RECOMMENDER SYSTEM CHALLENGE 2022-23

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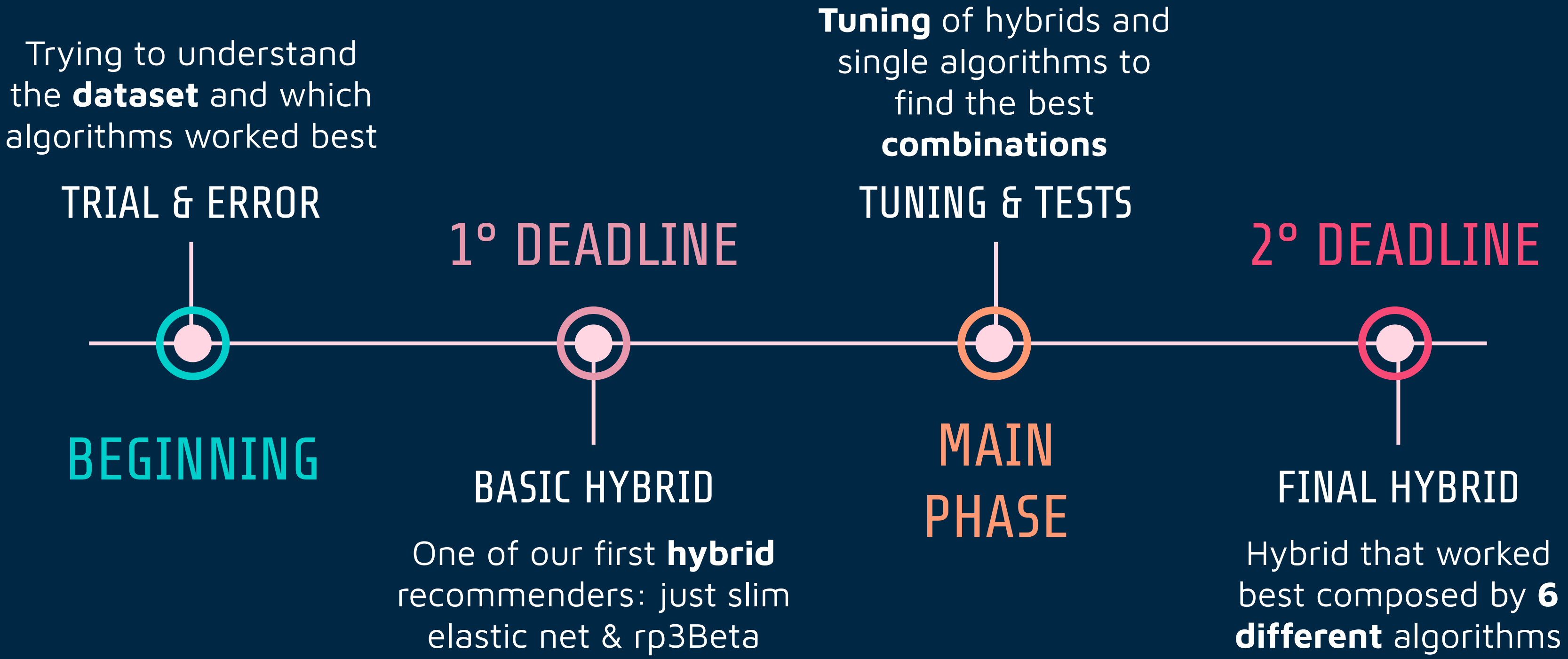
OUR PROCESS



