Build Your Own Timeline Algorithm

Davide Eynard

FOSDEM, 1 Feb 2025

https://fosstodon.org/@mala

https://github.com/aittalam/byota

BYOTA is not...

- a new algorithm
- an end-user application
- a service

BYOTA is... a (pacifist) call for arms

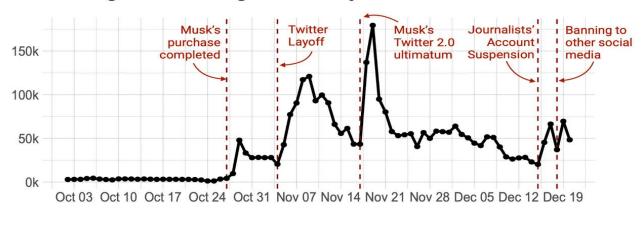


How it started

October 26 2022

#TwitterMigration

New mastodon accounts (daily)



Data from @mastodonusercount@bitcoinhackers.org

Six months earlier...

 \equiv CM Business Markets Tech Media Calculators Videos

Elon Musk to buy Twitter in \$44 billion deal



By <u>Clare Duffy</u>, CNN Business ② 5 minute read · Updated 8:44 PM EDT, Mon April 25, 2022





#MyMigration

New mastodon users (daily) Data from @mastodonusercount@bitcoinhackers.org Musk's Twitter Judge denies Musk's Musk's attempt offer to purchase accepts purchase the offer to delay trial completed i. 100k 50k Twitter Layoff May 0k 1 Sep Jun Jul Oct Nov Jan Feb Mar Apr Aug



Timeline algorithms

Timeline Algorithms

Define *whether* and *how* posts appear on your timeline

Algorithm	Remove?	How
Revchron	No	Sort by datetime in ascending order
Spam / Bots	Yes	Remove post if spam / bot
Moderation	Yes/No	Remove / Downrank if post is abusive
Recommender	No	Uprank if post is more likely to receive engagement

- Movie Trailer
- News Story
- Stranger's Job Update
- "Fake News"
- Spam
- Low Quality News
- Random Baby Photos
- Hate Speech
- Puppies
- CSAM
- Stranger's Holiday Photos
- Copyrighted Content
- Fake User
- Nudity (Phishing)
- Same News Story
- · Phishing
- Clickbait
- Similar News Story
- ...

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- News Story
- Low Quality News
 - Fake User (missed)
 - Same News Story
 - Clickbait
 - Similar News Story
 - Album Release
 - Community Fundraiser
 - Opinion Piece
 - · Son's Job Update
 - · Friend's Holiday Photos
 - Local Event Invitation
 - Photos of Baby Niece
 - Nature Photos

•

Candidate Generation

(items removed if not relevant to user \clubsuit)

- 1. Son's Job Update
- 2. Photos of Baby Niece 3. Friend's Holiday Photos
- 4. Album Release
- 5. News Story
- 6. Same News Story
- 7. Similar News Story
- 8. Community Fundraiser
- 9. Local Event Invitation
- 10. Low Quality News
- 11. Nature Photos
- 12. Fake User (missed)
- 13. Clickbait
- 15. ...





2. Photos of Baby Niece 3. Friend's Holiday Photos 4. News Story 5. Album Release 6. Same News Story 7. Community Fundraiser 8. Similar News Story 9. Local Event Invitation 10. Low Quality News

1. Son's Job Update

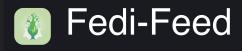
Ranking

Re-Ranking

Luke Thorburn et Al.: How Platform Recommenders Work (2022)

Moderation (items flagged or filtered out)

On the shoulders of giants 💙



Philip Kreißel



Jan Lehnardt

Tootfinder

Opt-in global Mastodon full text search. Join the index!

Search...

Search

Full text search on Mastodon

Imagine searching any post on Mastodon. This is now possible - at least for the posts of users who opt in.

Tootfinder indexes all public posts of consenting users and makes them searchable for 3 months. If you want to be part of it, join the index.



Mastodon Digest

Sourced from your timeline over the past 12 hours

Here are some popular posts you may have missed:

Matt Hodges



Adam Hill

Matthias Bürcher

Problems of timeline algorithms

Choose one or more of:

- Biased
- Not transparent
- Complete lack of control
- Not privacy preserving
- Huge computational cost
- Require deep ML knowledge
- Cannot be run locally

Also true for search & recommendations!

