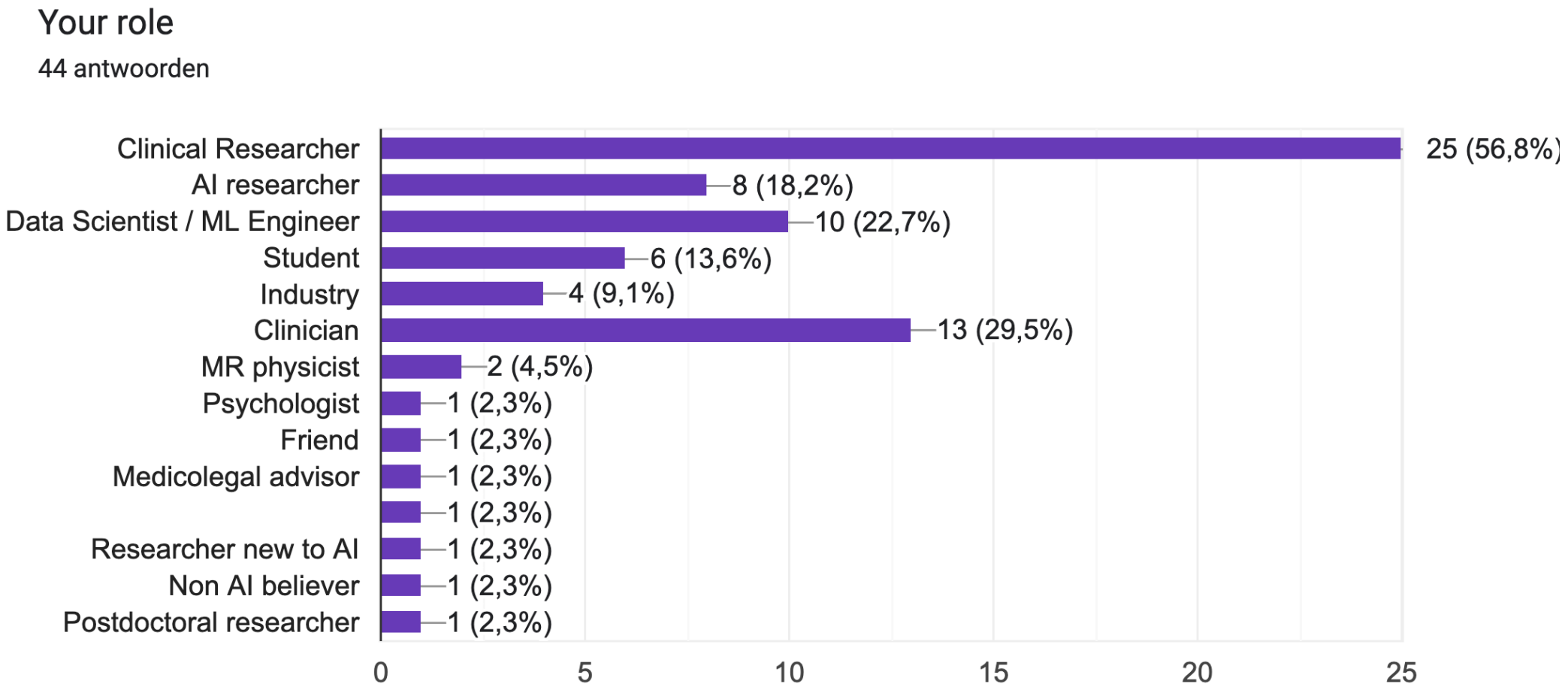
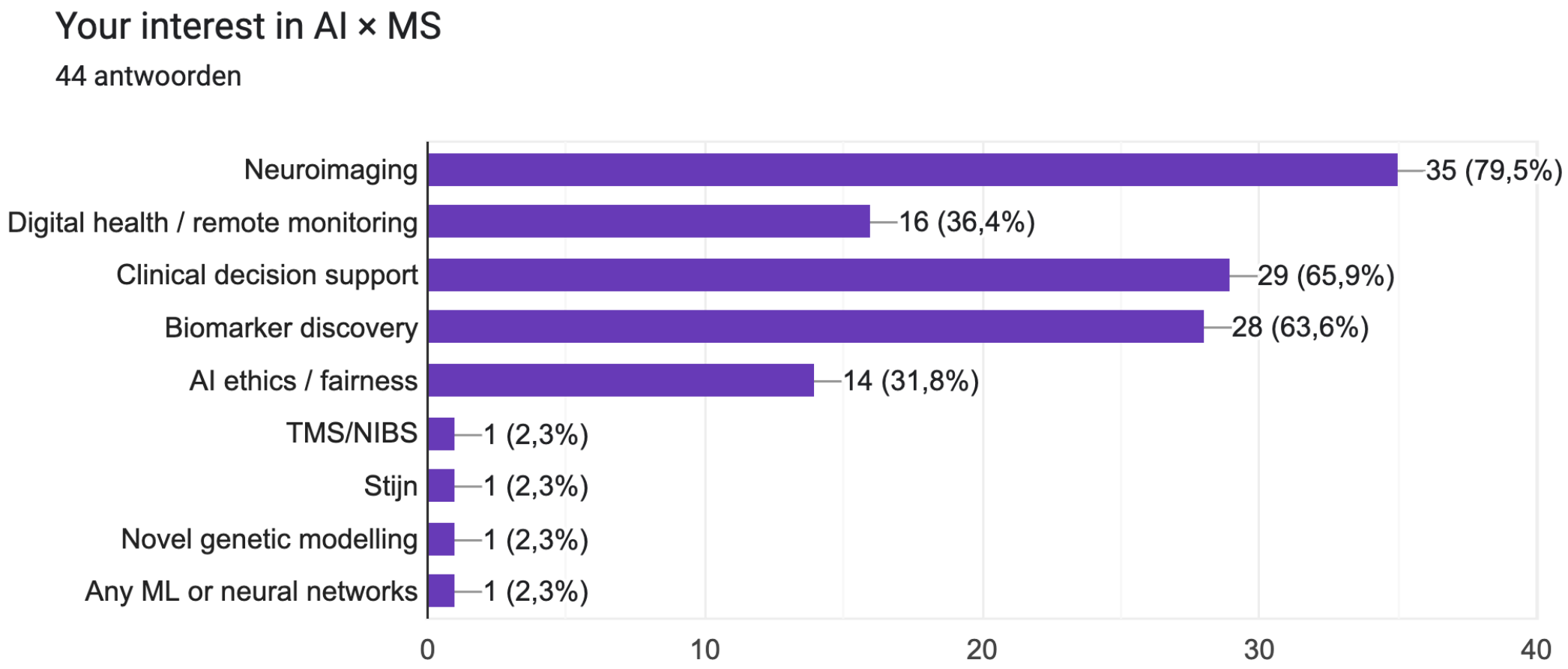

