

# RorschIA

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# Introduction

# Introduction

Supervised by Renaud EVRARD.  
Interdisciplinary project (Psychology and NLP).



Goal : Automatize the encoding part of the Rorschach inklot test procedure.

# Rorschach test

Rorschach inkblot test is 100 years old !



# Rorschach test

The test :

- Gather the answers
- **Scoring of the answers**
- Calculate the psychogram



**Figure:** all 10 cards in order

# Rorschach test scoring

Scoring use 4 labels :

- **Content**
- **Determinants**
- Location
- Quality and other notes

# Objectives

Project objectives :

- Verify lack of literature connecting Rorschach and NLP
- Collect info on Stat of the Art
- Conceptualize the Test through NLP lens
- Define challenges and strategies to overcome them
- Apply trends to develop ML models to classify content and determinants
- Conduct the model training in an environmentaly friendly way
- Assess applicability of models

## Litterature and related works

No major research conducted between Machine Learning and Rorschach test.

Camati, Scaduto, and Enembreck, 2021 Machine learning models (TF-IDF) on Thematic Apperception Test, rated by Revised Morvalian System (RMS).

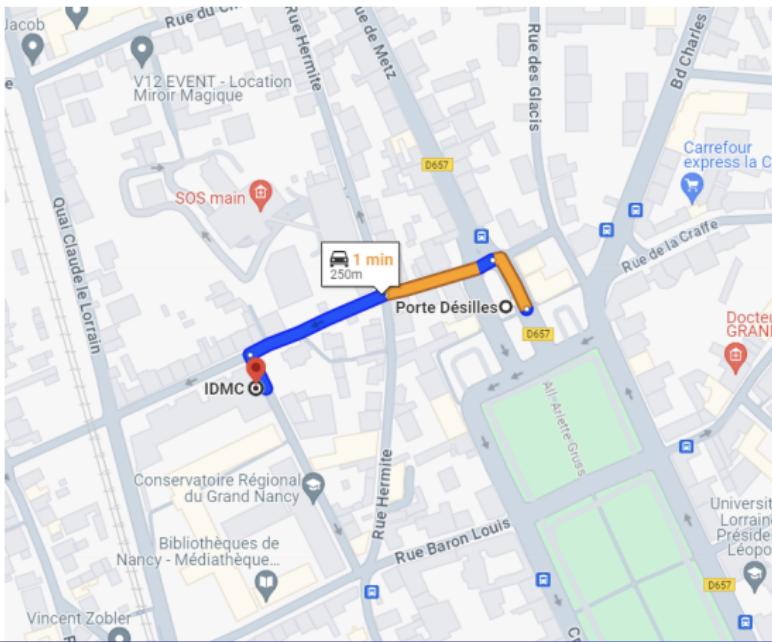
Interest : NLP team using the test to evaluate their models.

# Emissions and Energy Consumption

# Emissions and Energy Consumption

According to Green Algorithms Calculator (Lannelongue, Grealey, and Inouye, 2021):

- Energy consumption: 1.01kWh
- Carbon footprint: 51.88gCO<sub>2</sub>



# Data - 1st dataset

COVID-19 Rorschach test dataset (2017-2020)

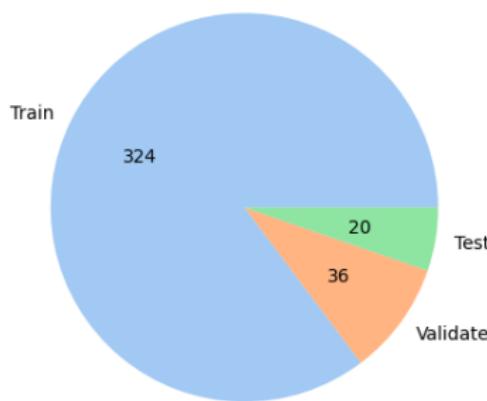
747 responses (after selection of the most qualitative)

- Inconsistent annotations
- Poor results when applied to the models
- Eventually abandoned

## Data - 2nd dataset

10 protocols from the psychology department = 380 responses  
More qualitative but rather low amount

Data splits for Model development



## Data - 2nd dataset

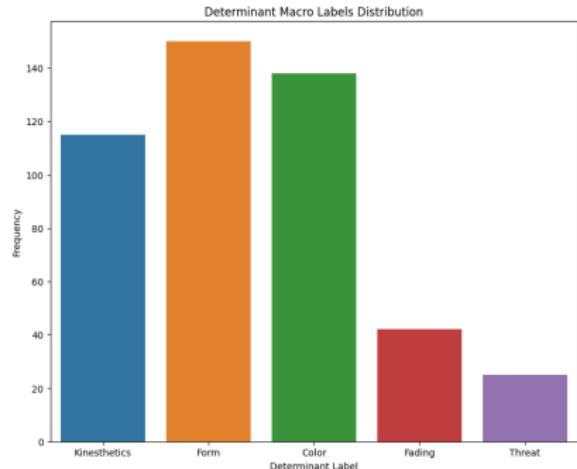
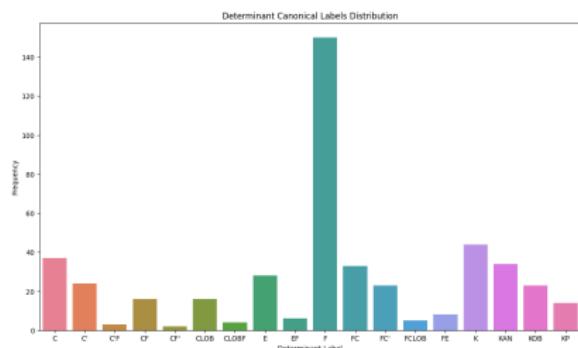
Data cleaning (on content and determinant labels):

