Introduction  
AI Applications  
▪ Artificial intelligence (AI) has become deeply integrated into our daily lives, enhancing various aspects  
of our routines and activities.  
• Ex) Personal Assistance, Smart Home, Online Shopping, Education, Healthcare, Transportation,  
Language/Communication, Financial Management, Fitness and Wellness, Content Moderation  
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Injecting User Contexts into AI Applications  
▪ Effective prompt design significantly influences the performance of these models, transforming  
general-purpose AI into domain-specific assistants capable of nuanced problem-solving.  
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Why is Human-AI Collaboration Challenging?  
▪ Limitations of AI capability and performance  
▪ Difficulties in clearly expressing user intentions  
▪ Disparity between user language and AI understanding  
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Communication Has Always Been Challenging!  
▪ The challenges we face with AI are not new—we've already been navigating the complexities of  
communication among ourselves.  
• People often struggle to fully express their thoughts or intentions.  
• Misinterpretations arise due to differences in perspective, language, or cultural context.  
• Understanding hidden or implicit contexts requires effort and active listening.  
• Building mutual understanding takes time, trial, and error.  
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Strategies for Better Human-to-Human Communication  
▪ The following strategies reflect the effort we put into improving mutual understanding.  
Observing Asking Demonstrating  
Understanding through careful Clarifying intentions and Using examples, visuals, or actions  
listening and non-verbal cues uncovering hidden contexts to make ideas clearer  
Research for Better Human-AI Collaboration

Research for Better Human-AI Collaboration  
Asking  
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Robust Eye Blink Detection Using Video Vision Transformer  
IEEE/CVF WACV 2024

[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Eyeblink detection and its applications  
Mental condition detection Eye health monitoring system Human behavior Assistant  
Driver’s fatigue, students’ attention Diagnosis of dry eye syndrome, Communication tool, device  
level and stress. computer vision syndrome control for disorders  
[Cho 2021, Phan 2021, Jyotsna 2018] [Sharmila2019, Mohanakrishnan2013] [Luo 2021, Francis 2021]  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Existing approaches for eyeblink detection  
Image Processing Deep Learning  
4D model (Jahan et al., 2023) MS-LSTM (Hu et al., 2019)  
Motion vector Thresholding  
(Phuong et al., 2022) (Wu et al., 2008)  
EAR (Eye Aspect Ratio)  
(Phuong et al., 2022) Ensemble networks(Cortacero et al., 2019)  
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Potential problem:  
highly sensitive to environmental conditions (lighting, camera angle, etc.)  
Eyeblink8 Researcher’s night ZJU mEBAL HUST-LEBW  
[Pan, 2007] [Fogelton, 2016] [Drutarovsky, 2014] [Daza, 2020] [Hu, 2019]  
Most previous studies do not specifically account for conditional factors  
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Objective  
Develop a Highly Robust  
Eyeblink Detection Method  
The main contributions of this work include :  
✓ Newly proposed dual embedding based video vision transformer (ViViT)  
for robust eyeblink detection.  
✓ Created the MAEB dataset reflecting components of real-life situations  
to validate the proposed approach.

