A Clinical Validation Tool for Children Serious Games

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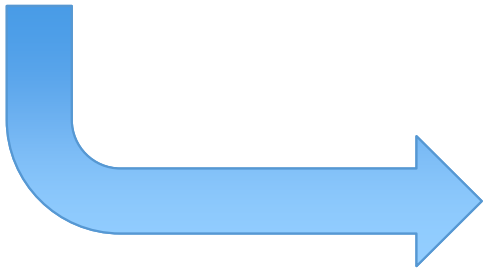
PROJECT PURPOSE

- Nowadays children are increasingly involved in using mobile games
- We developed an informatic tool to validate serious games from a clinical point of view found on

Google Play Store

Starting point: Google-Playstore.csv

- We chose a **Google-PlayStore** database provided by **Kaggle** to import it in our code as first source



- ✓ Very detailed database containing several features
- ✓ Highly compatible with the google-play-scraper library

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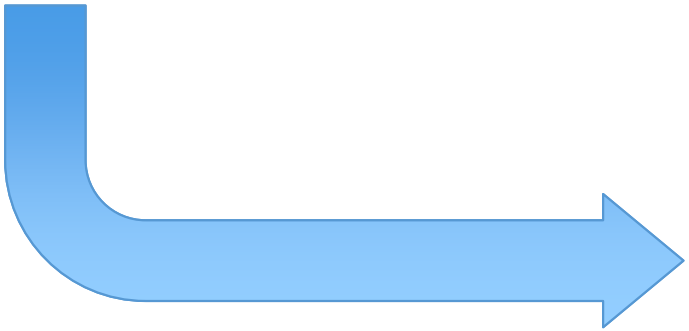
Filtering Potential “Serious Game”

- Our purpose is to find all those applications that can be potentially evaluated as “serious games”
- According to the solution we implemented, we based our filters on:
  - ✓ Educational Category selection
  - ✓ Rating threshold
  - ✓ Minimum Rating Count



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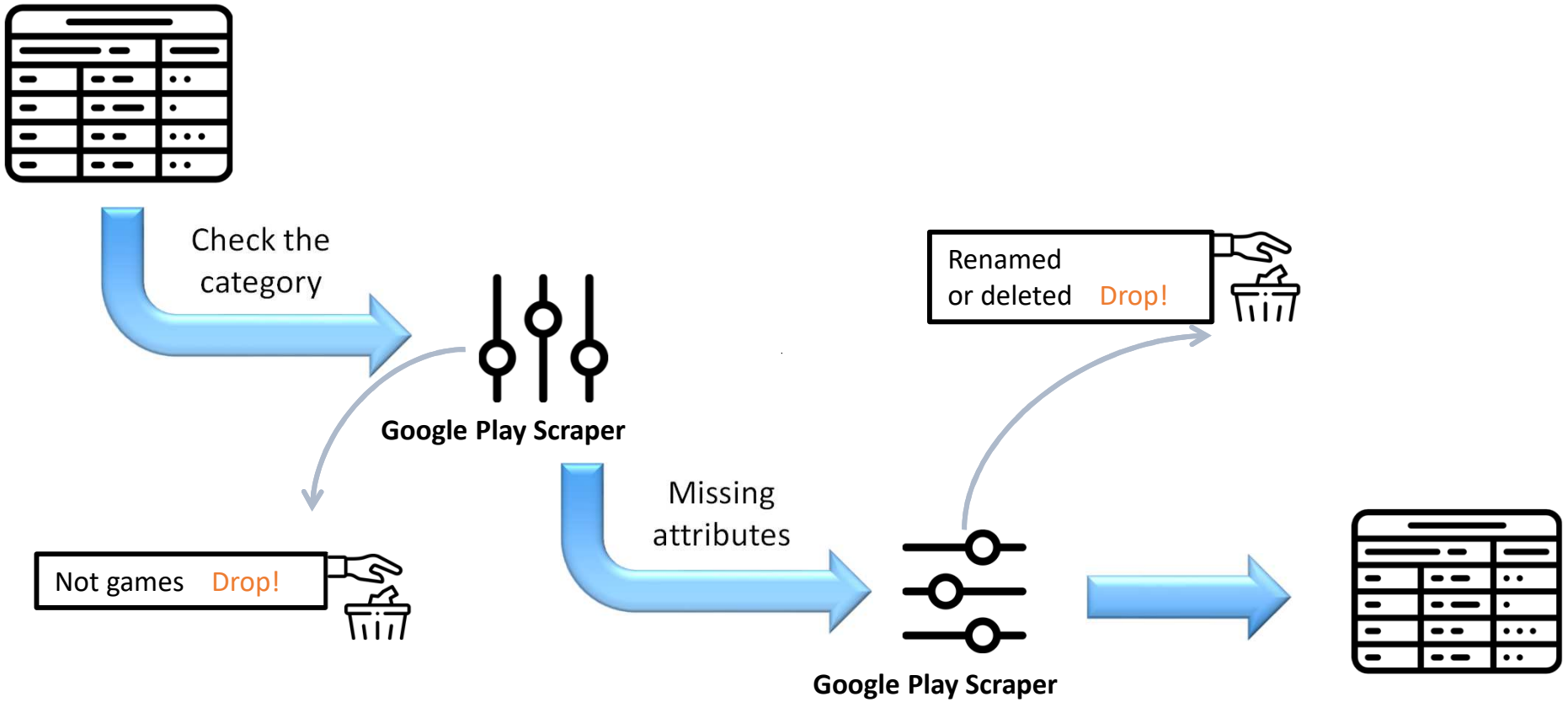
Filtering out Apps