Breaking the assumptions

Choose one or more of:

- Biased
- Not transparent
- Complete lack of control
- Not privacy preserving
- Huge computational cost
- Require deep ML knowledge
- Cannot be run locally

- → Open, substitutable models
- → Clear, simple methods
- → Make code available / easy to run
- → Don't share personal data
- → Use lighter models
- → Out-of-the-box embeddings
- → Build it so it runs locally :-)

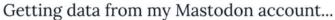
Also true for search & recommendations!

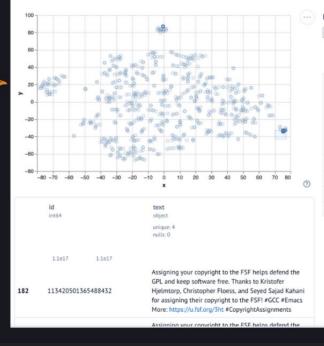
→ All the above work here too!

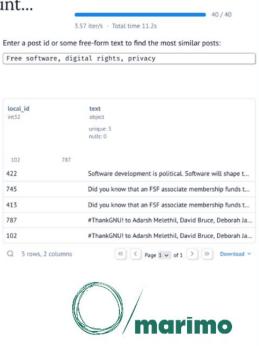
BYOTA

Architecture









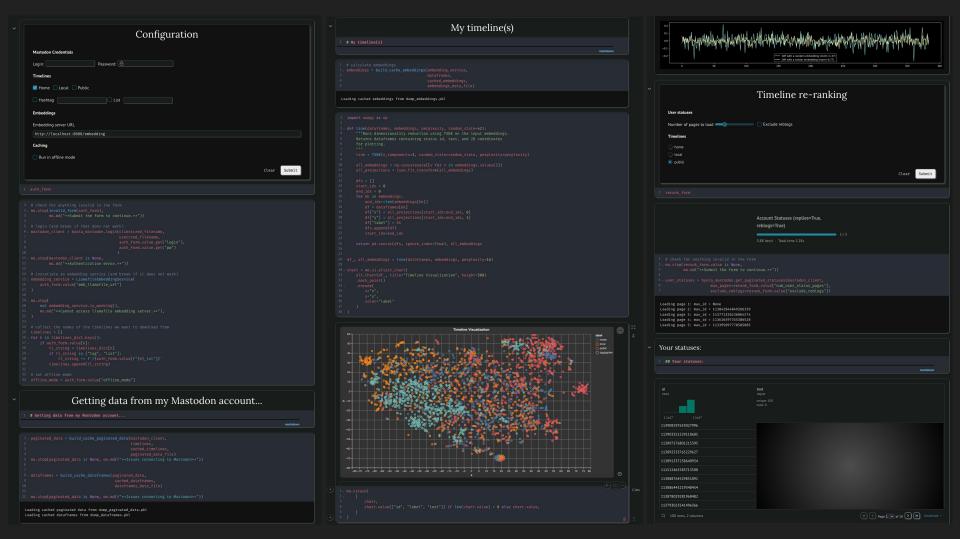
mastodon

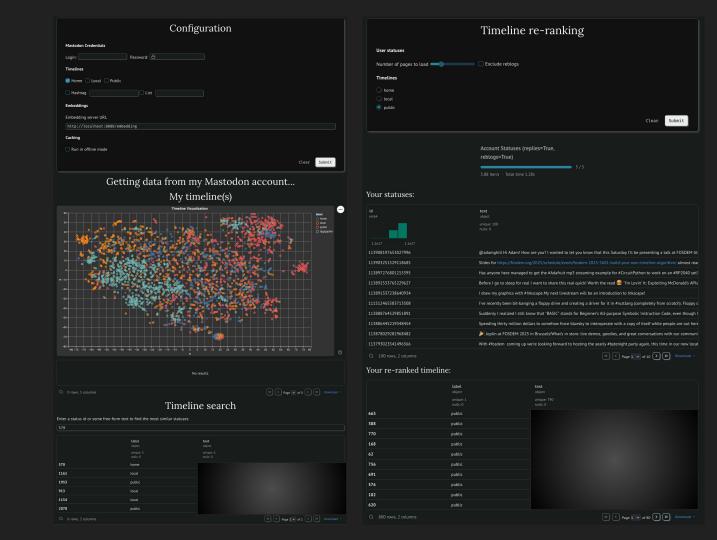
<u>Llamafile</u>

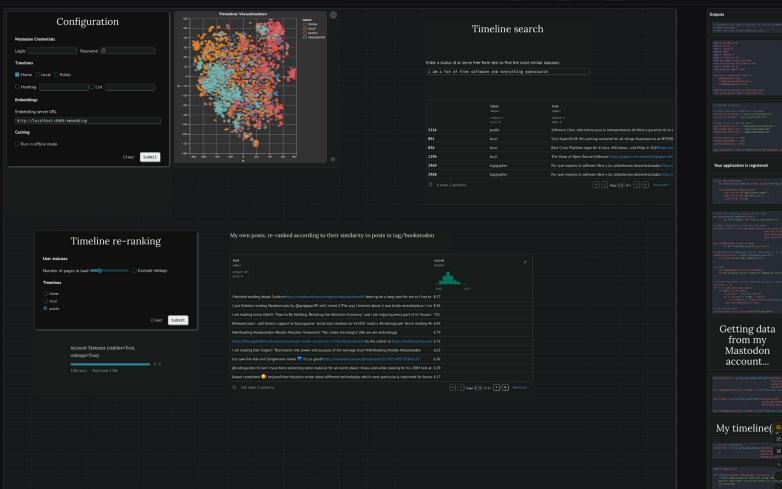
- Single-file LLMs language models
 - sentence-transformers/all-MiniLM-L6-v2 (code/papers, training data)
- 100% local
- Optimized to run on slower hardware
- Used to calculate *status embeddings*

<u>marimo</u>

- Reactive notebook for Python
- Sharable as an app
- Runs in your browser as a WASM-powered standalone HTML file! 55 (2)