[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
DE-ViViT: Dual Embedding ViViT  
Overview  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Tubelet embedding of DE-ViViT  
• Modified traditional tubelet embedding to include overlapping stride operations  
• Allows effective capture of global contextual information  
• Useful in situations where rapid movement is present in image sequence  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Residual embedding of DE-ViViT  
• Modified residual embedding by using pixel subtraction between the original input and key frame to  
leverage residual information.  
• Enables capture of micro-variations within sequence  
• Useful when a blink sequence has clear pixel difference between beginning, central, and end frames  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Evaluation  
• Performance under in-the-wild conditions with public dataset  
• Dataset: HUST-LEBW  
• Models: Proposed model, ablation study variants, baseline models, SOTA models  
• Exploring change in model performance with camera angle variation  
• Dataset: MAEB (Multi Angle Eye Blink) - Newly collected for this study  
• Models: Proposed model, ablation study variants, baseline models  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Datasets  
HUST-LEBW MAEB  
• Video frames that are captured from movies • Specifically tailored to capture wide variety of camera  
(unconstrained conditions). angles, with other environmental conditions kept constant  
• Each blink sample covers one whole eyeblink process that • Structure of each data sample similar to HUST-LEBW  
corresponds to: “eye open→eye close→eye open”.  
Dataset Non-blink Blink Total  
Dataset Non-blink Blink Total  
HUST-LEBW (Train) 740 983 1,723  
MAEB 720 720 1,440  
HUST-LEBW (Test) 392 497 889  
HUST-LEBW samples and statistics MAEB samples and statistics  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Datasets  
MAEB (Multi Angle Eye Blink)  
• In order to extensively explore the impact of camera angle variation on blink detection, data from multiple camera  
angles was collected for the same subject  
• Sequential images with diverse blinks of 20 subjects from 9 different camera perspectives.  
• A total of 1,440 sequence data was used for the test.  
Data collection procedure  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Performance on HUST-LEBW dataset (in-the-wild condition)  
Proposed Method+Baselines  
Metric 3DCNN CNNLSTM CNNLSTM2 P2B2 P2B3 P3B3 ORG-ViViT T-ViViT DE-ViViT  
Precision .809 .691 .856 .796 .814 .775 .689 .861 .851  
Recall .828 .760 .849 .839 .838 .810 .776 .817 .858  
F1-score .818 .724 .852 .815 .825 .789 .730 .837 .853  
Baseline models Proposed model ablation  
• 3DCNN: VGG16network modified for 10-frame sequences • ORG-ViViT: original ViViTmodel architecture  
• CNNLSTM: an implementation of Dazaet al., • T-ViViT: original ViViTwith tubeletembedding  
2020 with 2 different learning rates  
• DE-ViViT: Proposed ViViTnetwork with tubeletand residual embedding  
(CNNLSTM: 0.0001, CNNLSTM2: 0.001)  
• PBBN: pyramid bottleneck network from Bekhoucheet al., 2022 with three  
different block/branch variations  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Performance on HUST-LEBW dataset (in-the-wild condition)  
SOTA Models  
Method Eye Recall Precision F1 score  
Left .361 .647 .463  
[Soukupova and Cech, 2016]  
Right .302 .576 .396  
Left .541 .892 .674  
[Hu et al., 2019]  
Right .444 .767 .563  
Blink detection+ [Phuong,  
Both .590 .801 .679  
2022]  
InstBlink [Zeng, 2023] Both .976 .566 .717  
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[Observing] Robust Eye Blink Detection Using Video Vision Transformer  
Performance on MAEB (with different camera angles)  
• Overall, all methods show  
performance drop in corner camera  
angles (especially cameras 1,7,9)  
• Proposed DE-ViViT shows highest  
average accuracy, with relatively  
consistent performance across  
camera angles  
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[Observing] Other Ongoing Projects  
Chain-of-Emotions (Compound Facial Expression)  
▪ Identifying the emotion of a facial expression from an image with multiple emotional labels.  
• e.g. happily surprised, sadly fearful)  
▪ Sequential uses of VLM can capture diverse aspects of the facial image.  
▪ Chain-of-Emotions outperforms SOTA models in RAF-DB compound label dataset, including  
models trained on external datasets  
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[Observing] Other Ongoing Projects  
RespireSegNet (Sleep Breathing Pattern)  
▪ Analyzing breathing sounds during sleep can help understand individual health contexts, but the  
signals are weak and easily affected by various environmental factors.  
▪ RespireSegNet, a non-invasive deep audio segmentation method, analyzes respiratory patterns  
during sleep (Breathing frequency and cycle length).  
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StuBot: Learning by Teaching a Conversational Agent  
Through Machine Reading Comprehension  
Findings of EMNLP 2022

[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Learning by teachingis a teaching method that enables students to teach other students.  
Many studies have revealed the effectiveness of learning by teaching from diverse perspectives.  
• Long-term learning (Fiorella and Mayer, 2014)  
• Motivation and self-esteem (Wagner and Gansemer-Topf, 2005)  
• Communication skills (Stollhans, 2016)  
• Abilities to gather and structure information (Grzega and Schöner, 2008)  
https://www.pexels.com/ko-  
kr/photo/3182745/

[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Agent-based systemsare widely used for learning.  
Facilitating school administrative services  
• FAQ chatbot for academic requirements (Bhavika et al., 2017).  
• CourseQ for assignment or events reminder (Guillem et al., 2018).  
Improving knowledge of a specific subject  
• MathBot for learning mathematical concepts (Grossman et al., 2019).  
• Massistant for helping users to build their own concept graphs (Jiang et al., 2019).

