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# Automated screening of COVID-19 preprints: Can we help authors to improve transparency & reproducibility?

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## Background

- Preprints have grown in popularity since COVID-19 emerged
- Rapid publication is useful during a pandemic, but the lack of peer review has concerned many scientists
- Can we evaluate preprints at scale without relying on authors or the knowledge of readers?

## Evaluation

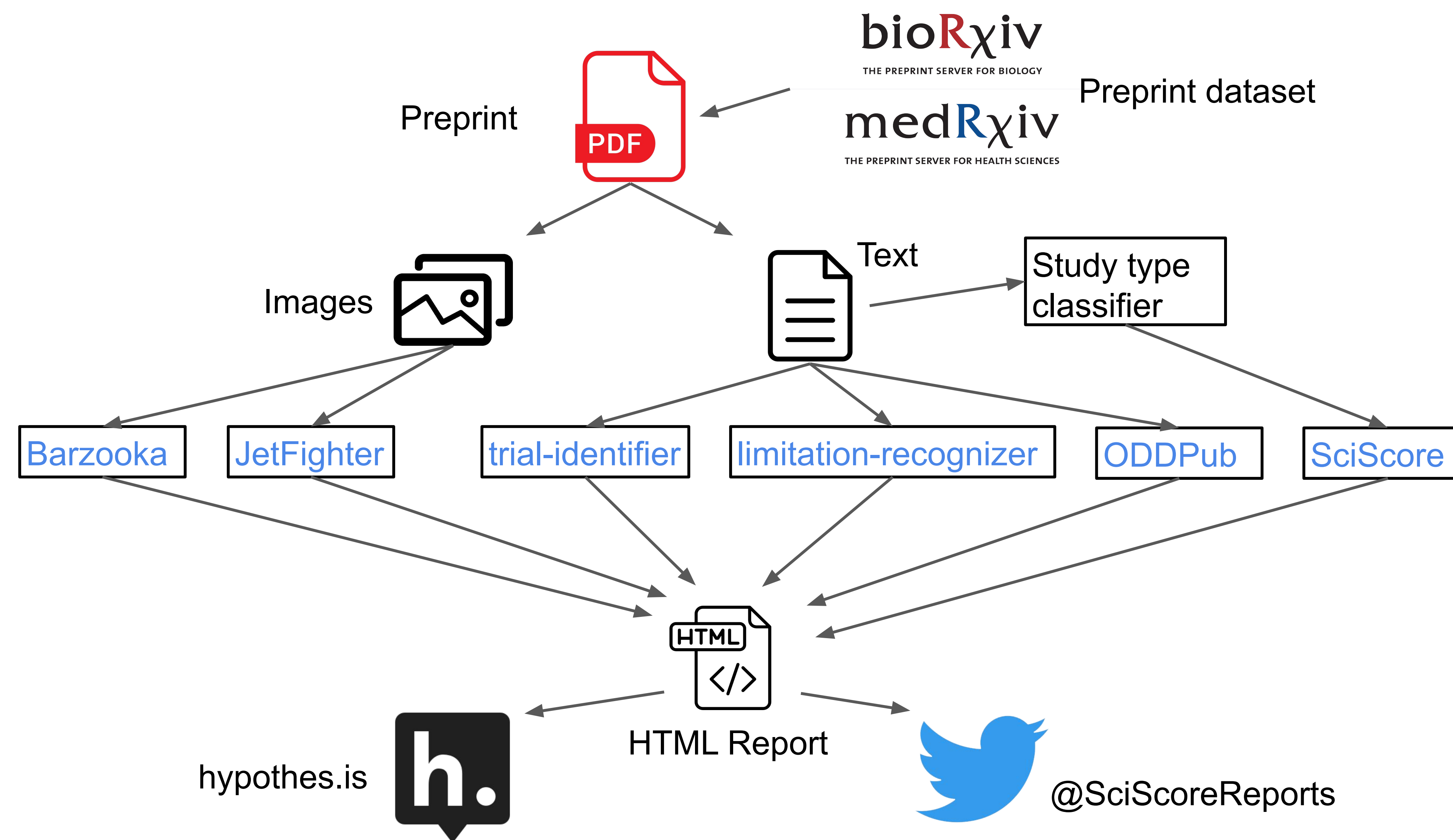
- Goal to automatically evaluate COVID-19 preprints for reproducibility criteria
- Each preprint is downloaded, parsed, and analyzed by a set of tools:
  - **SciScore** screens for rigor criteria defined by NIH and resources used (software tools, cell lines, etc.)
  - **ODDPub** screens for the presence of open data and code
  - **Limitation-recognizer** screens for study limitation statements
  - **Barzooka** screens for bar graphs used for continuous data
  - **JetFighter** screens for rainbow color maps
  - **Seek&Blastn** screens for correctly identified nucleotide sequences
  - **Trial-identifier** screens for and verifies clinical trial numbers

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## Pipeline overview



## Results

- Study design features
  - 75% of analyzed preprints are secondary analyses, modeling studies, or cell line studies
  - 20% addressed sex as a biological variable, despite known sex differences in COVID-19
  - 6.1% used model organisms, mainly mice
- Transparency
  - 34.4% included self-acknowledged study limitations
  - 14.3% shared open code
  - 13.6% of preprints shared open data
- Data presentation
  - 7.6% used rainbow colormaps, which are not colorblind safe and can create visual artifacts for viewers with normal color vision
  - 7.3% used bar graphs for continuous data, which can lead to misleading figures
- Combined, the automated Tweets have been viewed about 380,000 times
- Current average of ~1,000 views and ~10 link clicks per day
- The account has accumulated a total of
  - 2459 link clicks
  - 98 retweets
  - 42 replies

## Sample report and replies

## Conclusions

- It is feasible to conduct large-scale automated screening of preprints for common quality criteria and provide feedback to study authors and readers before publication
- Reports can publicly raise awareness of factors that affect study quality and reproducibility, while helping authors to present their research in a more transparent and reproducible manner.