AIxMS
Networking event

THE UNIVERSITY OF BRITISH COLUMBIA POLYTECHNIQUE MONTRÉAL UNIVERSITÉ D'INGÉNIERIE		The University of Nottingham UCL	Universitat Oberta de Catalunya	Amsterdam UMC	VUB UCLouvain ICOmetrix FLANDERS MAKE UHASSELT	Universitätsmedizin GREIFSWALD dehaze LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN
INSELSPITAL UNIVERSITÄTSSPITAL BERN HÔPITAL UNIVERSITAIRE DE BERNE CHUV	UNIVERSITÀ VITA-SALUTE SAN RAFFAELE UniSR QUID EST HOMO?	CHARLES UNIVERSITY	Med Uni Graz	ARISTOTLE UNIVERSITY OF THESSALONIKI	Iran University of Medical Sciences	

Nice to meet you! ☺



Nice to meet you! ☺



The planning of this evening

19:00 – 19:20	Registration + Welcome	
19:20 – 19:40	**Round 1:** How has AI helped MS research & care?	Science
19:40 – 20:00	**Round 2:** What is holding back further AI research?	
20:00 – 20:20	**Round 3:** Why don't we see models in practice?	
20:20 – 20:35	Break	
20:35 – 20:55	**Round 4:** What are the goals of the community?	Community
20:55 – 21:15	**Round 5:** How to facilitate interdisciplinarity?	
21:15 – 21:35	**Round 6:** Which events should follow this one?	
21:35 – 22:00	Wrap-up	

*Every round: Introduction → Discussion → Summary post-it

Round 1

How has AI helped MS research & care?

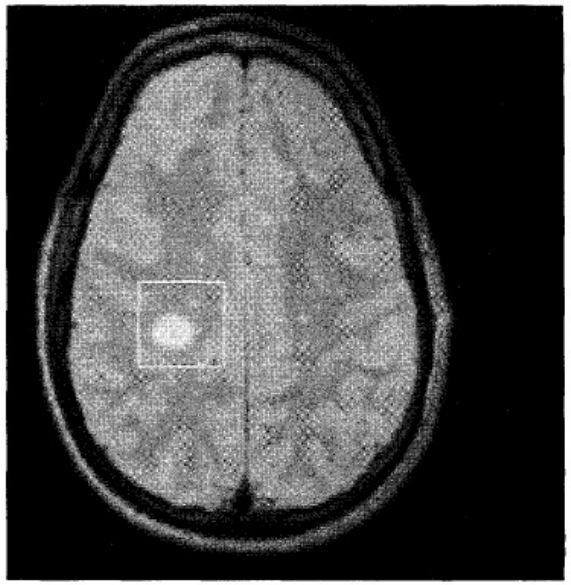
AI for better image segmentation

1990

Lesion detection in radiologic images using an autoassociative paradigm: Preliminary results

Ulrich Raff and Francis D. Newman
University of Colorado Medical School and University of Colorado at Denver, Denver, Colorado 80262 and International Center for Cancer and Developmental Biology, Santiago de Chile, Denver, Colorado and Madrid, Spain

(Received 8 December 1989; accepted for publication 2 May 1990)



DIASONICS MTS **0.35T**

VAX-11/750
"superminicomputer"

Size reference:
"large washing machine"[1]

[1] https://tinyurl.com/

2022

Commercial volumetric MRI reporting tools in multiple sclerosis: a systematic review of the evidence

Zoe Mendelsohn[1,2,3,4,5] · Hugh G. Pemberton[1,2,6] · James Gray[7] · Olivia Goodkin[1,2,3] · Ferran Prados Carrasco[2,3,8] · Michael Scheel[4] · Jawed Nawabi[5,9] · Frederik Barkhof[1,2,3,10]