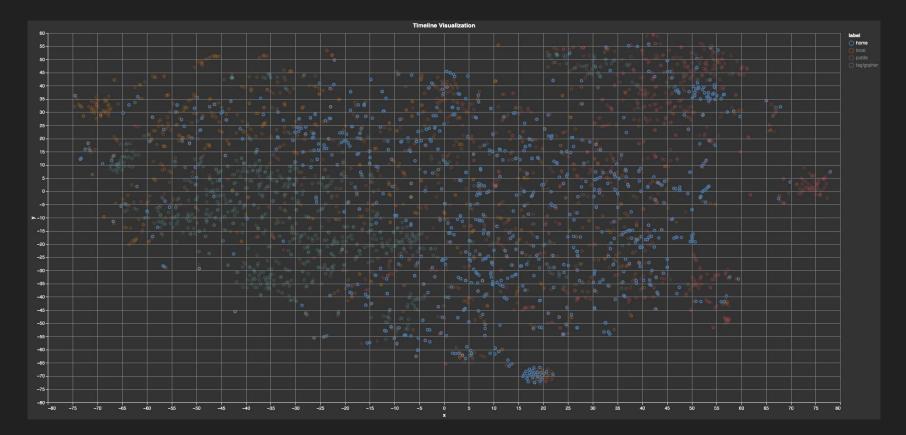


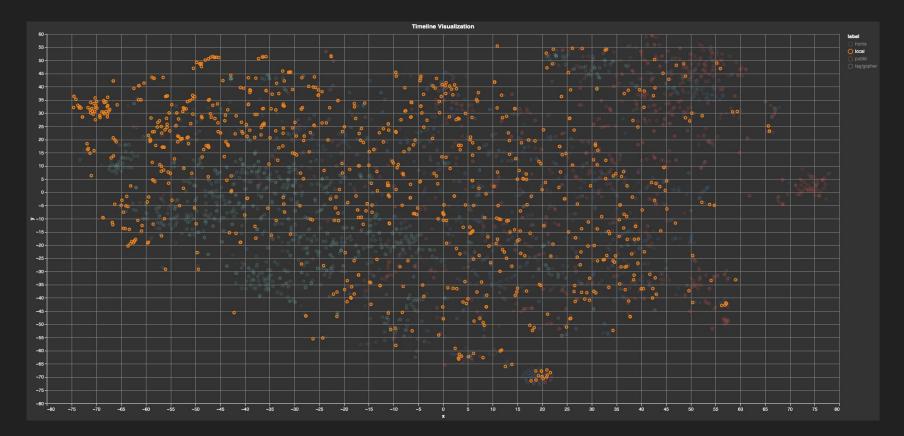


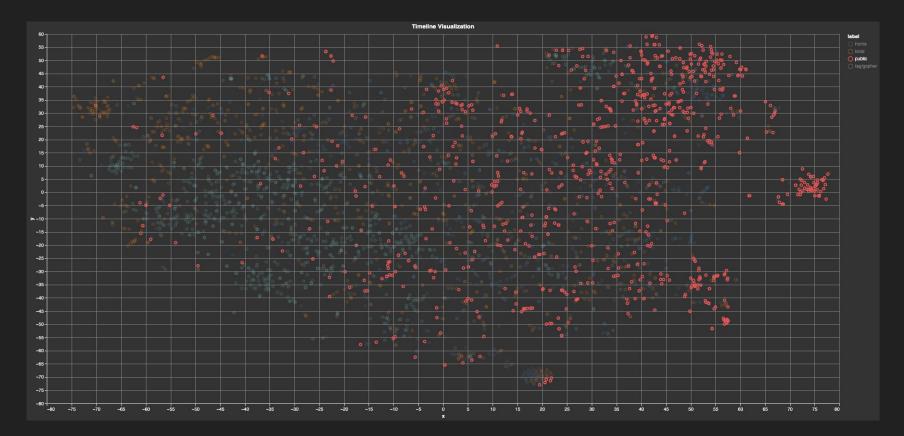


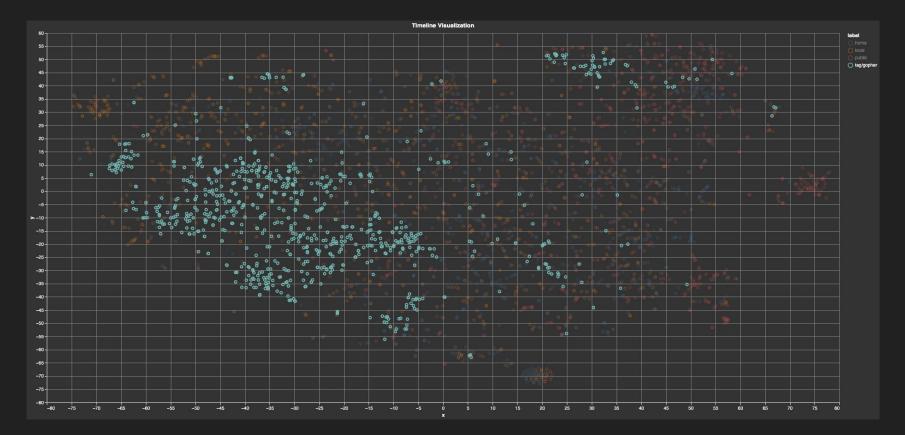
🔳 Grid 🛛 🖃 🛞 🥵

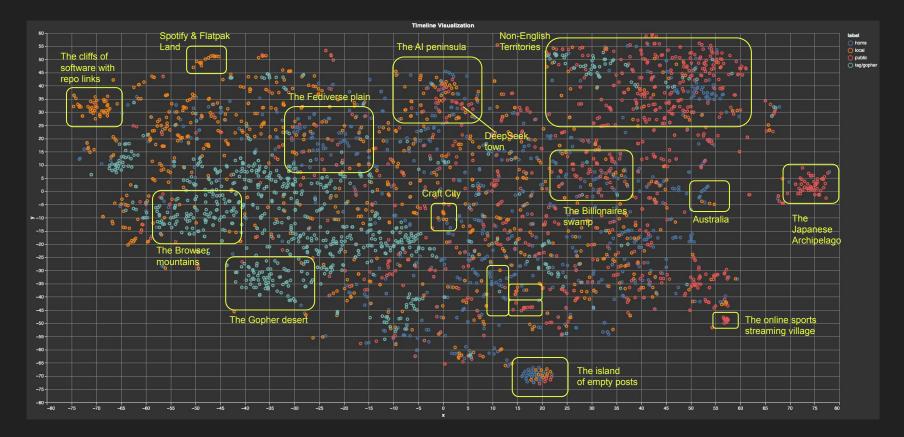
BYOTA in practice

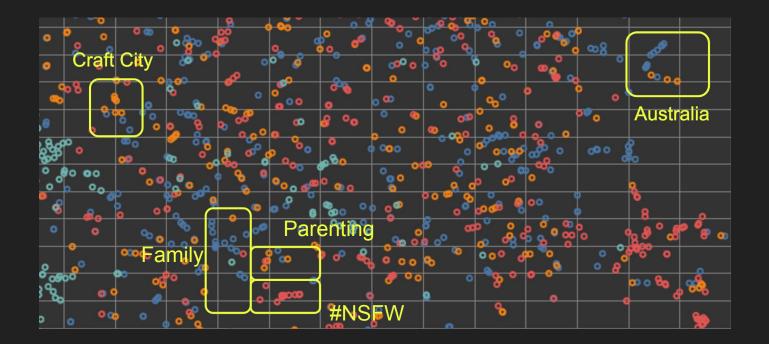












Semantic search

Enter a status id or some free-form text to find the most similar statuses:

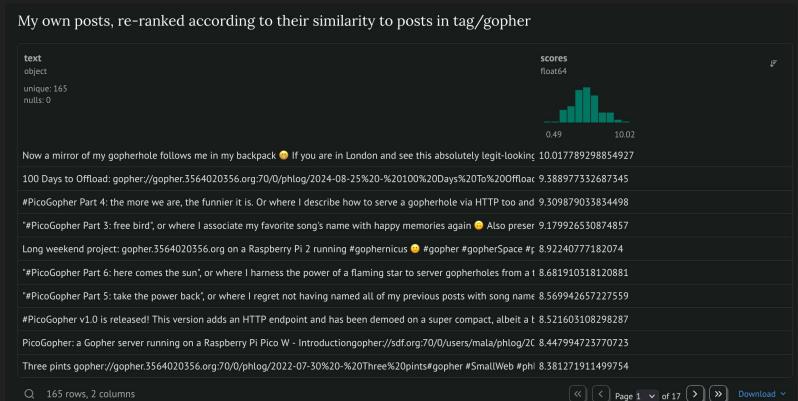
I am a fan of free software and everything opensource

