Exploring Human Cognition and AI Algorithms in Constellation Image Interpretation

Herman Meier, Eva Urankar, Belinda Lepmets, Helena Sokk

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Overview

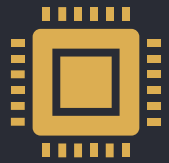
- Investigating initial strokes in constellation images
- Building upon precedent study [1]
- Refining AI algorithms

[1] T. Khajuria, K. Tulver, T. Luik, J. Aru. (2023). "Constellations: A novel dataset for studying iterative inference in humans and AI".

Objectives

Human Cognition:

- Understanding initial strokes made by individuals
- Insights into human brain perception and visual information processing



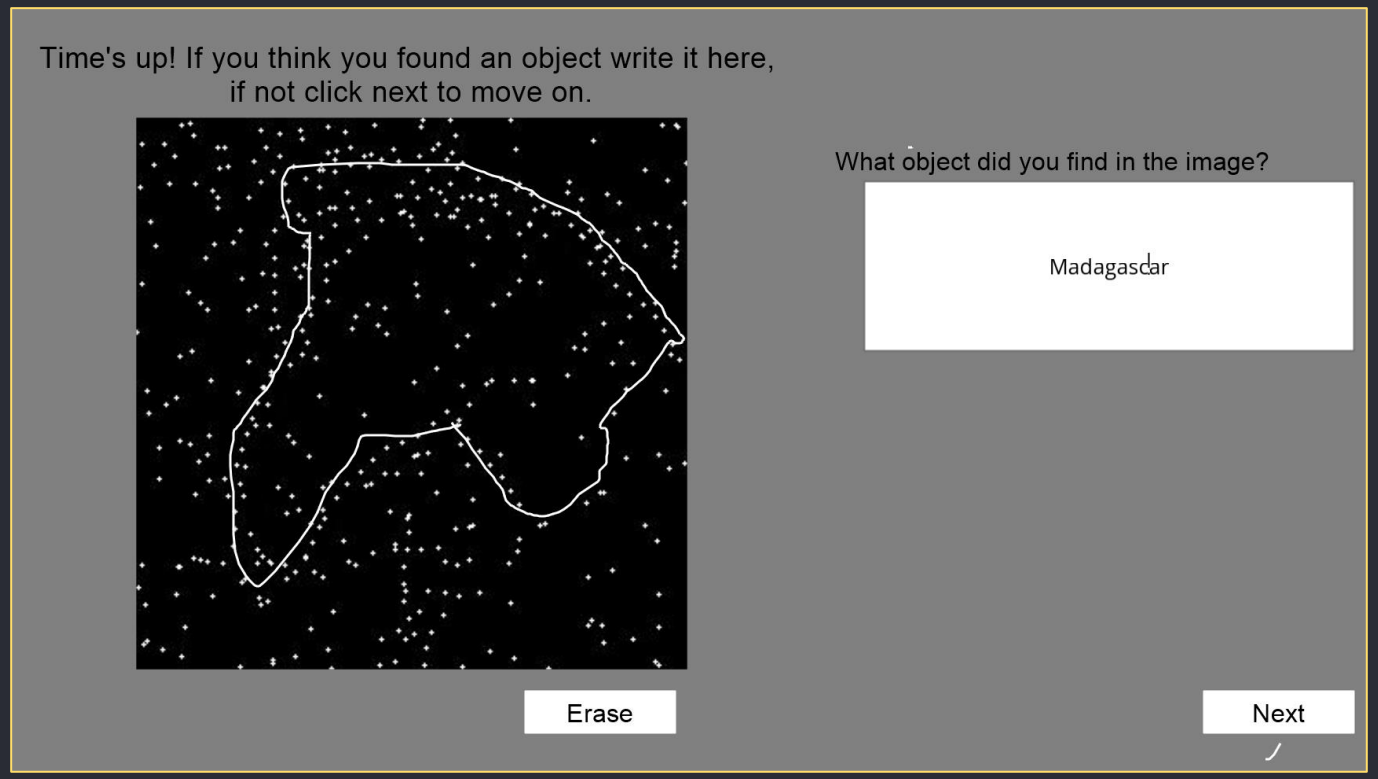
AI Algorithms:

- Comparing human and AI approaches to constellation pattern recognition
- Identifying deficiencies in existing algorithms, making improvements

