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# Crowdsourcing intelligent design

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# Motivation

- Design intelligence, namely, artificial intelligence to solve creative problems and produce creative ideas, has improved rapidly with the new generation of artificial intelligence.
- Existing methods are more skillful in learning from data and have limitations in creating original ideas different from the training data.
- Crowdsourcing offers a promising method to produce creative designs by combining human inspiration and machines' computational ability.

# Main idea

- We propose a crowdsourcing intelligent design method called 'flexible crowdsourcing design'. The flexible method uses a cultivation procedure to integrate crowd participants' ideas and cultivate these ideas until they evolve into high-quality ones.
- It encourages participants to propose a variety of ideas, evaluates the development potential of ideas for promising design directions, and refines design ideas with high development potential, continually improving the originality of ideas.

# Flexible crowdsourcing design procedure

1. Publish idea generation tasks based on the requirements of the design project and collect the initial design ideas.
2. Publish idea evaluation tasks. Publish similarity evaluation tasks and calculate the similarity distribution. Publish quality evaluation tasks.
3. Stop crowdsourcing if the ideas satisfy the project requirements, otherwise go to step 4.
4. Calculate the development potential of ideas according to their similarity distribution, refinement relations, and quality scores.
5. Prioritize ideas with high development potential and publish idea generation tasks. Participants refine these referent ideas and propose new design ideas. Go to step 2.

# Crowdsourcing design tasks

1. Participants scan the referent ideas, and review their descriptions, which include the features, intent, and limitations of each idea.
2. Participants recall their professional knowledge and personal experience, search for related information, and propose their new ideas.
3. Participants reflect on the features, intent, and the limitations of ideas.
4. The optimized idea generation task pushes participants to generate ideas based on their own knowledge and then reflect on their ideas. This enhances the variety of ideas and supports idea refinement. Therefore, this task supports idea cultivation in crowdsourcing design.

# Major results

The design space continually expanded with the crowdsourcing process. In addition, the flexible crowdsourcing design method continually increased the originality of high original ideas.



# Conclusions

- We describe a series of studies on a crowdsourcing intelligent design method called flexible crowdsourcing design.
- The empirical applications of the method demonstrated that it continually broadened the design space and produced highly original ideas, thus increasing the creative capability of crowd intelligence.