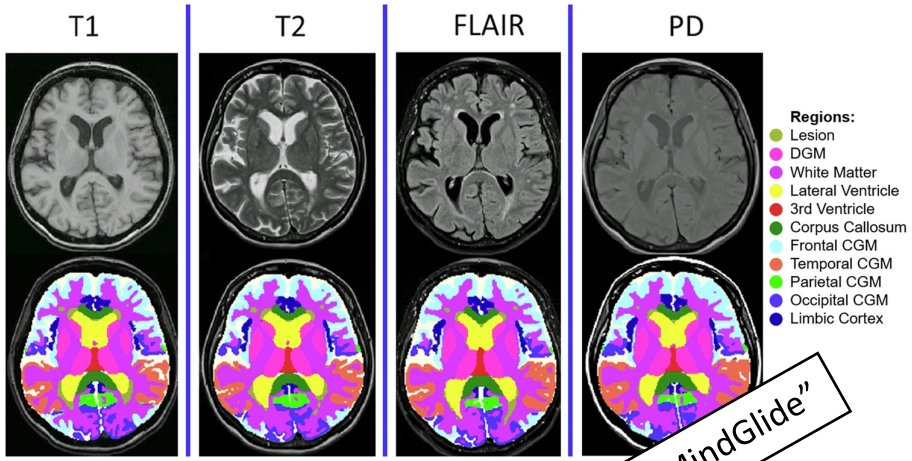
Received: 13 June 2022 / Accepted: 29 September 2022 / Published online: 4 November 2022

Cortechs.ai
jung diagnostics
Combinostics
AIRAmed artificial intelligence in radiology
icometrix
QYNAPSE
PIXYL
Quibim
mediaire
Quibo

2025

Article | Open access | Published: 07 April 2025

Enabling new insights from old scans by repurposing clinical MRI archives for multiple sclerosis research



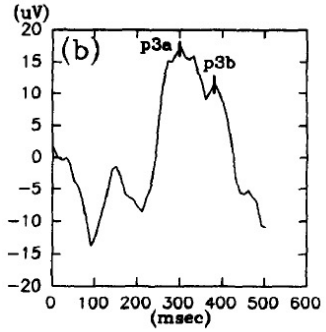
Goebl et al. 2025. Nat. Comm.

AI for better biomarkers

1993

A NEURAL NETWORK DESIGN FOR EVENT-RELATED POTENTIAL DIAGNOSIS

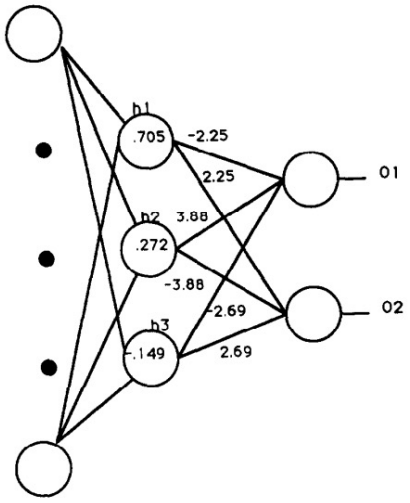
FRED Y. WU,* JEREMY D. SLATER,† LAWRENCE S. HONIG‡ and R. EUGENE RAMSAY†



256 data points

Downsample

25 data points



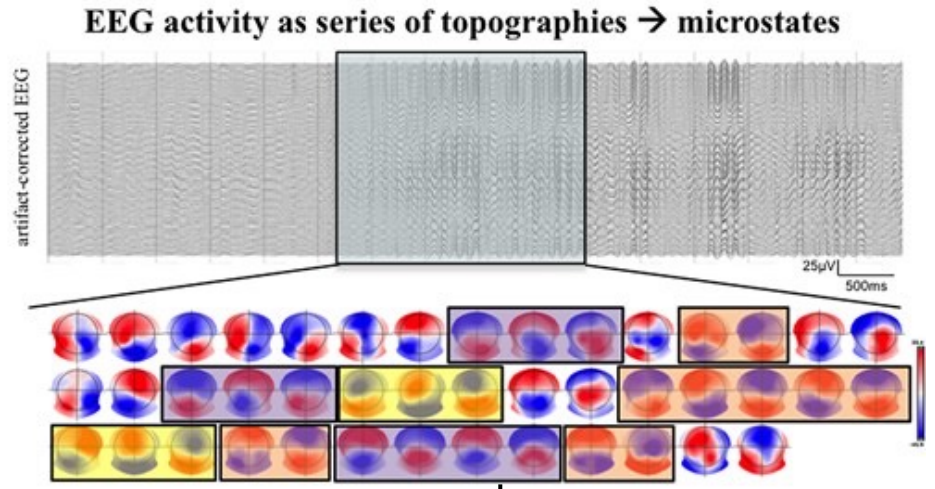
MS

Control

Fig. 2. Network structure.

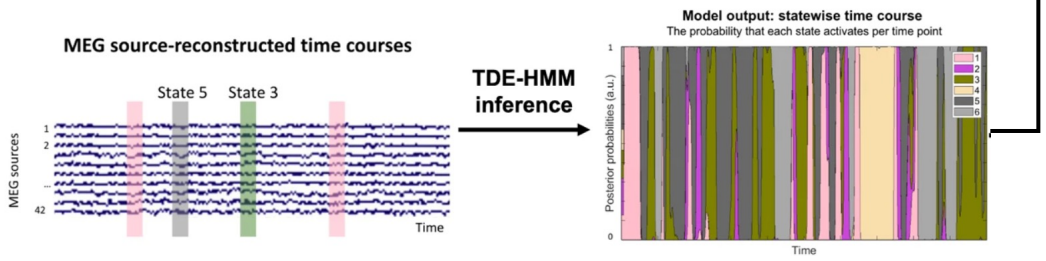
The complexity of the network structure directly affects the training time and is therefore a major concern in design. A more complex classification task can be performed by a more complicated network at the expense of more training time. The complexity of networks involves the number of nodes in the input layer and the number of hidden layer(s); the former determines the resolution of input patterns and the latter determines the flexibility of the network internal representation. Since it is impractical to implement a 256-input network to accept each ERP pattern, we developed a methodology for determining the optimal input representation based on the concept of NN classification discussed in the previous section. We hypothesize that an optimal input