Interactive learning with virtual agents using a learning by teaching approach are proposed.  
We present a new conversational agent that provide adaptive feedback.  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
StuBot  
▪ A text-based conversational agent that promotes learning by teaching  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Learning by teaching StuBot  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Internal Workflow of StuBot  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Step 1: Answering  
The user’s explanation texts are MRC model generates an appropriate answer A  
inputted to the server by receiving a context Cand a related question Q  
Research for Better Human-AI Collaboration

[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Step 1: Answering  
StuBot adopts a ETRI’s trained MRC model(ETRI, 2021)  
that adopts KorBERT(Korean Bidirectional Encoder Representations from Transformers),  
an extension of BERT(Devlin et al., 2018).  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Step 2: Self-grading  
• StuBot self-grades the answer text using the machine learning model by comparing it with its actual answer value corres  
ponding to a question.  
• We trained a model of support vector machine by using two input features: (i) Jaccard similarity (ii) the confidence score.  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Step 3: Messaging  
• StuBot prepares adaptive feedback messages for the user.  
• It then asks the user for further explanation about incorrectly answered exercises.  
• Next, if the user inputs another new explanation by responding to the first feedback message,  
StuBot performs the three modules again.  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
User study: Baseline vs. StuBot  
▪ Within-subject study (repeated measures)  
• 20 participants experienced two different types of  
‘Learning by teaching’ chatbots.  
▪ Quantitative analysis  
• Learning performance: Multiple-choice question,  
Descriptive question, Comprehension question  
• Immersion: Enjoyment, Emotional Involvement, Challenge,  
Transportation, Temporal Dissociation, Basic Attention  
▪ Qualitative analysis  
• User Experience  
• Failure Cases  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Result: Learning performance  
Using StuBot positively affected the scores  
on the descriptive questionand the comprehensive question.  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Result: Immersion  
Participants' immersion tended to be higher when using StuBot,  
with the largest difference being particularly in the transportation factor.  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Result: Immersion  
What did the participants prefer to use? Stubot or baseline?  
• All the participants commented that they preferred to use StuBot over Baseline.  
Because of…  
• helping understand the overall storyline  
“To teach StuBot, I had to study harder to understand its overall storyline entirely.” [P5]  
• increasing awareness through feedback  
“When I studied the material at first, I was not sure about how well I knew.  
However, with StuBot, I could clearly understand what I was insufficient in.” [P3]  
• feeling accomplishment  
“I realized that I had taught StuBot very well after seeing  
that it finally achieved a high score.” [P13]  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Result: Immersion  
• 9.1% of the answers generated by MRC were wrong even though the participants’ explanations were sufficient.  
• Interestingly, despite the internal errors, the participants tried explaining it better because they were a teacher.  
• We think the negative impacts of the MRC errors seemed not severe because of our appropriate design point  
on learning supports.  
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[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Discussions  
Awareness  
The adaptive feedback by a conversational agent can improve ‘learning by teaching’ by  
increasing the self-awareness of the learner’s understanding level.  
Interactivity  
The conversational agent’s adaptive feedback can increase interactivity and  
offer an immersive experience during ‘learning by teaching’.  
Research for Better Human-AI Collaboration #

[Asking] StuBot: Learning by Teaching a Conversational Agent Through Machine Reading Comprehension  
Discussions  
Intimacy  
The conversational agent’s adaptive feedback can motivate learners  
to focus on a ‘learning by teaching’ situation by increasing the intimacy.  
Inconvenient Interaction  
Designing conversational agents for ‘learning by teaching’  
may be different from designing conventional chatbot agents in education that  
mainly aim to offer convenience.  
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[Asking] Other Ongoing Projects  
Structured Follow-Up Question Recommendation  
▪ People often overtrust automated systems, assuming their results are always correct, which can  
reduce critical thinking.  
▪ We present a new approach to encourage users to think more critically by generating follow-up  
questions that prompt deeper engagement.  
▪ Follow-up questions are crafted using Bloom’s Taxonomy to stimulate thinking at various levels, from  
basic understanding to higher-order analysis.  
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[Asking] Other Ongoing Projects  
Iterative Music Generation with LLMs  
▪ Generative AI struggles to align with user preferences in music creation,  
especially with vague prompts.  
▪ Providing detailed attributes like tempo, genre, mood, and structure  
improves results.  
▪ Question-driven interactions with large-scale music caps datasets can  
help refine user input and bridge the expectation gap.  
Exploring Explicit  
Attribute Candidates Music Attributes  
Music  
Generation  
(Text2Music)  
Music Attribute  
User Prompt  
Based Questions  
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Colorbo: Envisioned Mandala Coloring  
through Human-AI Collaboration  
ACM IUI 2022