BEGINNING

TRIAL & ERROR

Trying to understand the **dataset** and which algorithms worked best

1° DEADLINE

BASIC HYBRID

One of our first **hybrid** recommenders: just slim elastic net & rp3Beta

MAIN PHASE

TUNING & TESTS

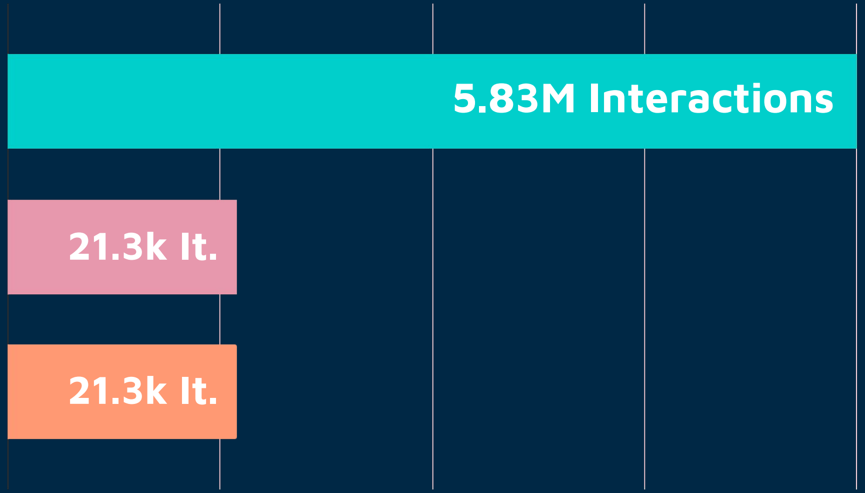
Tuning of hybrids and single algorithms to find the best **combinations**

2° DEADLINE

FINAL HYBRID

Hybrid that worked best composed by **6 different** algorithms

UNDERSTANDING THE DATA



URM

- 41.6k Users
- 24.5k Items
- 233k Impressions

ICM Type

- Types of items
- From 1 to 7
- Not present for every item

ICM Length

- Number of series’ episodes
- Not present for every item

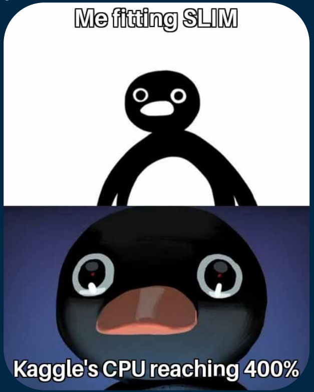
BASE MODEL EVALUATIONS

Performances: Valid MAP@10

SLIM-EN	Map@10: 0.036425	01
EASE_R	Map@10: 0.035487	02
RP3_BETA	Map@10: 0.033997	03
P3ALPHA	Map@10: 0.031520	04
ITEMKnnCF	Map@10: 0.031182	05
IALS	Map@10: 0.026376	06
SLIM-BPR	Map@10: 0.025328	07
PureSVD	Map@10: 0.019294	08

Where to start?

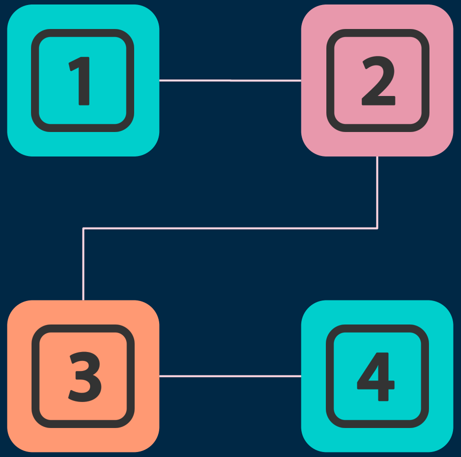
- Convert user and interaction csv into a binary URM
- Train-Validation Split (80:20)
- Understand course's repository
- Start from simpler solutions
- Don't panic



Our specs for the project

- Used Kaggle's integrated environment:
  - 4 Core CPU
  - 30 GB RAM
  - 12 hours max execution time for CPU

HYBRIDATION METHODS



STACKING

ICM type stacked
vertically to the URM

MERGING SIMILARITY MATRIX

With models that use
the same structure

PREDICTION COMBINATION

Using a weighted
average

ROUND ROBIN

Combination of csv
prediction files
It didn’t go well…

First Deadline Hybrid and Improvements

FIRST DEADLINE HYBRID

Our first best hybrid was a similarity merge between SLIM-EN and RP3 beta

Unfortunately it was not enough to pass the last baseline so we were doing something wrong (or maybe we had been too much optimistic)

