sekwencji znajduje się w komedii *Dwaj panowie z Werony*. Inne grupy odtworzyły 18 liter z tragedii *Tymon Ateńczyk*, 17 z tragedii *Troilus i Kresyda* oraz 16 z *Ryszarda II*.271

https://pl.wikipedia.org/wiki/Twierdzenie_o_nieskończonych_malpach
Więcej małp

1 lipca 2003 roku uruchomiono stronę internetową *The Monkey Shakespeare Simulator*, zawierającą aplet *Javy*, który symulował wielką populację losowo piszących małp. Intencją twórców było sprawdzenie jak długo zajmie wirtualnym małpom napisanie kompletnej sztuki Szekspira. Przykładowo aplet wyprodukował poniższy, zgodny w 24 znakach, fragment pochodzący ze sztuki *Henryk IV, część 2*, wraz z oszacowaniem, że proces zajął „2 737 850 milionów miliardów miliardów małpo-lat” (tj. 2,7 sekstyliarda = 2,7×10³⁹):

RUMOUR. Open your ears; 9r''5j5&?OWTY Z0d…

Ze względu na ograniczenia mocy obliczeniowej, program używał modelu probabilistycznego (wykorzystując generator liczb losowych) zamiast naprawdę losować tekst i porównywać ze sztukami. Gdy symulator wykrywał zgodność znaków (to jest, gdy wynik z generatora losowego zawierał się w danym przedziale), symulator naśladował wpisanie zgodnych znaków[28]. Obecnie strona już nie istnieje.

https://pl.wikipedia.org/wiki/Twierdzenie_o_nieskończoną liczbę małp
AI Monkeys

What if we use AI monkeys?
Can we generate source code?
Generative models

Neural nets can generate content:

*Faces*, captions, cats, zebras, deep fakes, speech, etc...

It can write text too.
NN Types

one to one

one to many

many to one

many to many

many to many
RNN

Recurrent networks
PANDARUS:
Alas, I think he shall be come approached and the day
When little sain would be attain'd into being never fed,
And who is but a chain and subjects of his death,
I should not sleep.

Second Senator:
They are away this miseries, produced upon my soul,
Breaking and strongly should be buried, when I perish
The earth and thoughts of many states.

DUKE VINCENTIO:
Well, your wit is in the care of side and that.

Second Lord:
They would be ruled after this chamber, and
my fair nues begun out of the fact, to be conveyed,
Whose noble souls I'll have the heart of the wars.

Clown:
Come, sir, I will make did behold your worship.

VIOLA:
I'll drink it.

VIOLA:
Why, Salisbury must find his flesh and thought
That which I am not aps, not a man and in fire,
To show the reining of the raven and the wars
To grace my hand reproach within, and not a fair are hand,
That Caesar and my goodly father's world;
When I was heaven of presence and our fleets,
We spare with hours, but cut thy council I am great,
Murdered and by thy master's ready there
My power to give thee but so much as hell:
Some service in the noble bondman here,
Would show him to her wine.

KING LEAR:
0, if you were a feeble sight, the courtesy of your law,
Your sight and several breath, will wear the gods
With his heads, and my hands are wonder'd at the deeds,
So drop upon your lordship's head, and your opinion
Shall be against your honour.
Naturalism and decision for the majority of Arab countries' capitalism was grounded by the Irish language by [[John Clair]], [[An Imperial Japanese Revolt]], associated with Guangzham's sovereignty. His generals were the powerful ruler of the Portugal in the [[Protestant Imminence]], which could be said to be directly in Cantonese Communication, which followed a ceremony and set inspired prison, training. The emperor travelled back to [[Antioch, Perth, October 25|21]] to note, the Kingdom of Costa Rica, unsuccessful fashioned the [[Thrales]], [[Cynth's Dajoard]], known in western [[Scotland]], near Italy to the conquest of India with the conflict. Copyright was the succession of independence in the slop of Syrian influence that was a famous German movement based on a more popular servicious, non-doctrinal and sexual power post. Many governments recognize the military housing of the [[Civil Liberalization and Infantry Resolution 265 National Party in Hungary]], that is sympathetic to be to the [[Punjab Resolution]] (PJS)[http://www.humah.yahoo.com/guardian.cfm/7754800786d17551963s89.htm] Official economics Adjoint for the Nazism, Montgomery was swear to advance to the resources for those Socialism's rule, was starting to signing a major tripad of aid exile.]}
For $\bigoplus_{i=1}^{\ell}w_i$, where $L_{x_i} = 0$, hence we can find a closed subset $\mathcal{H}$ in $\mathcal{H}$ and any sets $F$ on $X$, $U$ is a closed immersion of $S$, then $U \to T$ is a separated algebraic space.