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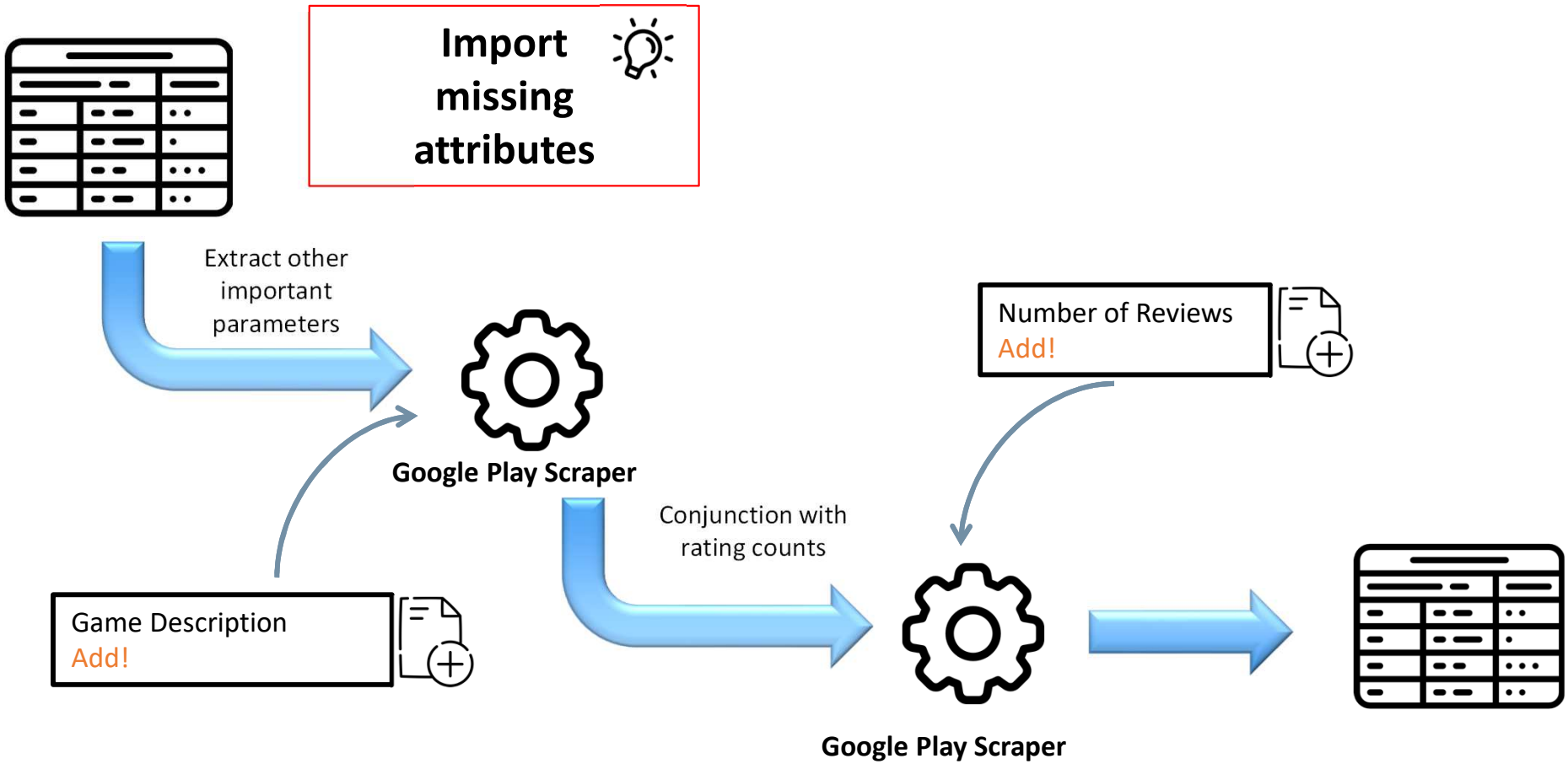
Enriching the Dataset with Descriptions and Reviews