So the next step was to understand what were we doing wrongly…

Improvement #1

Stacking ICM

We noticed that some base models improve their performances by stacking the icm

Improvement #2

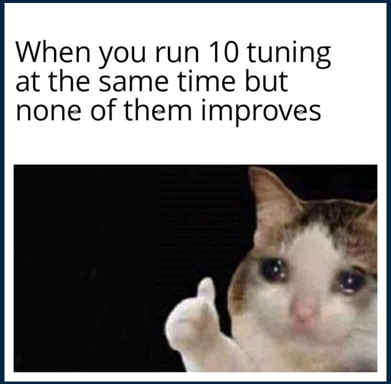
TUNING

By exploiting Kaggle's potential we managed to run up to 20 different tuning at the same time

Improvement #3

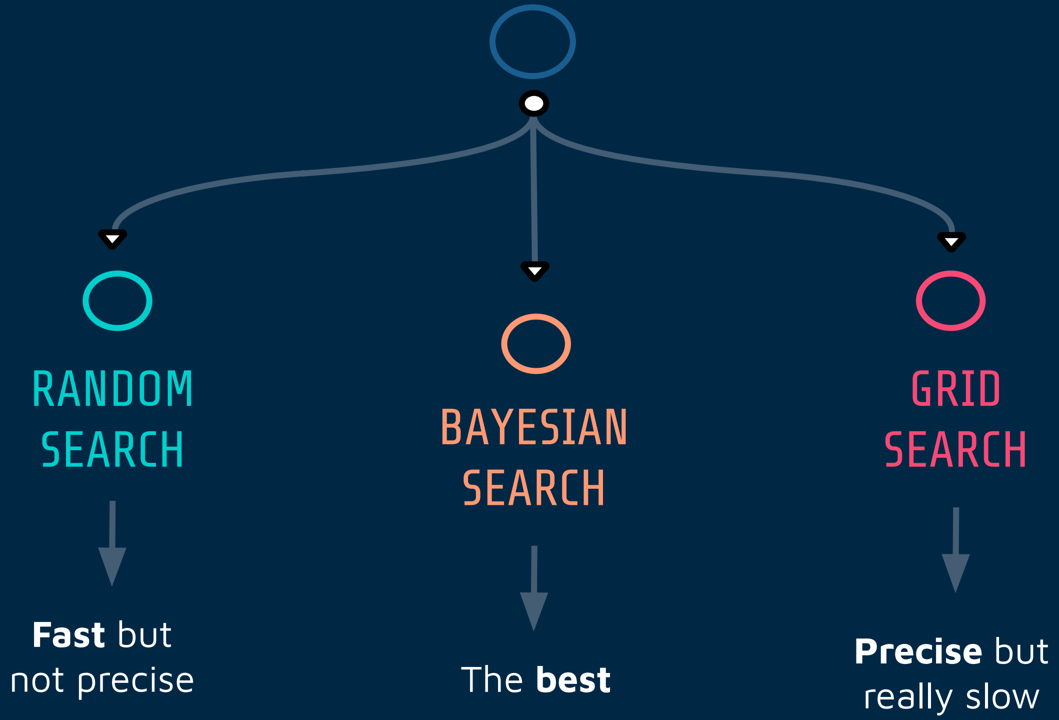
HYBRID MORE

After the tuning phase we managed to pass the last baseline so we focused on improving our hybrid model