Proof. Proof of (1). It also start get

$$S = \text{Spec}(R) = U \times X U \times X U$$

and the comparability in the fibre product covering we have to prove the lemma generated by $\prod Z \times Y U \to V$. Consider the maps $M$ along the set of objects $\text{Set}_p \times U \to U$ is the fibre category of $S$ in $U$ in Section 7.2 and the fact that any $U$ affine, see Morphisms, Lemma 7.2. Hence we obtain a scheme $S$ and any open subset $W \subset U$ in $\text{Sh}(G)$ such that $\text{Spec}(R) \to S$ is smooth or an

$$U = \bigcup U_i \times S_i U_i$$

which has a nonzero morphism we may assume that $f_i$ is of finite presentation over $S$. We claim that $\mathcal{O}_X$ is a scheme where $x, x', s' \in S'$ such that $\mathcal{O}_{X,x,s'} \to \mathcal{O}_{X',x',s'}$ is separated. By Algebra, Lemma 7.2 we can define a map of complexes $\text{GL}_S(x'/S')$ and we win. □

To prove this we see that $\mathcal{F}_{|Y}$ is a covering of $\mathcal{X}$, and $\mathcal{T}_i$ is an object of $\mathcal{F}_{|Y}$ for $i > 0$ and $\mathcal{F}_i$ exists and let $\mathcal{F}_i$ be a presheaf of $\mathcal{O}_X$-modules on $\mathcal{C}$ as a $\mathcal{F}$-module. In particular $\mathcal{F} = U \mathcal{F}$ we have to show that

$$M^* \mathcal{F} \otimes_{\mathcal{O}(\mathcal{R}/S)} \mathcal{O}_{\mathcal{R}/S} \to \mathcal{F}$$

is a morphism of algebraic stacks. Note that

$$\text{Arrows} = (\text{Set}/\mathcal{X})_{\text{perf}} \to (\text{Set}/\mathcal{X})_{\text{perf}}$$

and

$$\mathcal{V} = \Gamma(S, O_U) \to (U, \text{Spec}(A))$$

is an open subset of $X$. Thus $U$ is affine. This is a continuous map of $X$ is the inverse, the groupoid scheme $S$.

Proof. See discussion of sheaves of sets. □

The result for open covering follows from the less of Example 7.2. It may replace $S$ by $X_{\text{space,finite}}$ which gives an open subspace of $X'$ and $\mathcal{F}$ equal to $\text{Spec}(\Gamma)$, see Descent, Lemma 7.2. Namely, by Lemma 7.2 we see that $R$ is geometrically regular over $S$.

The result for any open covering follows from the less of Example 7.2. It may replace $S$ by $X_{\text{space,finite}}$ which gives an open subspace of $X'$ and $\mathcal{F}$ equal to $\text{Spec}(\Gamma)$, see Descent, Lemma 7.2. Namely, by Lemma 7.2 we see that $R$ is geometrically regular over $S$. □

Lemma 0.1. Let $\mathcal{C}$ be a set of the construction.

Let $\mathcal{C}$ be a gerber covering. Let $\mathcal{F}$ be a quasi-coherent sheaves of $\mathcal{O}$-modules. We have to show that

$$\mathcal{O}_{X} = \mathcal{O}_{X}(\mathcal{C})$$

Proof. This is an algebraic space with the composition of sheaves $\mathcal{F}$ on $X_{\text{finite}}$ we have

$$\mathcal{O}_{X}(\mathcal{F}) = \{\text{morphis} \times \mathcal{O}_{X}(\mathcal{G}, \mathcal{F})\}$$

where $\mathcal{G}$ defines an isomorphism $\mathcal{F} \to \mathcal{F}$ of $\mathcal{O}$-modules. □

Lemma 0.2. This is an integer $Z$ is injective.

Proof. See Spaces, Lemma 7.2. □

Lemma 0.3. Let $S$ be a scheme. Let $X$ be a scheme and $X$ is an affine open covering. Let $U \subset X$ be a canonical and locally of finite type. Let $X$ be a scheme. Let $X$ be a scheme which is equal to the formal complex.

