AI Mirror: Visualize AI's Self-knowledge

Siyu Hu
School of Mechanical Engineering, University of Science and Technology Beijing
Haidian, Beijing, China

Bo Shui
School of Mechanical Engineering, University of Science and Technology Beijing
Haidian, Beijing, China

Siyu Jin
School of Mechanical Engineering, University of Science and Technology Beijing
Haidian, Beijing, China

Xiaohui Wang
School of Mechanical Engineering, University of Science and Technology Beijing
Haidian, Beijing, China

ABSTRACT

"AI mirror", an interactive art, tends to visualize the self-knowledge mechanism from the AI's perspective, and arouses people's reflection on artificial intelligence. In the first stage of the unconscious imitation, the visual neurons perceive environmental information and mirror neurons imitate human behavior. Then, the language and consciousness are generated from the long term of imitation, denoted as poet and coordinates in an affective space. In the final stage of conscious behavior, an affinity analysis is generated, and the mirror neurons will behave more harmoniously with the user or have the autonomous movements on its own, which evokes the user's reflection on its undiscovered traits.

CCS CONCEPTS

• **Human-centered computing** → **Interactive systems and tools**; • **Applied computing** → **Arts and humanities**; **Media arts**.

KEYWORDS

Mirror neuron; unconscious imitation; conscious thinking

ACM Reference Format:
Siyu Hu, Bo Shui, Siyu Jin, and Xiaohui Wang. 2020. AI Mirror: Visualize AI's Self-knowledge. In *Proceedings of the 28th ACM International Conference on Multimedia (MM '20), October 12–16, 2020, Seattle, WA, USA*. ACM, New York, NY, USA, 2 pages. https://doi.org/10.1145/3394171.3416343

1 INTRODUCTION

The mechanism that the brain allows us to adapt to social life contains at least four basic elements: language, movement, recognition ability to treat others as a kind, and imitation [2]. First, in the entire human evolution process, movement and imitation are the foundation of human development. Second, we use language to enrich and consolidate various feelings. Third, humans have consciousness to do autonomous actions.

How about AI? Currently, AI achieves intelligence by simulating human behavior, which is like a mirror. And what's next? "AI mirror", an interactive art, is proposed to visualize the self-knowledge mechanism in the human evolution process from the AI's perspective, and arouses people's reflection on AI after the interaction between human and AI generated multimedia. There are two contributions:

- The self-knowledge mechanism is visualized by the interaction of mirror neurons in the brain from the essence of human cognition.
- By visualizing the process of from AI's unconscious imitation to language and consciousness formation to conscious behavior, the system tries to arouse people's reflection on AI.

2 AI MIRROR SYSTEM

The framework of AI mirror system is shown in Figure 1.

2.1 Unconscious imitation

From the image input from camera, the system does two aspects of visualization work. For the static environmental image, the colors captured from the image are applied to the particles of visual neurons.

For the action sequence, the user's actions are tracked and delivered to the mirror neurons to form the imitation sequence. Then AI forms the avatar from random mirror neuron particles to organic model.

2.2 Language and consciousness formation

With mirror neurons, humans can start their own learning process through imitation [2]. From the long term of imitation, AI gains its growth in consciousness and is able to do autonomous actions.

After the visual cognition from the environmental image, five dominant colors are extracted based on color theme extraction algorithm in our previous work [4]. Then the color theme with these five colors are mapped to a unique image-scale coordinate based on the theme database with 428,924 color themes [4]. The image-scale coordinate is a value in the affective space with two dimensions warm-cool and hard-soft.