Human cognition

PsychoPy Code Modification

- Adjustments for focusing on initial 30 seconds of participant responses
- Refinement of the questionnaire for relevant data collection



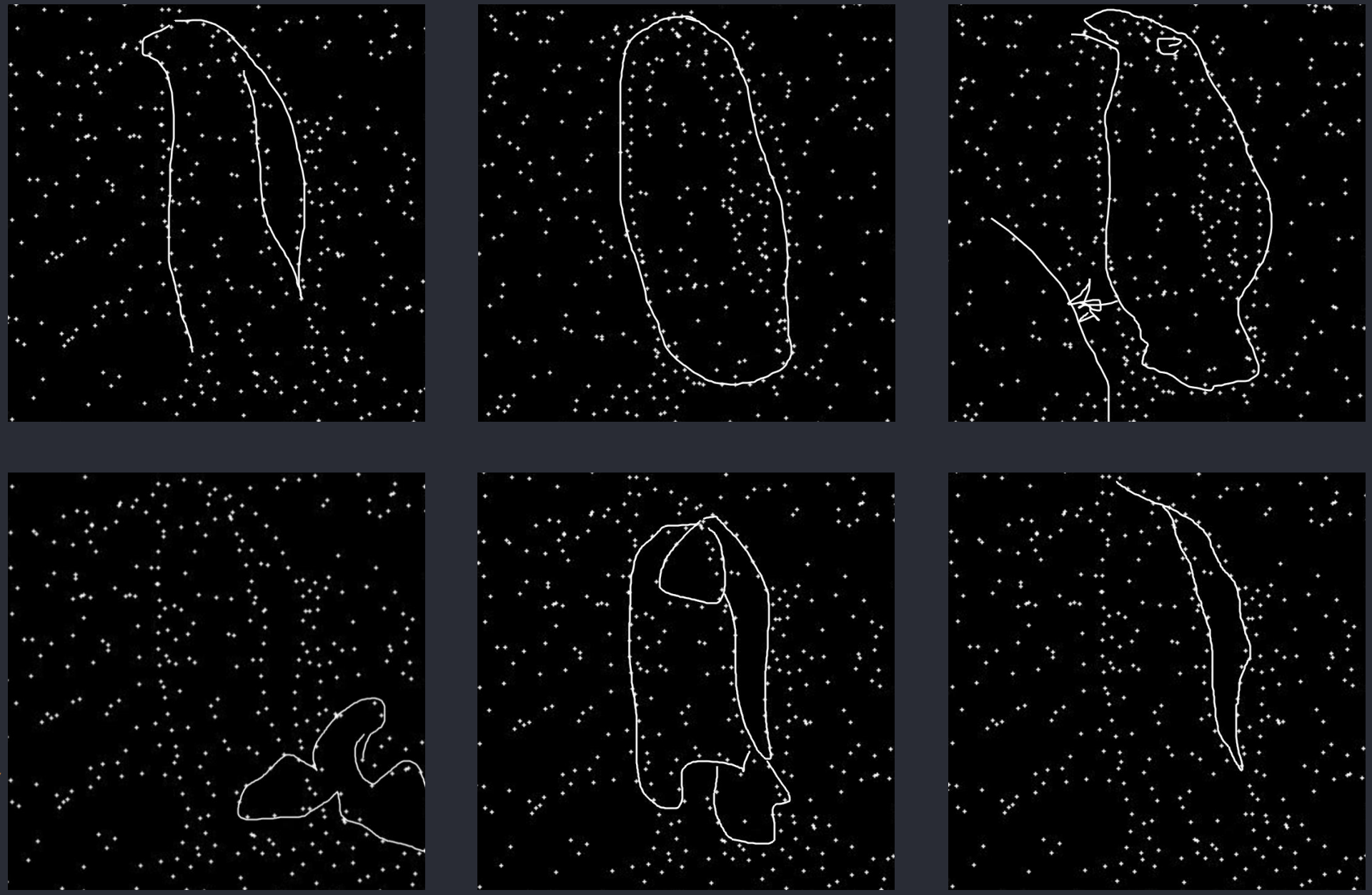
Data gathering and analysis

- 40 participants,
- each solving 38 constellation images

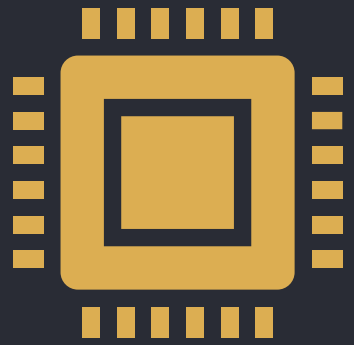
- Data collection : Screenshots, brush coordinates, participant responses