2022 [1]



Cognitive impairment

2024 [2]



* Time delay embedded-hidden Markov model (TDE-HMM)

[1] Baldini et al. 2022. *Brain Communications* | [2] Rossi et al. 2024. *Communications Biology*

AI for better phenotyping

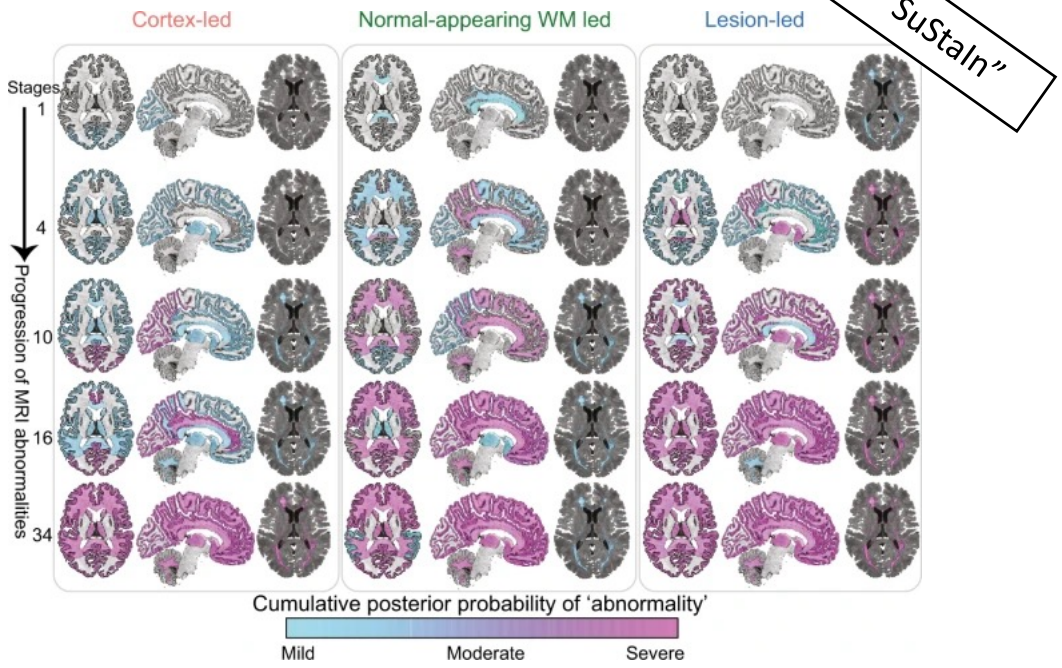
Article | Open access | Published: 06 April 2021

Identifying multiple sclerosis subtypes using unsupervised machine learning and MRI data

Arman Eshaghi ✉, Alexandra L. Young, Peter A. Wijeratne, Ferran Prados, Douglas L. Arnold, Sridar Narayanan, Charles R. G. Guttmann, Frederik Barkhof, Daniel C. Alexander, Alan J. Thompson, Declan Chard & Olga Ciccarelli

Nature Communications **12**, Article number: 2078 (2021) | Cite this article

"SuStaIn"



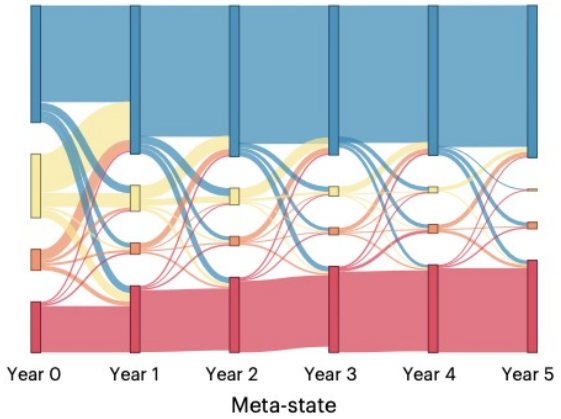
Article | Open access | Published: 20 August 2025

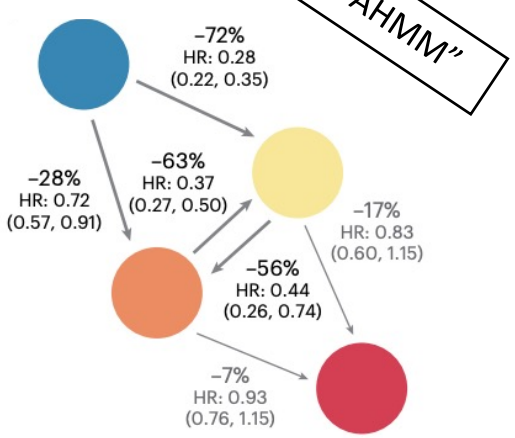
AI-driven reclassification of multiple sclerosis progression

Habib Ganjgahi, Dieter A. Häring, Piet Aarden, Gordon Graham, Yang Sun, Stephen Gardiner, Wendy Su, Claude Berge, Antje Bischof, Elizabeth Fisher, Laura Gaetano, Stefan P. Thoma, Bernd C. Kieseier, Thomas E. Nichols, Alan J. Thompson, Xavier Montalban, Fred D. Lublin, Ludwig Kappos, Douglas L. Arnold, Robert A. Bermel, Heinz Wiendl ✉ & Chris C. Holmes

Nature Medicine (2025) | Cite this article

"FAHMM"





EME
Asymptomatic radiological disease activity
Relapse
Advanced MS

1. How has AI helped MS research & care?

	Round: 1	Round: 2	Round: 3	Round: 4	Round: 5	Round: 6
A	[25 2 11 1 40 27]	[7 37 40 4 6 30]	[13 32 1 6 3 5]	[20 2 23 38 32 13]	[20 34 25 36 31 38]	[33 35 42 37 19 11]
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H	[7 16 4 36 8]	[10 23 41 5 3]	[23 8 34 37 15]	[30 25 6 19 15]	[1 33 22 16 39]	[2 16 31 5 36]

Round 2

What is holding back further AI research?