	label object	text object
	unique: 3 nulls: 0	unique: 6 nulls: 0
2116	public	Software Libre, alternativa para la independencia de Meta y garantía de la soberanía digitalhttps://c
891	local	Visit #openSUSE this coming weekend for all things #opensource at #FOSDEM. Don't miss out. #ope
856	local	Best Cross-Platform Apps for #Linux, #Windows, and #Mac in 2025https://www.tecmint.com/cross-r
1294	local	The Value of Open Source Software https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4693148 #
2969	tag/gopher	Por qué importa el software libre y las plataformas descentralizadas https://kolektiva.media/w/mRł
2968	tag/gopher	Por qué importa el software libre y las plataformas descentralizadas https://kolektiva.media/w/mRH

Q 6 rows, 2 columns

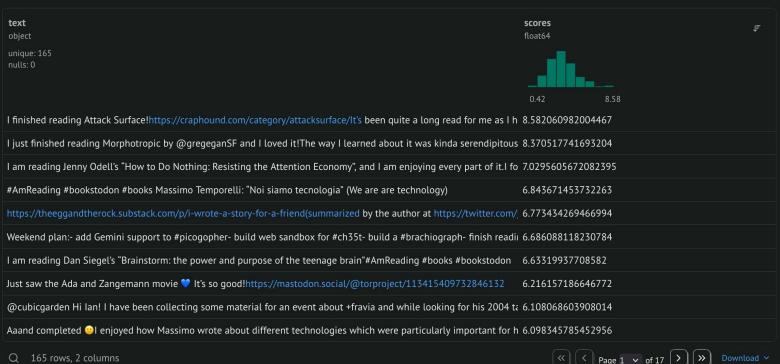
≪ < Page 1 v of 1 > >>> Download v

Re-ranking



Re-ranking

My own posts, re-ranked according to their similarity to posts in tag/bookstodon



165 rows, 2 columns Q

What about performance?