- Task focus: Drawing the first perceived element within a 30-second time frame

- Qualitative assessment: Visual inspection of screenshots



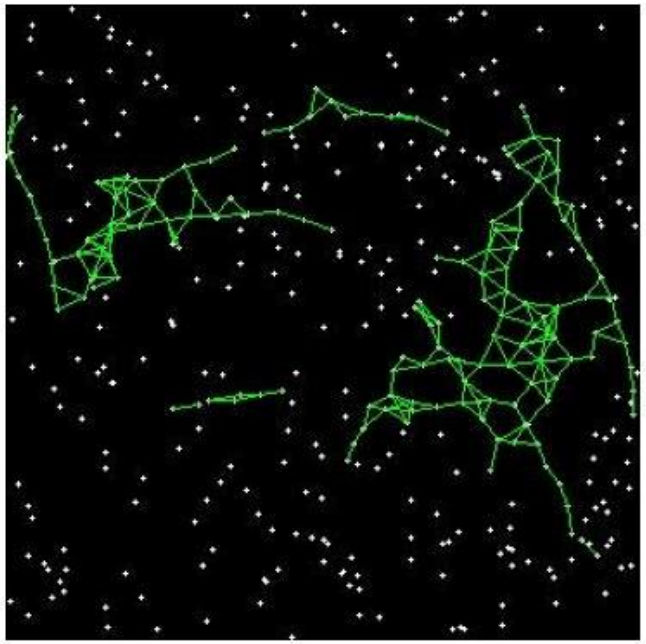
AI Algorithms



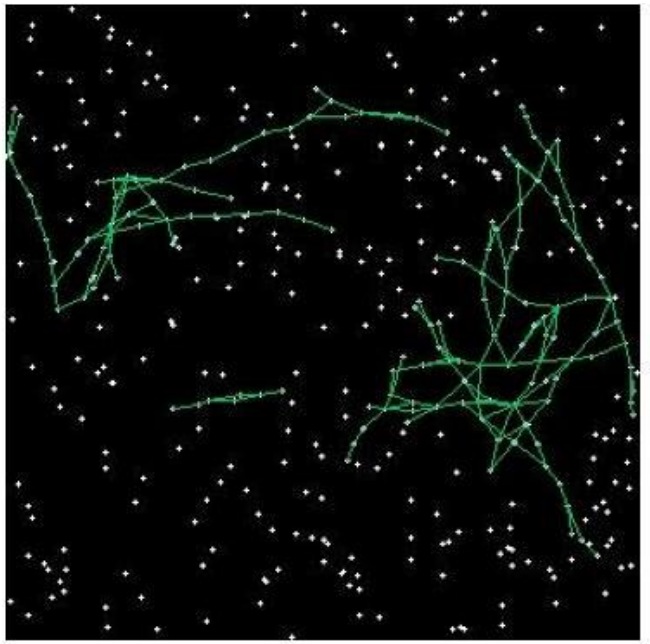
Connecting the dots

- Basic solution based on regular spacing assumption