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Keywords Extraction with Natural Language Processing (NLP)

Classify the filtered games according to their specific Learning Category and Age Range

Parameters **not found** neither in Kaggle dataset nor with Google-Play-Scraper

We build a set of keywords related to different *'Learning category'* and *'Age range'*. Thus, the *'Learning category'* and *'Age range'* are assigned based on presence of the keywords found in the Description

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Benchmark For Game Selection

120 Application

40 Serious Games

Non Serious Games

40 Non-Serious Games

RANDOM GAMES

40 Random Games

Benchmark idea: verify that our algorithm has selected **all the serious games** and filtered out **the not serious ones** and the **random apps**

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Benchmark Results

EVALUATION

Accuracy
92.5%

Distinguish a serious game from a non-serious one, or any other application

Sensitivity
77.5%

Recognize a serious game

Specificity
100%

Recognize a non-serious game

Relative Accuracy
85%

Measures the ability to **focus on** serious games

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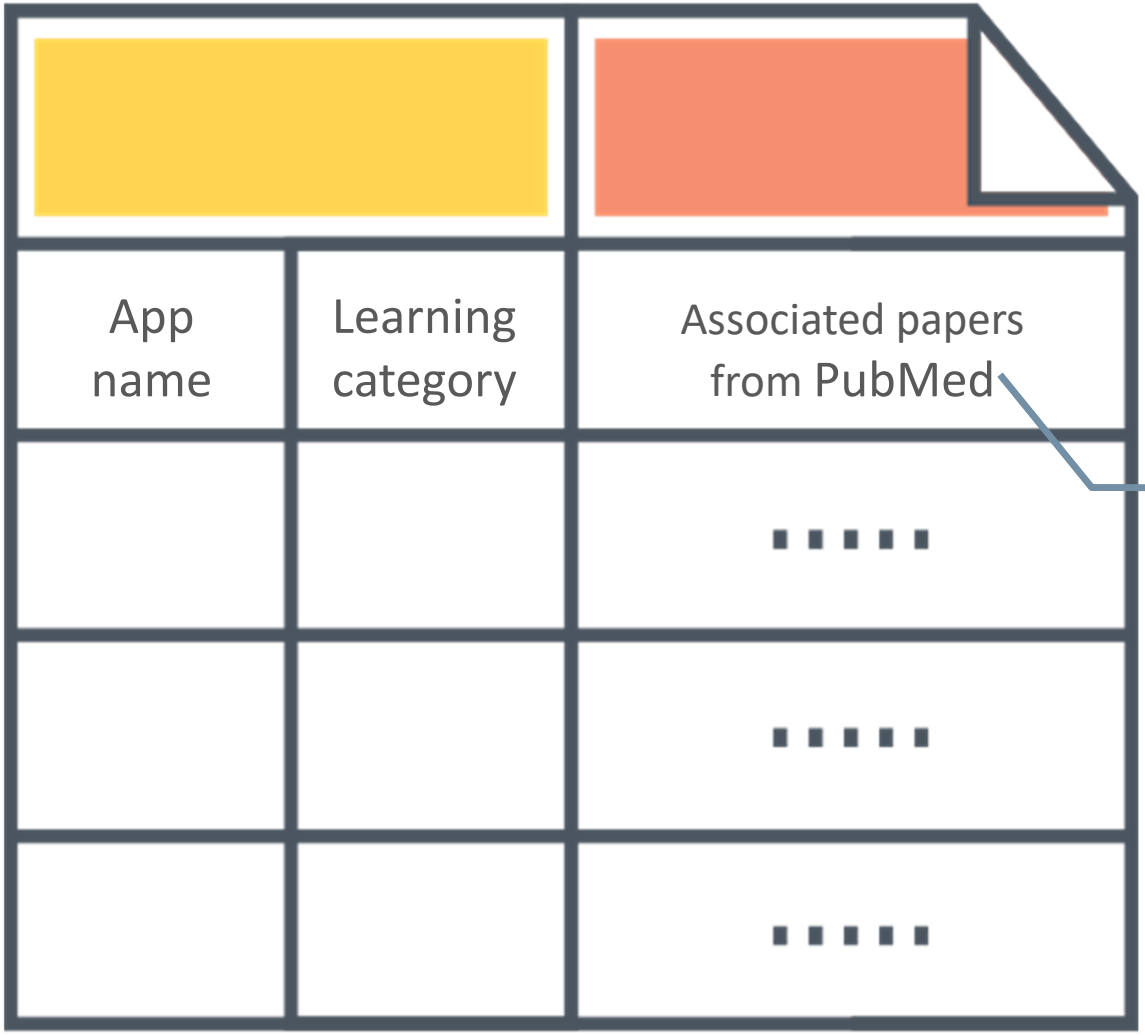
Build Dataset with Pubmed Papers