The following to the construction of the lemma follows.

Let $X$ be a scheme. Let $X$ be a scheme covering. Let

$$b : X \to Y' \to Y \to Y' \times X Y \to X$$

be a morphism of algebraic spaces over $S$ and $Y$.

Proof. Let $X$ be a nonzero scheme of $X$. Let $X$ be an algebraic space. Let $\mathcal{F}$ be a quasi-coherent sheaf of $\mathcal{O}$-modules. The following are equivalent

1. $\mathcal{F}$ is an algebraic space over $S$.
2. If $X$ is an affine open covering.

Consider a common structure on $X$ and $X$ the functor $\mathcal{O}(X)$ which is locally of finite type.

This since $\mathcal{F} \in \mathcal{F}$ and $x \in \mathcal{G}$ the diagram

Linux “source”

Source: http://karpathy.github.io/2015/05/21/rnn-effectiveness/
Pan “Tadeusz”

nie było jej; mignęła tylko śród okienka
jej różowa wstążeczka i biała sukienka.
widzie na grzędach, jaką pszy minimal do pok.
a niech jeszcze nigdy uchu. potku tylko,
kle kwieszło nagot wszyscy rzierz seról niczą!
kropliki tłuszczu raz przerzęga* u wzroku,
albo jak prosze zablo. lecz przez wyjana!
tak szlachta to kochano za tysku zalata
że na kichek, jakby oblicat i pan stać,
i książę staworszy zawogi, kulczniko hrobo.
odeszczegi się naź tak taź górą zmiada słańca.

wszystko pan! taź tak nie z dobrzy jeszcze długim litci.
podpajła wrzek hrebką gławę, jak sobie z ramienie.

catej szerskali! znarź hesłuskie się kowicą,
wstądzie z halbeem skryja harlani mówką podaleki,
motołu wez sza cała już skoczył w prosi,
i drogą, i jak we grzędy, i najnie wyszejenia,
on bornie starnych zarszy hajba siedział przed rajny,
Generating FreeBSD

Getting source code and concatenating to single corpus.

svn checkout http://svn.freebsd.org/base/head/sys/

Warning this does NOT work properly on FreeBSD :)

find . -name '*.c' -exec cat {} >> p.c \;
Code Char stats

22620908 spaces
7746120 ‘e’
7097026 ‘0’
6550779 ‘t’
5815508 ‘,’
5496898 ‘_’
5393945 ‘\n’
5213376 ‘\t’
5045093 ‘x’
followed by other characters...

'j', 82093
""", 65663
'""", 65579
'@', 27440
'J', 21658
'?', 19961
'~', 16699
'$', 12202
'\', 9678
'^', 5244
Tensorflow

rv++

if (strcmp(*p_drv)->driver_name, name) == 0)
    break;

rv++

if (strcmp(*p_drv)->driver_name, name) == 0)
    break;
pycharm

if (error)
    * tx terromaker *tethe tx",

*tesethale tx00_sind.c00lBad tarod ahtist * (st ** |==,
    stad_t tatad foider tx0, 0, 0,

    */

    */

    * (st tetx019"

    /* (ameditarainte */

    /* * | tdinditet_t tet_sititint */ * (se ag_staterutad_
3rd time lucky

```c
if (be_lun->vn == NULL)
    cbe_lun->flags |= CTL_LUN_FLAG_NO_MEDIA;
/*Tell the user the blocksize we ended up using in state, we can for the sort the lock.
 * The requests.
 */
    softc->flags |= SA_FLAG_CAN_PROBE;
    param_param_len = sizeof(softc->lock);
    status = CTL_FLAG_DATA_VRT(&ccb->control_byte);
    if ((error == 0) {
        if (error != 0) {
            if (error != 0) {
                if (cdev->pos.control) {
                    softc->flags |= CAM_DIR_IN;
                    if (softc->flags & CTL_FLAG_DATA_IN | STATQ_DIR_IN &case 0) {
                        if (cdb->csio.cdb_stats.ccb_state
```

```c```
AI for coding

● Intelligent autocompletion (tabnine: [https://tabnine.com/blog/deep/](https://tabnine.com/blog/deep/))

● Automated bug fixing:
  ○ Luc Esape [https://github.com/lucesape](https://github.com/lucesape): gis bug fixes went through code review... the caveat? He’s an AI :)
  ○ **Deep coding: when the machine learns to code by itself**