From bert to llama, time to embed 800 statuses

				2016 MB Pro		2024 M3 Max	
Model Name	Architecture	Size	Params	llamafiler 0.9.0	ollama 0.5.7	llamafiler 0.9.0	ollama 0.5.7
all-MiniLM-L6-v2.F16	bert	46 MB	22.6M	52	42	21	11
nomic-embed-text-v1.5	nomic-bert	274MB	137M	280	302	26	15
mxbai-embed-large-v1-f16	bert	670MB	334M	586	715	35	24
e5-mistral-7b-instruct	llama	5GB	7.11B	-	-	193	126

How local is this?

- Embedding servers (llamafile, ollama) run locally

(base) mala@Davides-MacBook-Pro byota % curl http://localhost:11434/api/embed -d '{

"model": "all-minilm",

"input": "There is a crack in everything, that`s how the light gets in"

}'

289739,0.063623264,-0.018333575,-0.039952043,-0.010457686,0.01835603,-0.014461786,-0.048471212,-0.10302953,-0.04449307,-0.033806648,0.043435317,-0.055 35696,-0.08392212,-0.069332235,-0.1140092,0.094958186,-0.004860086,-0.035971902,0.0064314394,-0.011037193,-0.0042981366,0.057368666,-0.07753447,0.0582 05567,0.06930106,-0.029682364,0.008502044,0.009354028,0.0283228,-0.06902948,-0.03418532,-0.067206554,-0.021176727,0.016437624,0.002215454,0.036747105, 0.07724692,-0.015402062,0.077265225,-0.054167006,-0.033349615,0.020193053,0.034084015,0.061406456,0.032288905,-0.040040996,0.023521626,0.02126329,0.08 615035, -0.061375607, 0.06355097, 0.04620808, 0.0041378327, 0.031874895, 0.114311315, -0.030882692, -0.038698573, -0.013728155, 0.024873884, -0.012341479, 0.04672 664,0.03756118,0.010759333,-0.043871537,-0.011314235,-0.044753373,-0.06690473,-0.06965222,0.04193043,0.1315757,0.017704383,-0.03661285,0.012033759,0.0 5674712,0.07129007,0.025094792,0.07849084,-0.045343563,-0.06141006,-0.0020801648,-0.08567624,0.011793135,-0.0596682,0.018057982,0.011267296,0.00093738 77,0.022480756,-0.013365701,-0.037117377,0.028427813,-0.017001763,0.0011356488,0.046418704,-0.020152528,0.03514104,-0.07136514,0.00035700458,0.1282400 3,-0.0022463154,-0.0018500297,0.06896258,-0.014172439,0.08096553,0.035695687,-0.013391483,-0.07353376,-0.022956979,0.035261188,-0.11386469,0.1013533,-0.029097252,0.030631319,-0.05699662,0.04995545,-0.014374496,-0.06827453,0.022101417,-5.79777e-33,0.047753297,0.010481634,0.013510314,-0.06565448,-0.04 959897,-0.019746777,-0.014892544,0.032647777,-0.0370615,0.031402756,0.02753166,-0.036928885,-0.044419184,0.017205695,0.009339862,-0.024484064,0.025361 564,-0.007454156,-0.086544834,0.021759672,-0.054570444,-0.03250337,0.0267465,-0.023788553,-0.0429258,0.08550657,0.0030403528,-0.029352954,-0.002826801 5,0.008470148,-0.060643297,0.14131382,0.022634849,0.06030029,-0.02347907,0.038513415,0.07336358,0.023913588,-0.10735695,-0.020961767,-0.15948609,-0.00 9127056,0.06648866,0.043618027,0.0303683,0.03637972,-0.024620412,0.03369837,-0.024581097,0.028490027,-0.006795191,-0.042151425,-0.04695509,0.011976727 ,-0.0019522137,0.06114577,0.060792405,-0.02162295,0.009280819,0.036745682,0.03309684,-0.009520336,0.002621163,0.02847645,0.030024678,-0.01093194,-0.01 3517996,0.04346806,-0.00074209954,0.006243889,-0.0798012,-0.035463694,-0.0044531957,0.051712632,-0.06932025,-0.006013705,-0.050425116,0.0027645791,-0.

How local is this?