When you run 10 tuning at the same time but none of them improves

HYPERPARAMETER TUNING



RANDOM SEARCH

Fast but not precise

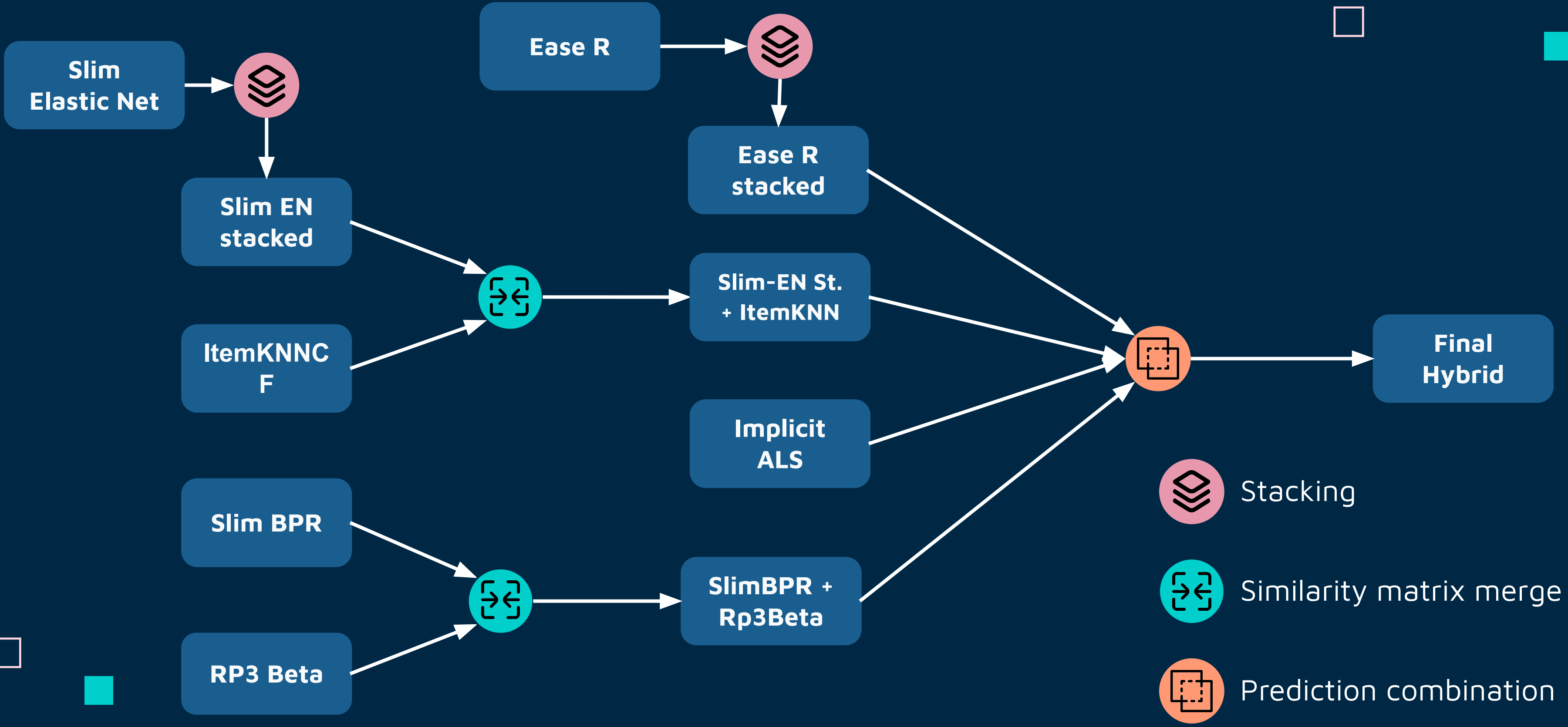
BAYESIAN SEARCH

The **best**

GRID SEARCH

Precise but really slow

OUR BEST HYBRID



WHAT DIDN'T WORK

- Building a **not-binary** URM exploiting information from ICMs
- Some algorithms did good individually but bad when hybridized (Ex: P3Alpha)
- List merging (Round Robin)
- Using Top Popular recommendations for specific users
- Stacking with ICM_length
- Tailor different models for specific portions of the data

OUR FINAL RESULT

- Thanks to the mentioned improvements and the final hybrid, we managed to reach an online map of: 0.06064 (private leaderboard)

OUR TEAM

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THANK YOU FOR YOUR ATTENTION

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