Access to large data repositories?

MSBase
Neuro-Immunology Registry

"The Registry commenced in 2004 and has accumulated over 122,000 patient records from 45 countries, and is the largest organised global repository of longitudinal, 'real-world' MS patient data."

INTERNATIONAL
PROGRESSIVE MS ALLIANCE

More than hope. Progress.

The International Progressive MS Alliance's MS Clinical and Imaging Data Resource (CIDR) provides the academic and research community with access to harmonized, anonymized data from more than 13,500 clinical trial participants living with MS, including 72,000 MRI scans and feedback from 200,000 clinical visits.

Apply to Access the Data:

Applications to access the data will be open to investigators in **Fall 2025.**

Investigators with research focused on MS are welcome to apply for access to the data.

Access to large data repositories?

Communication-Efficient Learning of Deep Networks from Decentralized Data

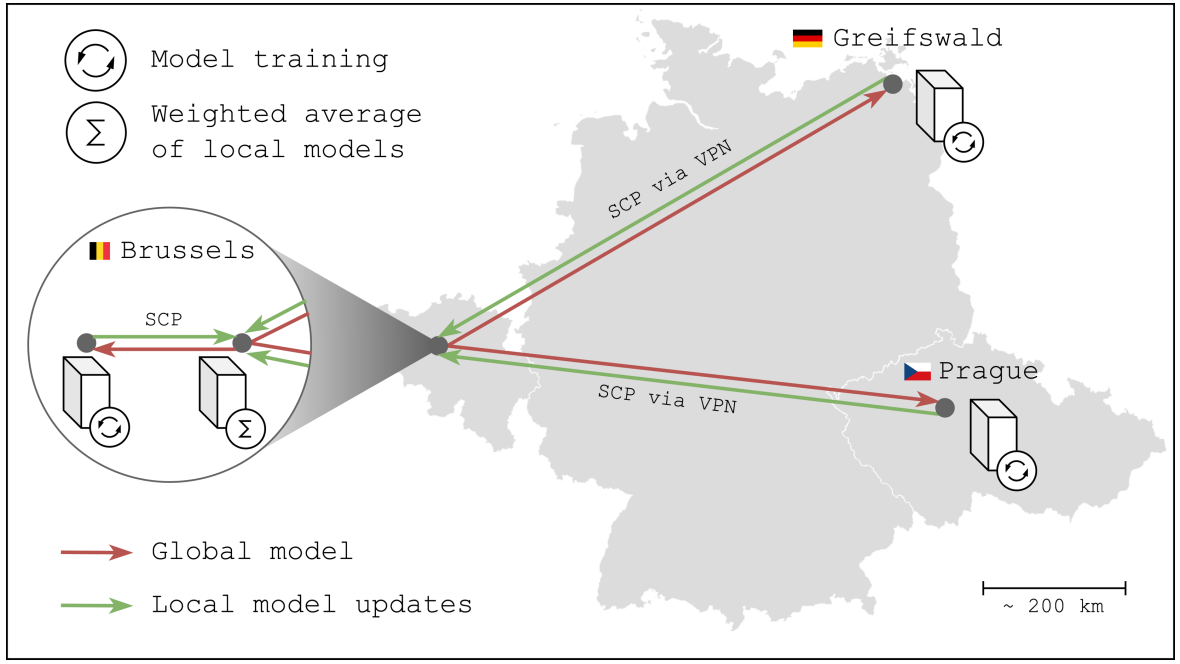
H. Brendan McMahan Eider Moore Daniel Ramage Seth Hampson Blaise Agüera y Arcas
Google, Inc., 651 N 34th St., Seattle, WA 98103 USA

Algorithm 1 `FederatedAveraging`. The K clients are indexed by k; B is the local minibatch size, E is the number of local epochs, and η is the learning rate.

Server executes:
initialize w_0
for each round $t = 1, 2, \dots$ **do**
  $m \leftarrow \max(C \cdot K, 1)$
  $S_t \leftarrow$ (random set of m clients)
  for each client $k \in S_t$ **in parallel do**
    $w_{t+1}^k \leftarrow \text{ClientUpdate}(k, w_t)$
  $m_t \leftarrow \sum_{k \in S_t} n_k$
  $w_{t+1} \leftarrow \sum_{k \in S_t} \frac{n_k}{m_t} w_{t+1}^k$ *// Erratum*[4]

ClientUpdate(k, w): *// Run on client k*
$\mathcal{B} \leftarrow$ (split $\mathcal{P}_k$ into batches of size B)
for each local epoch i from 1 to E **do**
  for batch $b \in \mathcal{B}$ **do**
    $w \leftarrow w - \eta \nabla \ell(w; b)$
return w to server

2



[1] McMahan et al. 2016 (updated 2023). arXiv | [2] Denissen et al. 2025. *medRxiv*

Access to large data repositories?