- Marimo wasm runs in your browser

Downloaded data:

Status	Method	Domain	File	Initiator	Туре	Transferred	Size
200		test-files.pythonhosted.org	marimo_base-0.10.17-py3-none-any.whl	<u>/:10</u> (fetch)			666.91 kB
200		🔒 files.pythonhosted.org	Markdown-3.6-py3-none-any.whl	<u>/:10</u> (fetch)	octet-stream	cached	105.38 kB
200		🔒 cdn.jsdelivr.net		<u>/:10</u> (fetch)			1.12 MB
200		files.pythonhosted.org	pymdown_extensions-10.8.1-py3-none-any.whl	<u>/:10</u> (fetch)		cached	250.83 kB
200		🔒 cdn.jsdelivr.net	PyYAML-6.0.2-cp312-cp312-pyodide_2024_0_wasm32.whl	<u>/:10</u> (fetch)		cached	502.84 kB
200		🔒 cdn.jsdelivr.net	altair-5.4.1-py3-none-any.whl		wasm	cached	5.45 MB
	GET	🔒 cdn.jsdelivr.net	typing_extensions-4.11.0-py3-none-any.whl	fetch	wasm	31.83 kB (raced)	140.47 kB
	GET	🔒 cdn.jsdelivr.net	Jinja2-3.1.3-py3-none-any.whl	fetch	wasm	111.43 kB (raced)	494.18 kB
200		🔒 cdn.jsdelivr.net	MarkupSafe-2.1.5-cp312-cp312-pyodide_2024_0_wasm32.whl				31.67 kB
200		🔒 cdn.jsdelivr.net	jsonschema-4.21.1-py3-none-any.whl	fetch		cached	279.58 kB

	Inspector 🖒	Console D Debugger	↓ Network	{ } Style Editor 🕜 Performance 🗊 Men	mory 🗄 Storage 🏅	Accessibility	器 Application			9 ₅ [j] … ×
Ö T	Filter URLs				n	+ Q 🛛 All	HTML CSS JS XHR Fonts	Images Media	WS Other Disabl	e Cache 📔 No Throttling 🗧 🕇 🗱
Status	Method	Domain		File			Initiator	Туре	Transferred	Size 0 ms
200	POST	🔒 fosstodon.org		apps			<u>/:10</u> (xhr)	json	1.55 kB	444 B
200	POST	A localhost:8080		embedding			<u>/:10</u> (xhr)	json	5.49 kB	5.20 kB
200	GET	🔒 fosstodon.org		/api/v1/instance/		-	<u>/:10</u> (xhr)	json	3.84 kB	6.47 kB
200	POST	🔒 fosstodon.org		token			<u>/:10</u> (xhr)	json	1.71 kB	141 B
304	GET	🔒 fosstodon.org		/api/v1/instance/			<u>/:10</u> (xhr)		cached	6.47 kB
200	OPTIONS	6 🔒 fosstodon.org	N	/api/v1/instance/				plain	672 B	0 B
200	GET	🔒 fosstodon.org	\$	home			<u>/:10</u> (xhr)	json	18.25 kB	125.05 kB
200	OPTIONS	6 🔒 fosstodon.org		home			xhr	plain	672 B	0 B
	GET	fosstodon.org		home?max_id=113889573242074676			<u>/:10</u> (xhr)			
	OPTIONS	fosstodon.org		home?max_id=113889573242074676			xhr			

. . . .

Status	Method	Domain	File	Initiator	Туре	Transferred	Size	0 ms
200	GET	🔒 fosstodon.org	home?max_id=113880828320214162	<u>/:10</u> (xhr)	json	20.25 kB	110.35 kB	
200	OPTIONS	🔒 fosstodon.org	home?max_id=113880828320214162	xhr	plain	672 B	0 B	
200	GET	🔒 fosstodon.org	home?max_id=113880364682334614	<u>/:10</u> (xhr)	json	21.34 kB	112.50 kB	
200	OPTIONS	🔒 fosstodon.org	home?max_id=113880364682334614	xhr	plain	672 B	0 B	
200	GET	🔒 fosstodon.org	home?max_id=113880249393565733	<u>/:10</u> (xhr)	json	1.17 kB	2 B	
200	OPTIONS		home?max_id=113880249393565733		plain	672 B	0 B	
200	POST	🔒 localhost:8080	embedding	<u>/:10</u> (xhr)	json	5.47 kB	5.18 kB	
200	POST	🔒 localhost:8080	embedding	<u>/:10</u> (xhr)	json	5.47 kB	5.18 kB	
200	POST	🔒 localhost:8080	embedding	<u>/:10</u> (xhr)	json	5.49 kB	5.20 kB	
	POST	localhost:8080	embedding	<u>/:10</u> (xhr)				

What next?