- Translation of the protocols into English (DeepL translator)
- Standardisation of content and determinant labels
- One hot encoding

# Data - 2nd dataset

Uneven representativeness of the original classes

Second approach: regrouping of the labels into macro-labels



# Training

Evaluation metrics

Brief mention of tuning and training

Graphs for visual

Final epoch selection

probs breaking these into multiple slides

# Evaluation

Selection of final candidate models

Final model graphs

probs breaking these into multiple slides

# Results



# Results

**Table:** Final Results per Model

Model	F1	Accuracy	Precision	Recall	Hamming Loss*
C. Content	0.82	0.74	0.80	0.83	0.01
M. Content	0.89	0.86	0.91	0.87	0.02
C. Determinant	0.47	0.40	0.50	0.43	0.06
M. Determinant	0.59	0.44	0.62	0.57	0.20

\* Hamming Loss considerations: effect of number of predictions on the total score.

# Trade-offs between the two approaches

- Content representations: from 27 to 11
- Determinant representations: from 18 to 5

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- Content representations: from 27 to 11
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Lower number of labels led to better results. BUT the outcome of the models is less interpretable by the psychologist.

# Trade-offs between the two approaches

Practical solution? Use the models in tandem!



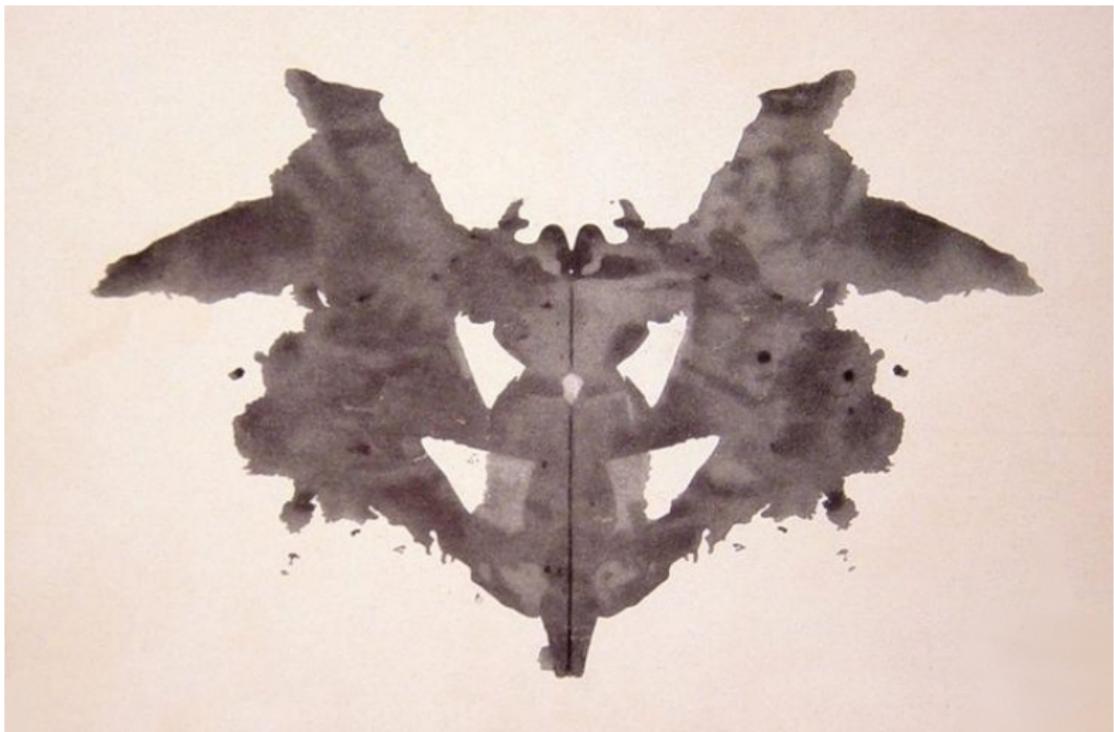
## Practical Example

# RorschIA App

RorschIA App hosted in



# Example Blot 1



# Example

Maybe a biblically accurate angel?

# Example

Ezekiel 1:15-17:

"For wherever the head faced, the cherubim would go in that direction, without turning as they moved. Their entire bodies, including their backs, hands, and wings, were full of eyes all around, as were their four wheels."

# Example

With the help of the Rorschach scoring cheatsheet provided by the InterPsy team we would probably code the answer as:

- Determinants: kan or k and F.
- Contents: (H)/(Ad) and Anat.

**What would our models do?**

## Future Work

# Future Work

- Combining both approaches
- Corpus creation
- Alternative approaches to the problem

# Bibliography I



Camati, Ricardo Stegh, Alessandro Antonio Scaduto, and Fabrício Enembreck (2021). "Using the Projective Thematic Apperception Test for Automatic Personality Recognition in Texts". In: *2021 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, pp. 78–85. URL:

<https://api.semanticscholar.org/CorpusID:252590374>.



Lannelongue, Loïc, Jason Grealey, and Michael Inouye (2021). "Green Algorithms: Quantifying the Carbon Footprint of Computation". In: *Advanced Science* 8.12, p. 2100707. DOI:

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