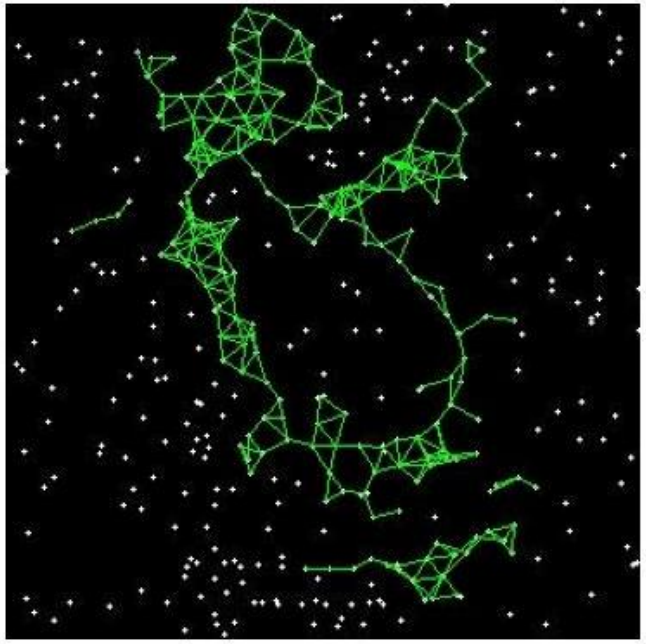
dolphin lines algorithm



dolphin existing algorithm



chess knight lines algorithm



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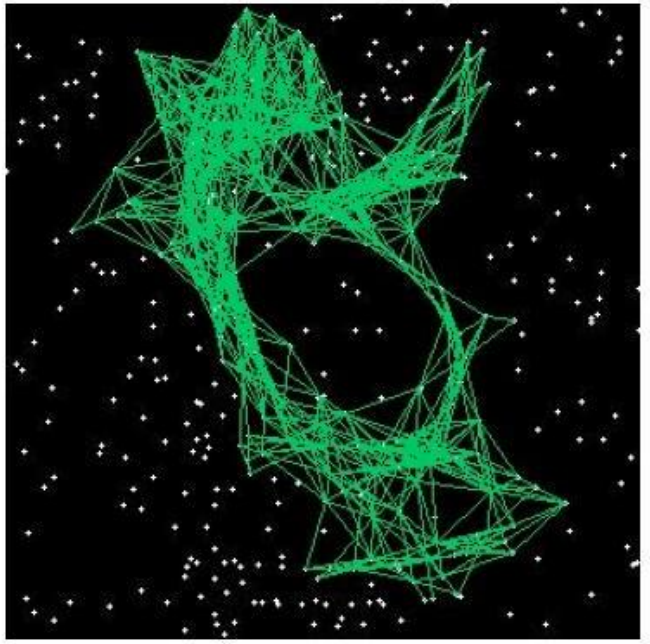
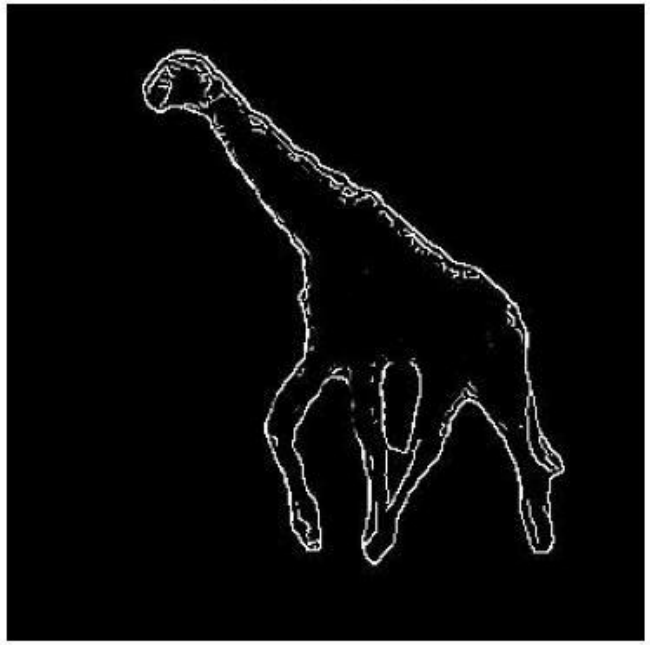


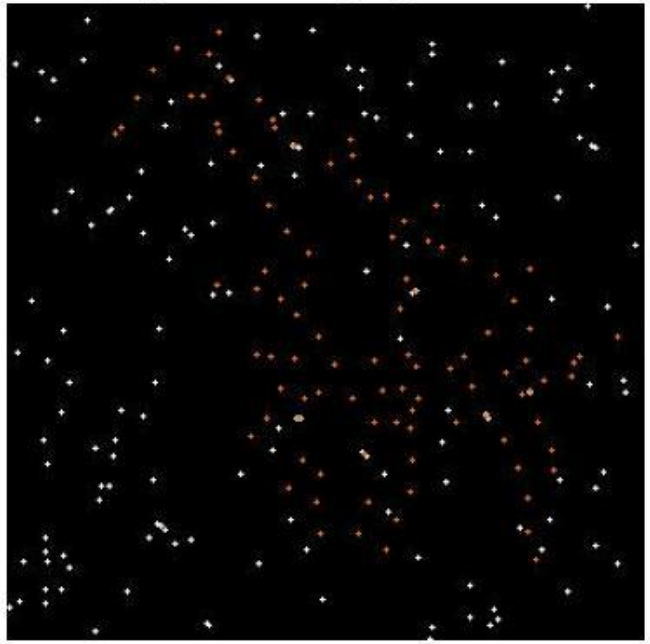
Human vs. Existing Algorithm vs. Our Algorithm