PubMed is used to retrieve the papers, that the algorithm will use to validate the apps.

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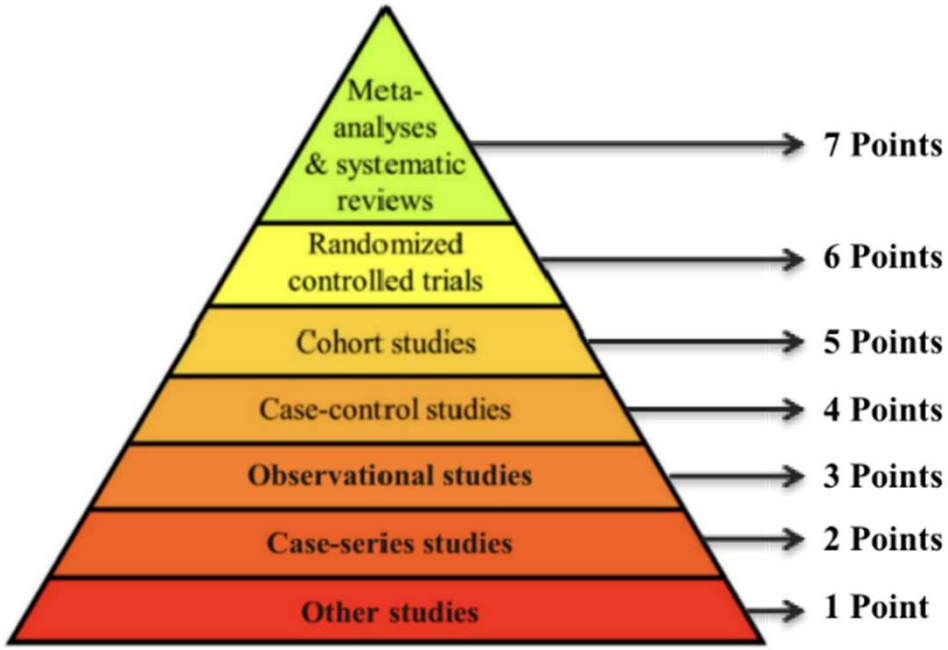
Reliability of Pubmed papers



Provide a Validation Score based on type ,and so reliability, of associated papers on Pubmed.

Implement a function that rewards the relevance of keywords associated to clinical studies with higher reliability in the different sections of the papers.