Next steps

- Grow as a tool where people can experiment with timeline algorithms
- Model comparison
- New approaches (e.g. clustering, classification)
- Protocols, not platforms

Thank you!

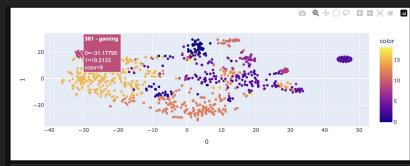
https://fosstodon.org/@mala

https://github.com/aittalam/byota

Modular

cardiffnlp/tweet-topic-base-multilingual

robertastodon



from scipy import spatial •••

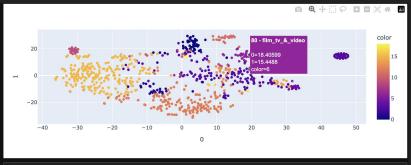
113886398592689487:Okay that's it! I 'I done with the first release version of my pixel 2D platformer game :blobcatti red: - 9 unique levels- 50 cats to rescue- 9 achievements & 10 leaderboards- 4 enemy types- over 50 different enemiseground- & wall sliding- loads more!Also no in-app purchases, no ads, no tracking and free in all stores \It's gonna ta ke a bit for review, I submitted them at the same time. Let's make it a race :apple_inc: igoogle:

113886568457272726:@vga256 @rek hey vga! It just so happens that we released a version of Ōquonie that runs on that tin y little virtual machine with the hope that it will allow the game to live on! It's playable on near everything with a screen and a d-pad.Have fun with Turye ixxn: https://hundrefabbits.itch.io/oquonie

113888689487472937:Sono arrivate le mie copie di Squeaky, il nuovo gioco della linela fluffy.Per ora i disegni di questa linea di giochi family sono tutti miei.Ho dato un'occhiata alle regole della modalità di gioco base e nel video provo a sintetizzarle. Spero di aver capito bene e non aver detto delle sciocchezze.GateOnGames David Spada #tartamani #tartaac celerato #squeaky #giochidatavolo #scoiattoli #arraffonihttps://youtu.be/dkQNyewCkVo7si=BgllSBuUDzc73/pO

113890702677157519:I made crossroad logic. Now I can make more interesting tracks designs.Some update under-the-hood.Cu rrently 3198 bytes#ASM #GameDev #MSD0S

113884008375636081:"n still working on the game editor for my #Amiga game called #InEdate .I've started today to work on the script editor, it's the window on the right and it's a bit horrible right now, but it's a starter.The idea is to fill the left column with the available commands and to use the right column for the script editing.I'm unsure if I've to add styled text (for the keywords) or not... maybe I'll add it at a later point if really needed.Btw, yes, the proje ct is still active! :amiga: ●



from scipy import spatial •••

113890179350397455:56.4 percent of my external viewers on YouTube come from Mastodon.12.9 percent are from Bluesky.5.1 percent are from Facebook.This is where it's at!♥☆♥

113883393289219428:I first heard about the #CriterionChallenge on here yesterday. Now I've put my list together for 202 5 - https://blog.tomasino.org/criterion-challenge-2025/So many movies to see!

11382416617946818:≝ officially entering pre-production for my video series about the #Fediverse ©THANK YOU for encour aging me to do this. It feels really energizing ♥I'm often thinking about this brilliant quote by filmmaker Ava DuVern ay: "If your dream is only about you, it's too small."My dream / lotty goal: for everyone to know about the #Fediverse and why / how to join it.Striving to create an easy to follow, persuasive video explainer.P.S.: I changed my bio 39 (I'm no longer a "filmmaker on histus")

113887011963722410:how have i never heard of this film until now https://www.youtube.com/watch?v=vnoHSnJsy6Q#movies #fi lm

113887415867547783:"The film? Oh it's a fairly new film. Yeah it came out in... okay, it's 12 years old. It's not a ver y new film, actually."What the fuck is time, and can it stop please?