giraffe original outline

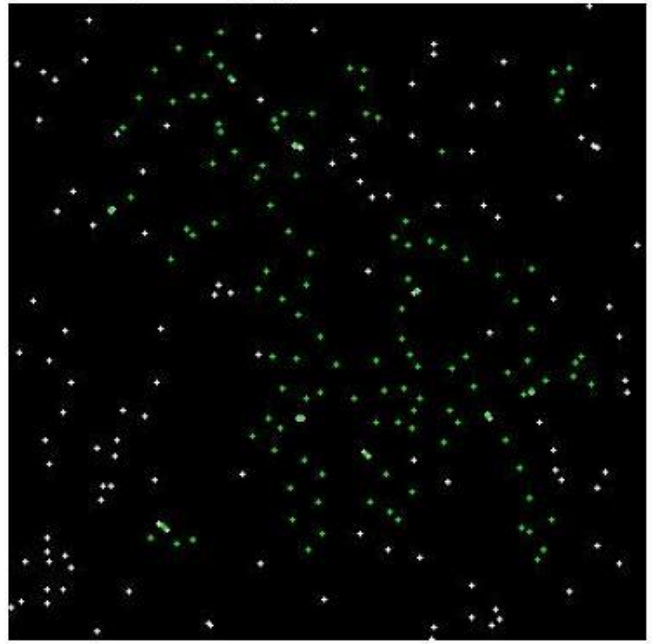


giraffe human guess

giraffe existing algorithm



giraffe graph + radius filter



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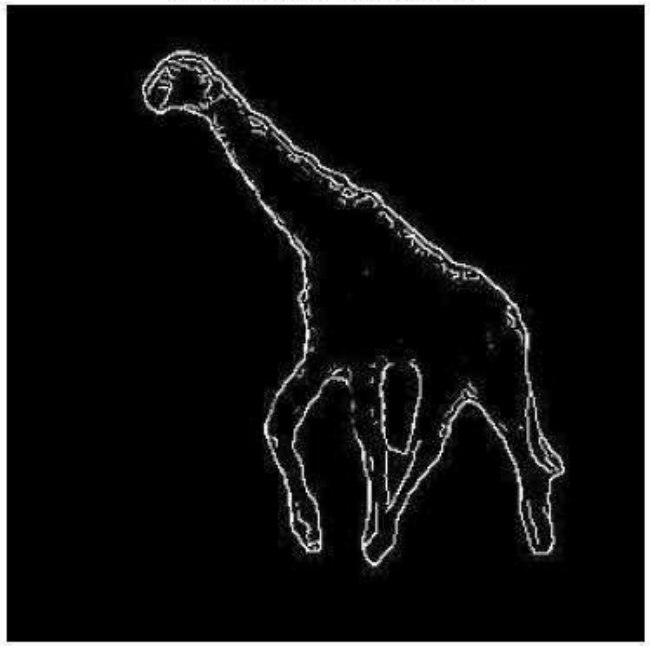