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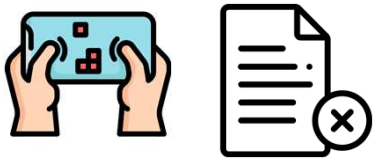
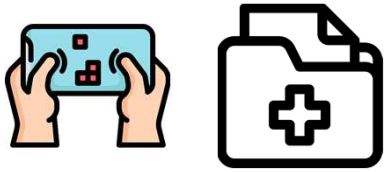
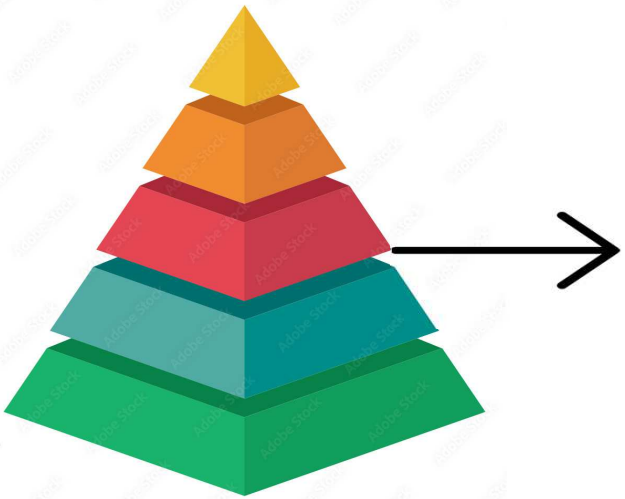
Threshold for Clinical Validation

Not Validated Games



Validated Games





We considered the presence of a keyword related to an **observational study** as a threshold for validation

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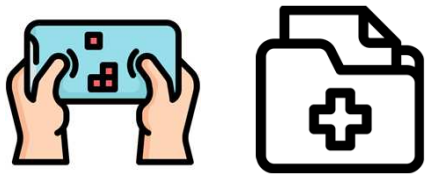
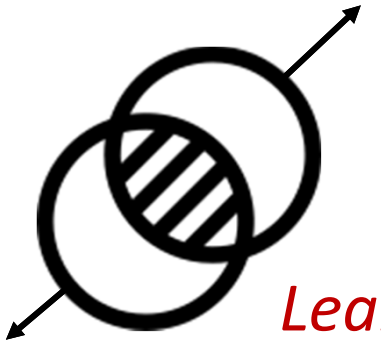
Similarity function for Not Validated Games

Let the user consult validated games of the same Learning Category of the non-validated ones

Validated Games





Learning Category

Not Validated Games

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Benchmark for Game Validation

30 serious validated games

5 serious non-validated games

Benchmark idea: **Compare** the clinical validation of a serious game found **by our algorithm** and the one found **by a person**

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Benchmark Results

EVALUATION

Accuracy
44.8%

Distinguish between a **validated** serious game and **not validated** serious one

Sensitivity
86.2%

Recognize a **validated** serious game

Specificity
3.4%

Recognize a **not validated** serious game

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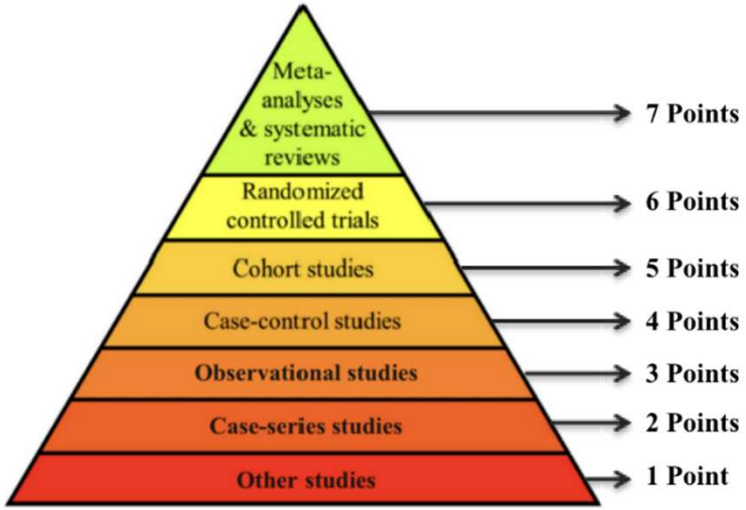
Benchmark for study type recognition



We selected 10 papers per study type

Benchmark idea: **Compare** validation score found **by our algorithm** to the one found **by a person**

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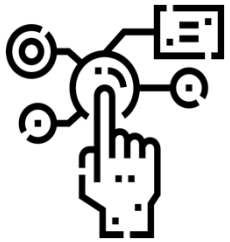
Benchmark Results

ACCURACY → Percentage of correctly classified study type: ***43.2%***

M.A.E. → Mean scores' differences: ***26.8%***

Dashboard



To display all mentioned information

- ✓ Available serious games per Learning Category and Age Range?
- ✓ Level of Clinical Validation associated a given serious game?
- ✓ Level of validation of a given paper according to its study type?
- ✓ Similar validated application for a not validated game?

Dashboard (Presentation)