Communication-Efficient Learning of Deep Networks from Decentralized Data

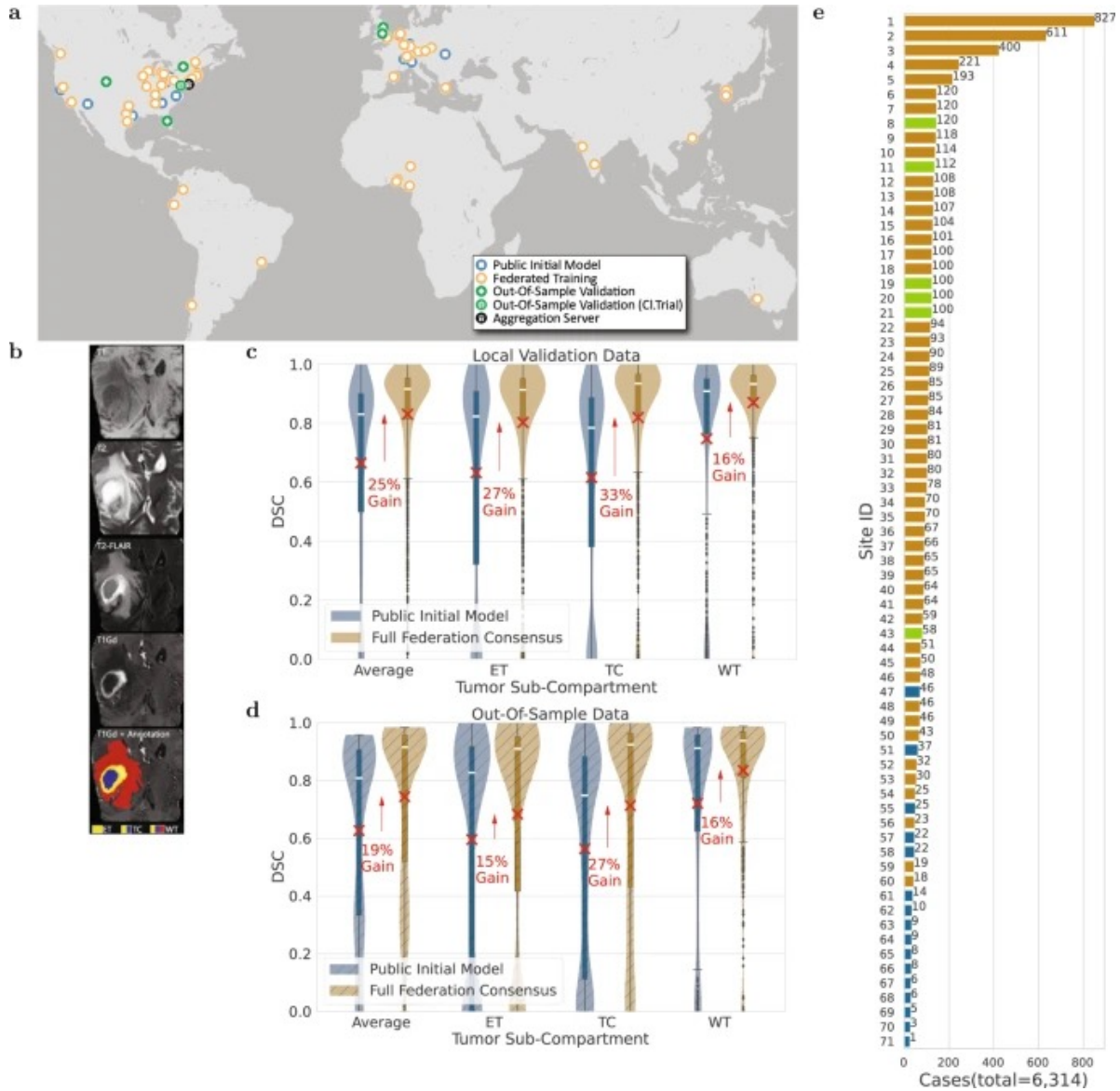
H. Brendan McMahan Eider Moore Daniel Ramage Seth Hampson Blaise Agüera y Arcas
Google, Inc., 651 N 34th St., Seattle, WA 98103 USA

Article | Open access | Published: 05 December 2022

Federated learning enables big data for rare cancer boundary detection

Sarthak Pati, Ujjwal Baid, Brandon Edwards, Micah Sheller, Shih-Han Wang, G. Anthony Reina, Patrick Foley, Alexey Gruzdev, Deepthi Karkada, Christos Davatzikos, Chiharu Sako, Satyam Ghodasara, Michel Bilello, Suyash Mohan, Philipp Vollmuth, Gianluca Brugnara, Chandrakanth J. Preetha, Felix Sahm, Klaus Maier-Hein, Maximilian Zenk, Martin Bendszus, Wolfgang Wick, Evan Calabrese, Jeffrey Rudie, ... Spyridon Bakas + Show authors