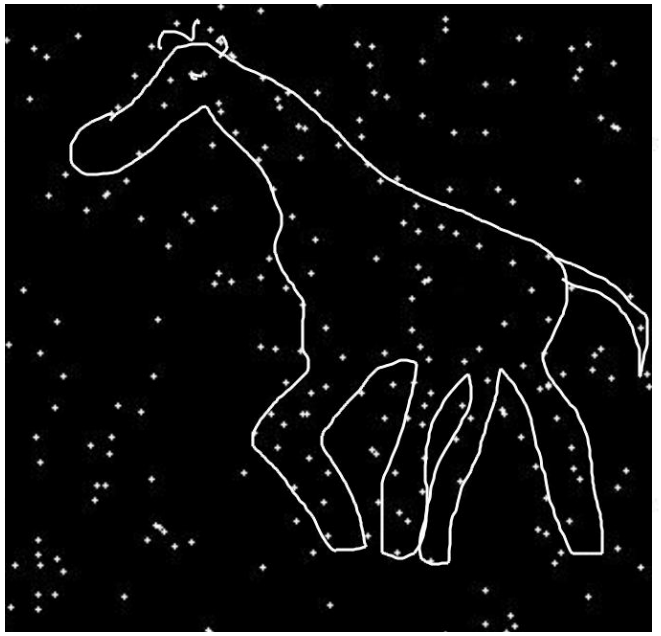

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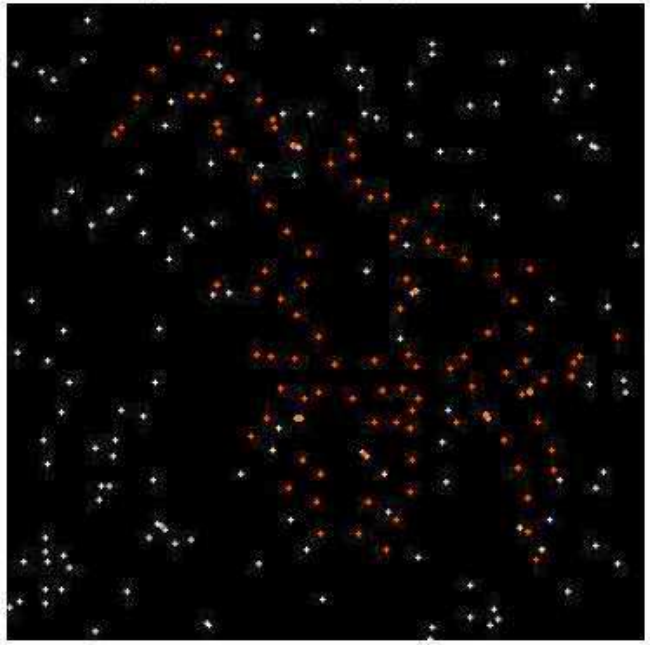

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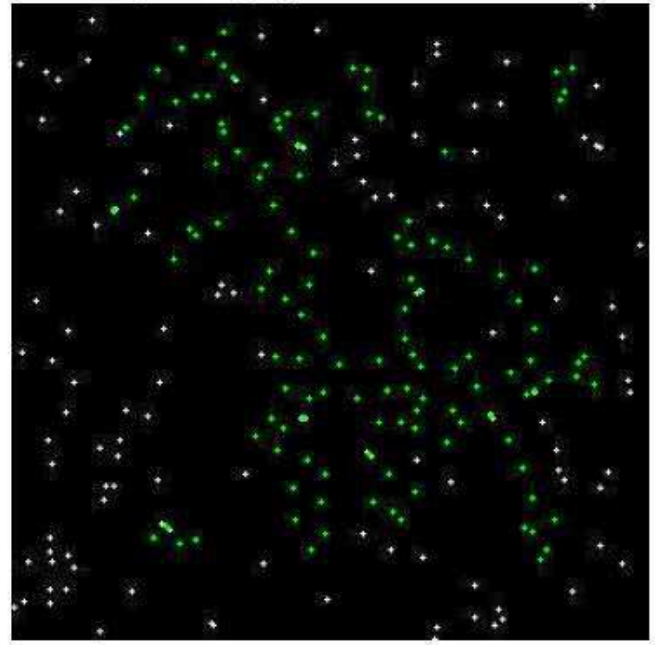

Results and discussion

Human perception:

- Curved and straight lines
- Subjectivity
- Significance of initial strokes
- Challenge : focus on initial impressions

Algorithm:

- Recognition of patterns similar to human perception
- Sensitive to parameter tuning

☑ Conclusion

- AI : Systematic pattern recognition
- Humans : Creativity and nuanced interpretation

- Potential for improved AI by incorporating more human-like qualities ?

ARTICLE

References :

[1] T. Khajuria et al. (2023). Constellations: A Novel Dataset for Studying Iterative Inference in Humans and AI
[2] K. Ducena et al. (2023). Human experiment with Constellation images: time limit
[3] H. Ers. (2021). Finding objects in constellation images using artificial neural networks