Supporting European Aviation

EUROCONTROL

PRC Data Challenge 2024

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Thanks First

- **John** FITZGERALD: Trino, API

- **Junzi** SUN: API, trajectory preparation & advise

- **Martin** STROHMEIER: advise & support

- **Allan** TART: advise & support

- **Quinten** GOENS: volunteering and evaluation

- **Rainer** KOELLE: conception and setup

- **Xavier** OLIVE: advise & support

- **José Miguel** de PABLO GUERRERO: institutional (PRC) support

Why a Data Challenge?

- Curiosity

- Involve **Aviation enthusiasts**

- But also **Data Science enthusiasts** (which are probably much more)

- Obtain a model that can be used and **trusted** in the **open**

  - reproducible reporting / research

  - trustable analysis (if other conditions are fulfilled)

- Interesting topic: **A**ctual **T**ake**o**ff **W**eight (ATOW)

Teams

- We were expecting ~10 teams, 2-3 submissions

- We got 132 registered teams (**261 members**), 43 ranked submissions

- A lot of solo teams

- A lot just interested in accessing the data
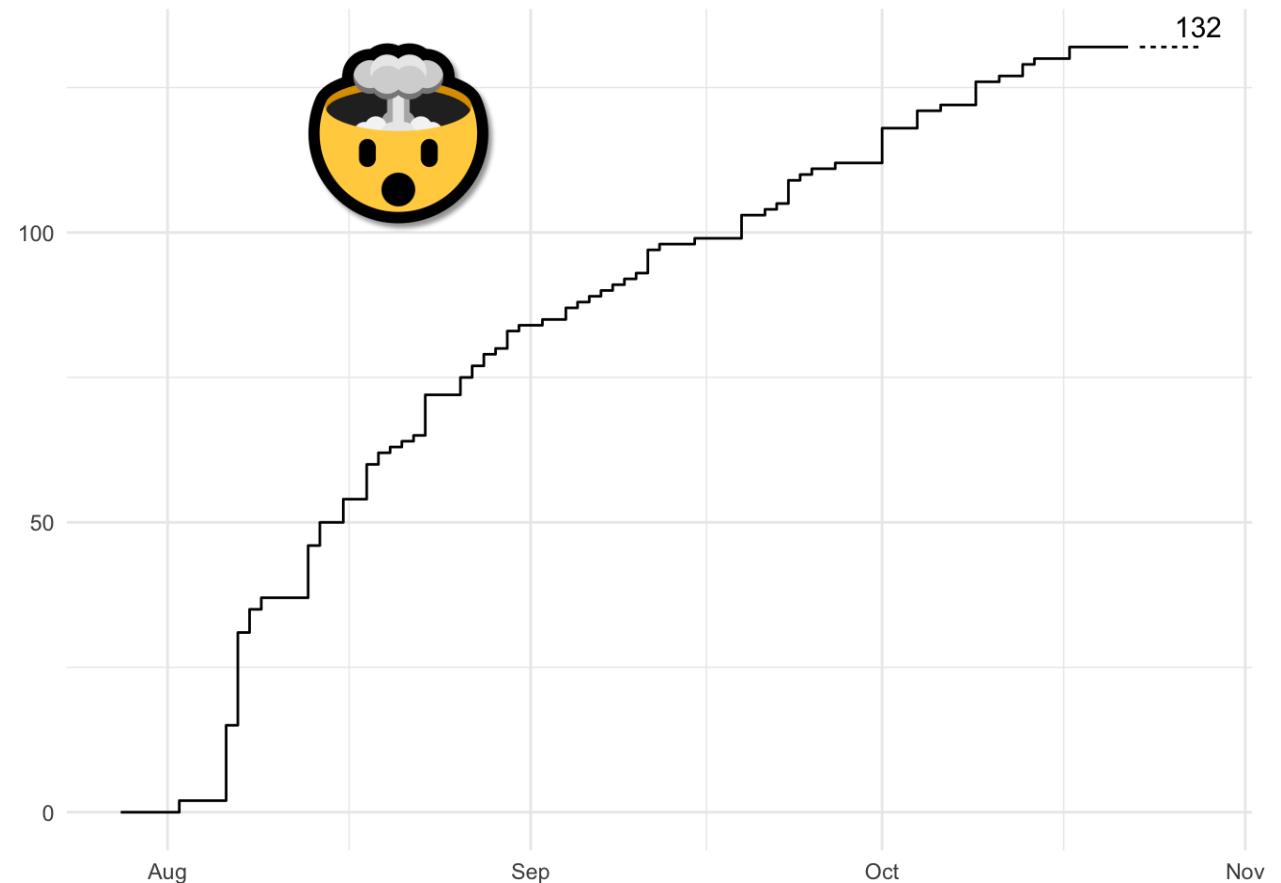
Submitting teams (43)
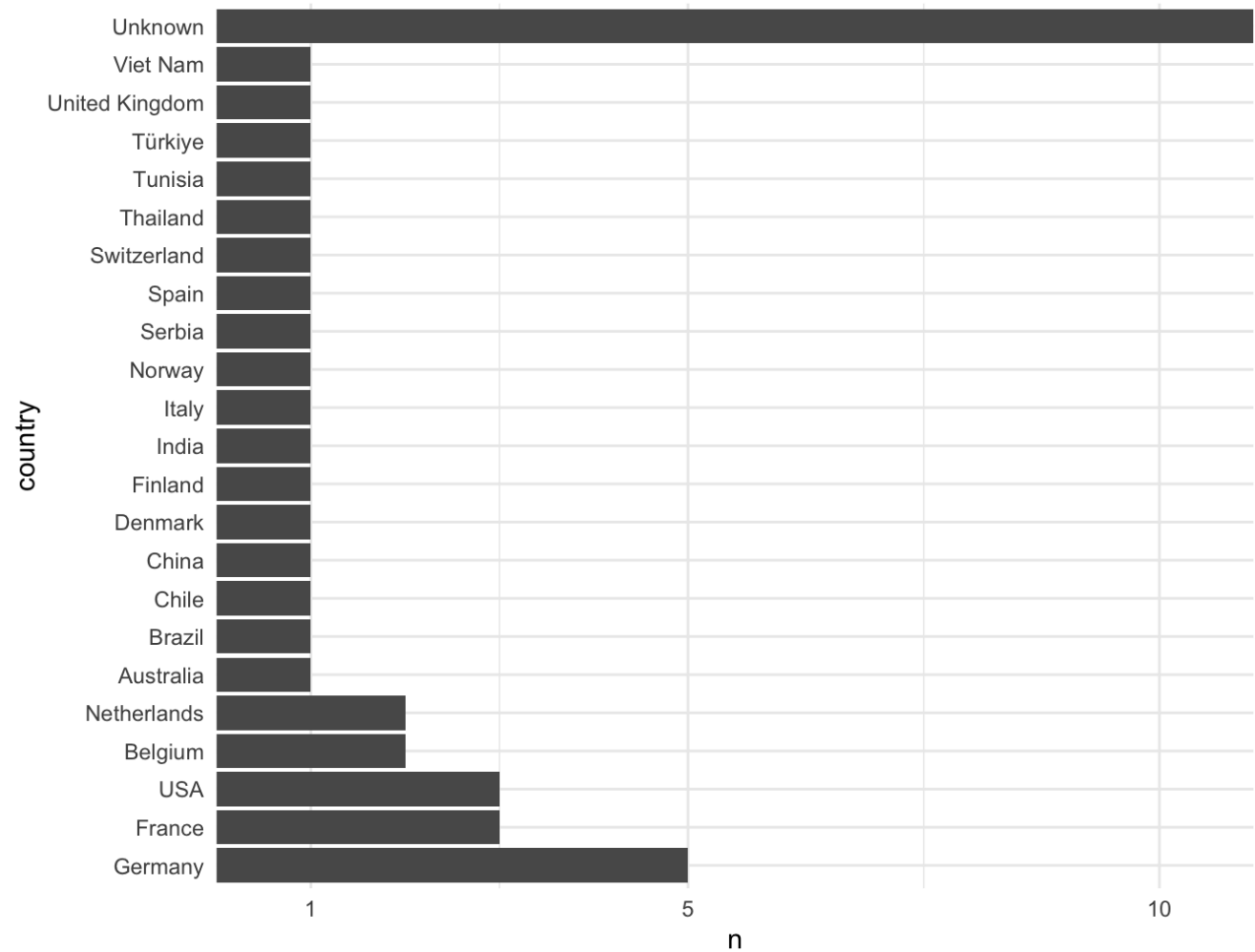
Data preparation