Nature Communications **13**, Article number: 7346 (2022) | Cite this article



2. What is holding back further AI research?

	Round: 1	Round: 2	Round: 3	Round: 4	Round: 5	Round: 6
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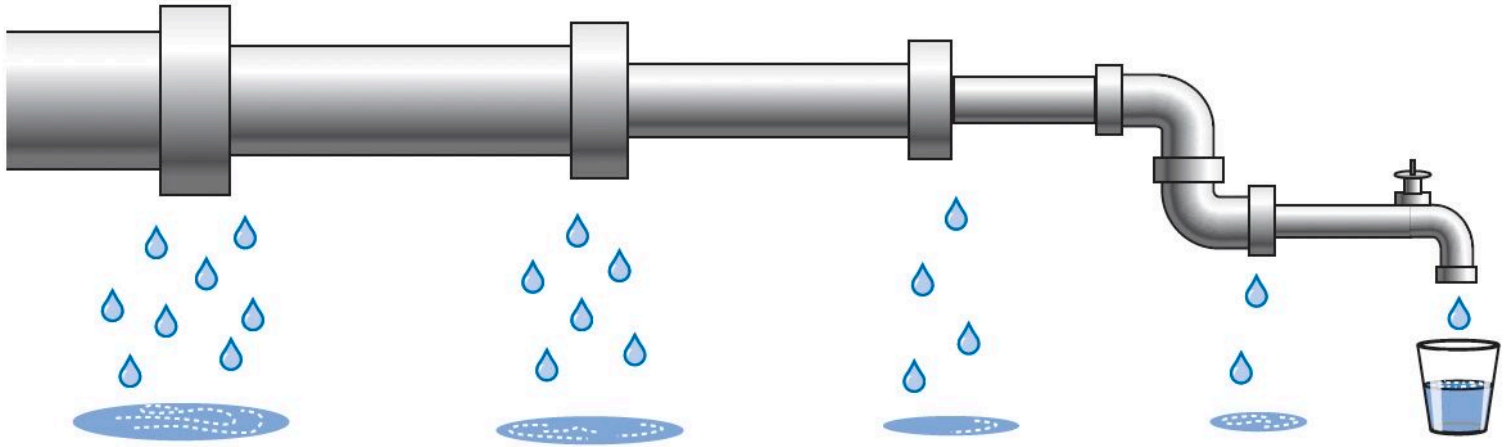
Round 3

Why don’t we see models in practice?

"The very leaky implementation pipeline"



Not fit for purpose

Developed on wrong patient population

Expensive or nonavailable predictors

Time-intensive to use model

Outcome measured unreliably

No validation

Lack of data or incentive to pursue validation studies

Incompletely reported prediction model

Poorly developed or overfitted model

Proprietary model code

No implementation

No impact on decision making or patient (health) outcomes

No software is developed to implement and use the model

Requirements for adherence to (medical device) regulations

Problematic cost(-effectiveness) of using model

Not adopted

Predictions are (perceived as) not useful

Predictions are not trusted

Model is not transparent enough, or no tools are available to enhance its use in practice

Model is (perceived as) outdated

Van Calster et al. 2025. *Annual Review of Statistics and Its Application*

Lack of validation in clinical practice

Artificial Intelligence in Medicine
Volume 143, September 2023, 102607

Research paper

FDA-approved machine learning algorithms in neuroradiology: A systematic review of the current evidence for approval

Alexander G. Yearley [a b], Caroline M.W. Goedmakers [b c], Armon Panahi [d], Joanne Doucette [b e], Aakanksha Rana [b f], Kavitha Ranganathan [g], Timothy R. Smith [a b]

Highlights

- Of the 52 “neuroalgorithms” studied, primary literature could be identified for 26 of them.
- Fifteen of the algorithms had primary literature reporting algorithmic performance metrics.
- Heterogeneity in study design between papers made definitive assessment of algorithmic performance difficult.
- Clinical adoption of algorithms was hampered by the relative lack of patient-centered research testing each algorithm.
- Few papers provided a comprehensive overview of all notable limitations for a single algorithm.

“… and studies exploring the use of algorithms in clinical practice were available for 7 algorithms” (out of 53)

Why don’t we see models in practice?

	Round: 1	Round: 2	Round: 3	Round: 4	Round: 5	Round: 6
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Break  

The planning of this evening

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19:20 – 19:40	**Round 1:** How has AI helped MS research & care?	Science
19:40 – 20:00	**Round 2:** What is holding back further AI research?	
20:00 – 20:20	**Round 3:** Why don't we see models in practice?	
20:20 – 20:35	Break	
20:35 – 20:55	**Round 4:** What are the goals of the community?	Community
20:55 – 21:15	**Round 5:** How to facilitate interdisciplinarity?	
21:15 – 21:35	**Round 6:** Which events should follow this one?	
21:35 – 22:00	Wrap-up	

*Every round: Introduction → Discussion → Summary post-it

Round 4

What are the goals of the community?

4. What are the goals of the community?

- To collaborate?
  - Convert output of 3 science questions into publication?
    - Guidelines/Position paper
  - Write research proposals (e.g. European Charcot Foundation)
  - Hackathons (coding together)? Workshops?
  - Validate algorithms? Open science (code, data)?
  - Create structured data / code repository?
  - With other consortia (e.g. MAGNIMS, MSBase, CIDR, …)
- To keep track of updates in the field?
  - E.g. Journal clubs, talks, ECTRIMS session next year, …
- Teaching?
  - Introduction to AI coding in Python (sklearn, pytorch, tensorflow), R, …

4. What are the goals of the community?

	Round: 1	Round: 2	Round: 3	Round: 4	Round: 5	Round: 6
A	[25 2 11 1 40 27]	[7 37 40 4 6 30]	[13 32 1 6 3 5]	[20 2 23 38 32 13]	[20 34 25 36 31 38]	[33 35 42 37 19 11]
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Round 5

How to facilitate interdisciplinarity?

5. How to facilitate interdisciplinarity?

- How to facilitate communication between disciplines?
  - Clinicians
  - Engineers
  - Patients + caregivers
  - Companies
  - …
- How do we communicate?
  - Discord, Slack, Email, MyECTRIMS, …

myECTRIMS

5. How to facilitate interdisciplinarity?

	Round: 1	Round: 2	Round: 3	Round: 4	Round: 5	Round: 6
A	[25 2 11 1 40 27]	[7 37 40 4 6 30]	[13 32 1 6 3 5]	[20 2 23 38 32 13]	[20 34 25 36 31 38]	[33 35 42 37 19 11]
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Round 6

Which events should follow this one?