[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Coloring is a popular art activity.  
Many studies have examined the positive effects of coloring activities.  
• Improving concentration, relaxation, self-expression [Curry 2005, Eaton 2017]  
• Decreasing depressive symptoms [Flett2017, Slegelis 1987]  
Image from https://kids.nationalgeographic.com/crafts/article/animal-coloring-pages

[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Mandalas are widely used for coloring.  
• The oldest type of Buddhist art  
"magic circle" or "center" in Sanskrit  
[Slegelis, 1987]  
• Repetitive and symmetrical patterns  
make the coloring task clearer  
[Curry 2005, Roquet2021]  
• Benefits of mandala coloring  
Mental well-being, meditation, therapeutic effects  
[Kellogg 1977] [Jung 2014] [Slegelis1987]

Facilitating Improvising  
Computer-Aided Systems for Art Human-AI Collaboration for Creativity  
Sketching Colorizing Painting Instrument playing  
SketchHelper (Choi, 2019) ColourAIze (Matulic, 2018) DuetDraw (Oh, 2018) In a Silent Way (McCormack, 2019)  
Envisioning  
We newly address the need for support to express images in one’s mind well.

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[Preliminary Study] Envisioning Mandala Coloring  
Results on semi-structured interviews with 10 participants (age: M = 24, SD = 3.23) after colorizing a mandala.  
Most participants often tried to However, anticipating how their  
envision how coloring would be finished. coloring would turn out was not easy.  
"I could not know the feelings that the colors  
"I colored it by imagining  
give. This disturbed my imagination." [C10]  
how it changes if using a certain color." [C7]  
"It was hard to imagine how the coloring would be  
"I continuously thought about the appearance of  
finished because filling in the sketch with several  
the entire mandala during coloring." [C10]  
colors in mind was complicated." [C9]  
Image from https://arteza.com/dp/ultimate-mandala-coloring-bundle

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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Envisioned Mandala Coloring through Human-AI Collaboration  
The user shows  
USER AI  
the present work to AI.  
…  
• Analyze its coloring pattern  
• Colorize the remaining areas  
AI visualizes the envisioned coloring,  
possibly in the user’s mind  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Colorbo: An Interactive System to facilitate Envisioned Mandala Coloring  
Beam projector  
Keypad  
Webcam  
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Colorbo: Envisioned Mandala Coloring through Human-AI Collaboration, ACM IUI 2022  
시연 동영상

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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Workflow of Colorbo  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 1. Preprocessing  
Image cropping Image alignment Color quantization  
Crop the margins of Aligned with its original sketch Unify similar RGB values  
the captured image based on ORB’s visual features via K-means clustering  
(Oriented FAST and Rotated BRIEF)  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 2. Segmentation  
Piece extraction Clustering Segments  
Distance  
from the center  
Shape similarity  
Linkage  
matrix  
Filled by  
the same color  
Connected-component labeling by SAUF Hierarchical clustering  
(Scan plus Array-based Union-Find) cooperating with linkage matrix data.  
Research for Better Human-AI Collaboration

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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 3. Color Selection  
Color extraction Color exploration Harmonious colors  
?  
…  
Embedding model  
The user’s colors are inputted to The model outputs harmonious colors  
the embedding model as seed colors that are likely in the same palette.  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 3. Color Selection  
▪ We adopted fastTextalgorithm to train an embedding model by using 20,266 palettes in Coolors.  
▪ Given seed colors, the model can predict other colors that are likely to gather together  
in the same palette (Similar to providing surrounding words using a word embedding model).  
▪ If the user’s color is not in the training set, its most similar color found by the embedding model  
is used as a seed color.  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 3. Color Selection  
▪ 30 participants who are majored in art and design.  
Results  
▪ Three methods for color combination  
• Reference: Most loved colors in COLOURlovers  
• Colorbo: colors by Colorbousing a random seed color  
• Random: randomly selected colors  
▪ Evaluate 30 palettes (10 for each method)  
▪ Two 5-point Likert scale questions  
• Color harmony  
“I think this color combination is harmonious.”  
• Likeability  
Reference ≅ Colorbo > Random  
“I like this color combination.”  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 4. Colorization  
AI-Palette Generation  
• Colors are randomly selected from  
the user’s colors or the ones selected by Colorbo.  
• Several different palettes are created  
depending on the selection results.  
Colorization  
• Each segment is filled with each color in the palette.  
• The Colorbo allows the user to explore the different  
complete versions, which were colorized  
by a different palette, through the keypad.  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Step 4. Projection  
Full Mode Layer Mode  
• For the layer mode, five circular layers in the mandala were initially drawn.  
• Then, the grab cut adjusts the area of each layer by taking in or out the  
colored pieces around its borderlines according to their connectivity.  
Research for Better Human-AI Collaboration