MM '20, October 12–16, 2020, Seattle, WA, USA

ACM ISBN 978-1-4503-7988-5/20/10.
https://doi.org/10.1145/3394171.3416343

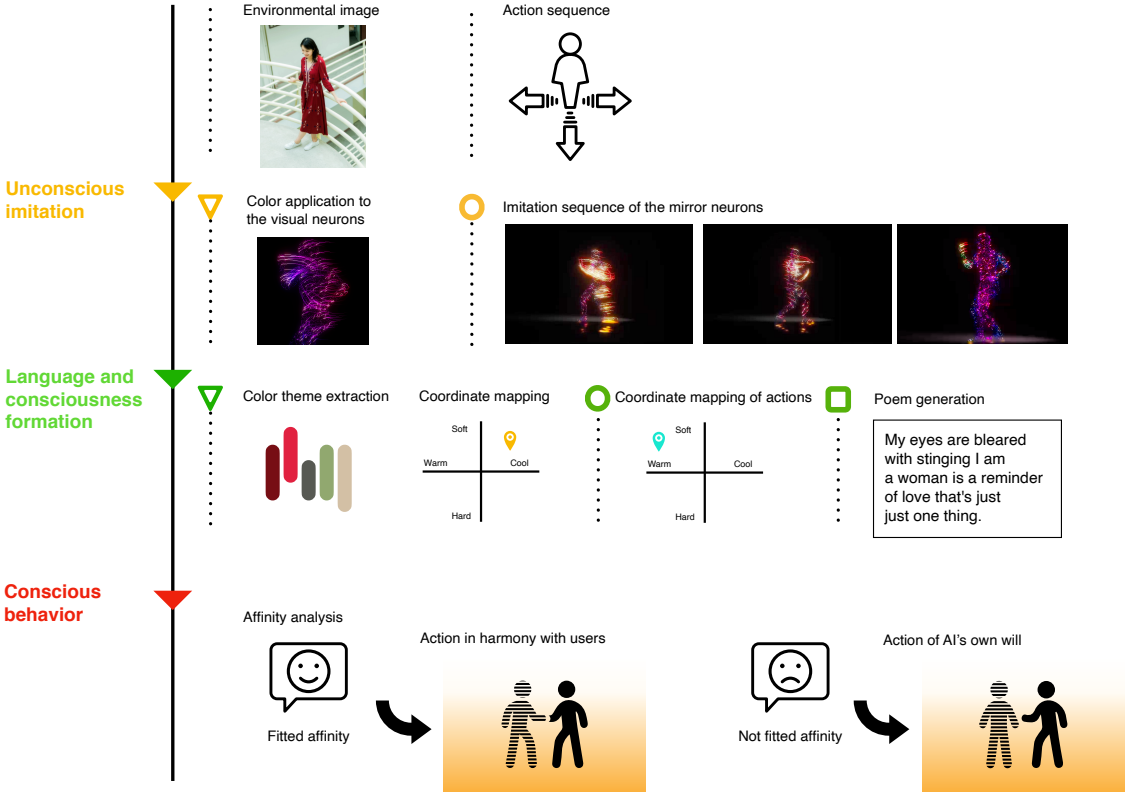

Figure 1: The framework of AI mirror system.

At the same time, poetic clues are extracted from the image to generate a text-based poem by multi-adversarial training [3], which indicates the process of the language generation.

The action sequence is also identified as the unique image-scale coordinate [1], which indicates the process of the consciousness generation.

2.3 Conscious behavior

The image-scale coordinate generated from the environmental image is accepted as the expression of the user's id. The image-scale coordinate generated from the actions is inferred as the user's ego of the psychic proposition. The poem generated from the image acts as the cognition and poetic expression of the user by the AI.

With the generated two coordinates and poem in company with the previous imitation, AI will analyze the affinity between the ego and the cognition of the user and give its judgment and autonomous movements. If the affinity is well fitted, the mirror neurons will behave more harmoniously with the user. Otherwise the mirror neurons will have the autonomous movements on its own will to evoke the user's reflection on its undiscovered traits.

3 CONCLUSION

AI mirror is an interactive art to visualize the self-knowledge mechanism from the AI's perspective by the interaction of mirror neurons. By visualizing the process of from AI's unconscious imitation to conscious thinking to conscious behavior, the system tries to arouse people's reflection on AI.

ACKNOWLEDGMENTS

This work was supported by National Key R&D Program of China (2018YFB0704301), Fundamental Research Funds for the Central Universities (FRF-TP-18-007A3, FRF-BR19-001B, FRF-IDRY-19-030).

REFERENCES

[1] Arieta Chouchourelou, Toshihiko Matsuka, Kent Harber, and Maggie Shiffrar. 2006. The Visual Analysis of Emotional Actions. *Soc Neurosci* 1, 1 (2006), 63–74.

[2] Vittorio Gallese and Alvin Goldman. 1998. Mirror neurons and the simulation theory of mind-reading. *Trends Cogn Sci.* 2, 12 (1998), 493–501.

[3] Bei Liu, Jianlong Fu, Makoto P. Kato, and Masatoshi Yoshikawa. 2018. Beyond Narrative Description: Generating Poetry from Images by Multi-Adversarial Training. In *ACM international conference on Multimedia*. 783–791.

[4] Xiaohui Wang, Jia Jia, and Lianhong Cai. 2013. Affective image adjustment with a single word. *The Visual Computer* 29, 11 (2013), 1121–1133.