6. Which events should follow this one?

- Another tapas tasting? ☺
- Session at ECTRIMS 2026 in Toronto 🇨🇦?
  - Scientific session on AI clinical implementation?
  - Collaboration with the current sessions on AI?
  - Hackathon?
- An online journal club?
- A separate conference on AI in MS?

6. Which events should follow this one?

	Round: 1	Round: 2	Round: 3	Round: 4	Round: 5	Round: 6
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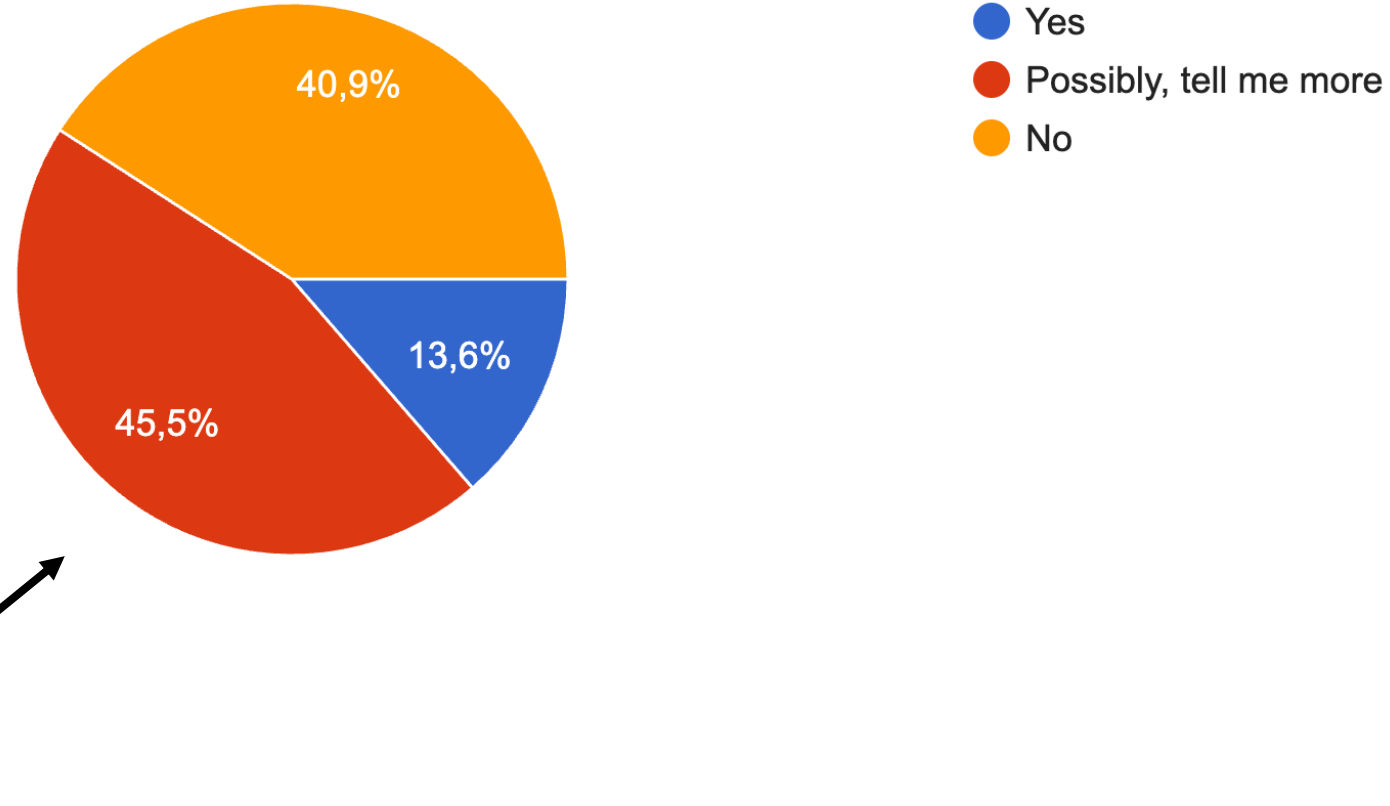
Wrap up 

The organising committee

Interested to be part of the organising committee?

44 antwoorden



Organising committee: please tell me more

- First post-event meeting:
  - Together analyse tonight's responses. Create summary and action points. Send out a post-event mail.
  - Distribution of roles, depending on desired engagement
- Responsible for organising the follow-up events, contacting members, keeping the community active
- Predominantly online meetings, e.g. once a month or depending on necessity
- If interested after tonight:
  - Meet me here! Or send me a mail: stijn.denissen@vub.be

Special thanks

- Maikey, Jorin & Mila
- The other Fedra staff

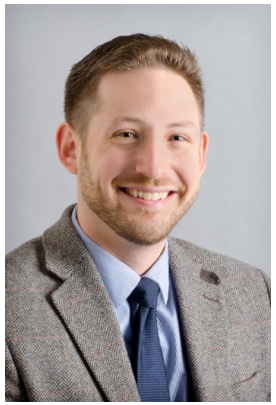
❤️

Special thanks

Dr. Ceren Tozlu and Prof. Mike Dwyer

Prof. Guy Nagels and Prof. Jeroen Van Schependom

Martin Peka and Matej Kudrna



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To you for being here ❤️

To be continued…
Thank you!