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User Study: With vs. Without Colorbo  
Within-subject study  
16 participants colorized mandalas in two different ways.  
Coloring experiences from three perspectives  
• Overall changes  
(open-ended questions, completion time)  
• Satisfaction  
(open-ended questions, a 7-point Likert scale question)  
• Acceptance  
(open-ended questions)  
Preference for projection modes

---61 (No Text Extracted) ---

---62 (No Text Extracted) ---

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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Results: Positive Changes  
87.5% of the participants were satisfied with the output when using Colorbo.  
Envisioning  
“How satisfied are you  
with your final mandala image?” “Colorbo showed several possibilities during the coloring, which  
helped me predict the future outcome of my mandala to a certain  
extent.” [P6]  
Unexpected/diverse/harmonious  
“I tended to mainly use bright colors to paint, and thus the  
combinations of dark colors generated by Colorbo were new  
to me.” [P7]  
Relieved stress during selection  
When I used Colorbo, I was less concerned about my coloring  
and less tired in deciding how to paint. [P11]  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Results: Concerns about using Colorbo  
12.5% could make a more satisfactory output when using Colorbo.  
Undermined creativity Completion time  
“I felt that I was not creative because I relied on  
recommendations rather than thinking on my own.” [P14]  
Took more time  
“There was a delay when utilizing the system, and it seems  
to have taken more time to interact with Colorbo.” [P8]  
Distracted  
“I think my immersion was slightly lowered because I had to  
stop painting while waiting for recommendations.” [P8]  
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[Demonstrating] Colorbo: Envisioned Mandala Coloring Through Human-AI Collaboration  
Results: Preference on Projection Modes  
Most of the participants (62.5%) preferred full mode to layer mode.  
Research for Better Human-AI Collaboration

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Discussion  
Improvising vs. Envisioning  
• We address the need to consider mental imaging in creative tasks,  
while earlier research has mostly focused on Improvising.  
• It is still questionable when the user prefers improvising or using mental images for their  
creativity (Characteristics of the task? Digital or analog?).  
Image from https://pixabay.com/

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Discussion  
Holistic vs. Partial Point of View  
• 62.5% liked full mode for their coloring because it helped them to  
both easily grasp the overall feelings that the colors created and decide which color to use next.  
• Mandala coloring emphasizes a holistic view of harmony,  
but in specific coloring tasks, narrowing the scope of the focus can be effective.  
• It is necessary to explore diverse ways of creating mental images.

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Discussion  
Adaptive vs. Evolving  
• Colorbo was designed to adapt to the user’s present work;  
however, this result shows the opposite in that the user can also adapt to the system.  
• It will be necessary to carefully consider the user’s adaptation in human–AI collaboration of art  
because it can undermine creativity.  
• To deal with this, it may be necessary for an AI system to evolve over time.

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[Demonstrating] Other Ongoing Projects  
Enhancing Collaborative UI Design Through Multi-Agent UX Writing  
▪ Enable agents to share and refine  
visual design alternatives to improve  
UX writing in user interfaces.  
▪ Focus on concrete design options  
over abstract debates to reduce  
miscommunication and enhance  
clarity.  
▪ Provide a structured process for  
agents to collaboratively refine  
practical design alternatives  
efficiently.  
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Conclusion  
For Better Human-AI Collaboration  
▪ Mutual Understanding is Key  
• Effective collaboration requires humans and AI to deeply understand one another.  
▪ Strategies for AI to Understand Human Context  
• Observing: Learning from patterns and behaviors.  
• Asking: Actively seeking clarification.  
• Demonstrating: Showcasing understanding for feedback.  
▪ Human Adaptation for AI Collaboration  
• Humans also need specialized communication skills for effective interaction with AI.  
• Training programs may be necessary to develop these abilities.  
▪ The Future: Multi-Agent Collaboration  
• AI-to-AI teamwork to accomplish complex tasks.  
• One human coordinating with multiple AI agents.  
• Preparing for these scenarios will be the next challenge.  
Research for Better Human-AI Collaboration