- Contacted 10 airlines: 3 positive to collaborate; **Austrian, Swiss and Vueling**

- Started from **2022 Flight List** from EUROCONTROL's Network Manager with useful TOW info (**1_006_051** out of 9.3M)
  and passed
  `flight_id`, `ICAO 24-bit`, `callsign`, `off-block`, `arrival` + 30 min
  to extract **trajectories** from OpenSky Network historical data
  (**369_013** + **105_959** + **52_190 = 527_162**)

- Initial set (158 GiB):

  – good/European trajectories + Filter applied

- Later set (250 GiB):

  – Same set, i.e. `flight_id`'s

  – No filtering (<u>future</u>: maybe better to pre-filter)

Submissions

- 34 submissions w/ (average) error ≤ 5% (9 no publicly shared repo)

- most used method: Gradient Boosting, mainly XGBoost but devil is in the details

- code and docs quality: big variations (even some ChatGPT enhancements ;-)

- 5% <   5 submissions ≤ 10% error

- 3% < 16 submissions ≤ 5% error

- 2% < 17 submissions ≤ 3% error

-            1 submission ≤ 2% error

What went well and less so (lessons learnt)

- Dedicated website 👍

- Team Registration: via **Form** rather than **email** or OSN forum 👎 + private API 👍 (ask for affiliation, geographical location, rationale for participation,…)

- Refreshed datasets:

  - Flight List, Issue with TOW data 👎: highlighted by some teams

  - Trajectories: strange leveled portions 👎

- Interaction with Teams: have a **Discord channel** 👍 rather than just **email** 👎

- API: good idea in general 👍 but got some **outages** and not easy coordination/reaction between continents 👎 (teams very **tolerant** 👍)

- Airport details (future): add **lon/lat** directly (no use for teams to do themselves) 👎

- Knowledge (future): more **docs on Aviation** topics to help Data Science teams 👎

Future

- Opend the Dataset up: **JOAS data paper**, data on Zenodo (beginning 2025)

- **Public code/docs** et al.: https://github.com/prc-data-challenge-2024

- Keep the API/ranking open: can people/teams improve?

- **JOAS Special issue** for teams to publish their approach: interested?

- Do you have proposals for the next Challenge?

  – Fuel consumption profile 😍: if ground truth is made openly available ⚠️

  – Taxi-out time estimation: ?

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આભાર

Cảm ơn ông

ধন্যবাদ

ขอบคุณ

Maturnuwun sanget

ありがとう

شكرا

شُكريا

Grazie

Gracias

شكرا

நன்றி

감사합니다

شكراً

Merci Thank you

Asante આભારી આહ

Na gode

Terima kasih

Obrigado

ধন্যবাদ

ਸ਼ੁਕਰਿਆ

ممنون

Teşekkür ederim

Salamat

Спасибо!

Terima kasih

شكريه بهت

ధన్యవాదములు

Danke

Winners: 3rd place

team_brave_pillow

TU Delft students

- Aidana Tassanbi

- M. F. Rahman

- Bintang A.S.W.A.M

spending voucher 750 EUR

Winners: 2nd place

team_tiny_rainbow

Professors and graduate students affiliated with the Aeronautics Institute of Technology (ITA) in Brazil

- Mayara C. R. Murça
- Carolina R. Lima
- Gabriel A. Melo

- João B. T. Szenczuk
- João P. A. Dantas
- Lucas O. Carvalho
- Marcos R. O. A. Máximo

spending voucher 1750 EUR

Winners: 1st place

team_likable_jelly

Professors at Ecole Nationale de l'Aviation Civile (ENAC) Toulouse, France

- Richard Alligier
- David Gianazza

spending voucher 2500 EUR