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Happiness Finder: Exploring User Experience in AI-Assisted Four-Leaf Clover Searches

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Abstract

The rare four-leaf clover (FLC) is regarded worldwide as a symbol of good luck. However, it is not easy to find one among the common three-leaf clovers. This study explores how people feel when technological intervention is introduced to assist in identifying FLC. We investigated user experiences during outdoor searches supported by an object detection algorithm. Our results showed no significant difference in the impact of technological intervention on users' positive emotions; however, the findings suggest that such intervention may play a supportive role.

CCS Concepts

• ***Human-centered computing*** → *Mixed / augmented reality;* • ***Computing methodologies*** → *Object detection;* • ***Applied computing*** → ***Psychology;***

1. Introduction

A four-leaf clover (FLC), steeped in European tradition and recognized across many cultures worldwide, is often regarded as a symbol of good luck. This unique variant arises from a somatic mutation of the common three-leaf clover, with an estimated occurrence of only one in every 10,000 clovers. Due to this rarity, distinguishing FLCs from their three-leaf counterparts presents a considerable challenge to the unaided human eye.

Positive computing has emphasized the role of interactive technology in shaping emotional experiences, advocating emotional well-being as a central design goal [CP14]. Consequently, the field of HCI has developed various approaches to create desirable emotional experiences, reflecting a shared understanding in both academia and industry that emotions fundamentally drive technology use [MW07].

In our previous work, we explored FLC search experiences using head-mounted displays [HCCK20] and smartphone-based systems [YHI*25]. However, despite these efforts, user studies in real outdoor environments have not yet been conducted.

Figure 1: *Happiness Finder detects an FLC in the camera image of a smartphone. (a) People can search with their eyes and their smartphone camera at the same time. (b) Happiness Finder visually indicates the location of the FLC (red circle) with a beep sound based on the confidence level of object detection adjusted by moving a slider on the smartphone screen.*

2. Method

To assist in FLC searches, we developed Happiness Finder, a web application using object detection techniques. A real-time detection model (Ultralytics YOLOv8x) was trained on 1,234 images from an FLC dataset [L. 19]. The model analyzed smartphone camera footage captured every second to determine whether an FLC appeared, outputting the coordinates of the corresponding bounding box (BBox). Performance on 310 test images yielded a precision of 0.676, recall of 0.500, and mAP@0.5 of 0.533. When the BBox confidence exceeded a user-defined threshold, a sound played and the BBox was overlaid on the live camera feed. A slider at the top of

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the interface allowed users to adjust the decision threshold, balancing false positives and negatives: sliding right increased precision (detecting only clear FLCs), while sliding left broadened detection to include more uncertain cases.

We then conducted a user study to explore emotional responses when FLC searches were technically supported. Sixteen university students and staff participated in a campus field experiment after providing informed consent. Participants completed a pre-questionnaire on their knowledge and interest in FLCs, then observed an artificial FLC that was later placed among natural clovers (about 1 m²). Each participant searched for the FLC under two conditions—using Happiness Finder and without feedback—while holding a smartphone (iPhone 15 Pro, 187 g). The order of conditions was counterbalanced. After each search, participants reported when they found the FLC and completed a post-questionnaire, followed by a semi-structured interview. The study was approved by the university's ethics committee.

Positive emotions were measured using the Japanese version of the Positive and Negative Affect Schedule (PANAS) [SY01], adapted from the original [WCT88]. The scale consists of 16 adjectives (eight positive, eight negative) rated on a 6-point Likert scale. Because one positive adjective (*Determined*) was omitted, one negative item (*Irritable*) was excluded for balance. The resulting seven-item positive (Cronbach's $\alpha = = .88$) and negative ($\alpha = = .85$) subscales were summed to compute affect scores (1 = Not at all, 6 = Extremely).

3. Results

The Normality assumption of the positive and negative affects rated by the participants was not violated. Results from a paired t test show no significant difference in participants' positive ($t(15)=.74$, $p=.47$, Cohen's $r=.19$) and negative affects ($t(15)=1.80$, $p=.092$, Cohen's $r=.42$) between using and not using the Happiness Finder. This may be due to the fact that the visual and auditory information presented by the Happiness Finder was designed to be ignored by participants when it was unnecessary to explore. Actually, few participants relied on the behavior of the Happiness Finder in their search, and many of them found the FLC when they were looking directly at the clover clumps with their own eyes. On the other hand, they used the Happiness Finder to carefully narrow down the area to be searched or to expand the area that could be searched once before finding the FLC.

Eleven participants indicated they were happy when they could find FLC. Five of them chose the Happiness Finder as the happier condition, two chose None, and the other four said they were equally happy under both conditions. Four of the five who chose the Happiness Finder cited the hard work of finding FLC as the reason for their happiness: *"The second [None] was more like finding it by accident, like, oh, there it is. The first [Happiness Finder], I felt like I had finally found it in the process of searching." [P6]*
Eight participants also mentioned that Happiness Finder brought relief and enjoyment during the search: *"In the first one [None], I was worried about whether I would find it or not, to the point that doubt would arise as to whether it was really there. (...) In the second one [Happiness Finder], I had the peace of mind that this phone would tell me, and I would definitely be able to find it sooner or later. That's quite different." [P5]*
Seven participants reported that they regarded Happiness Finder as a partner and cooperated with it to search for FLC. They described their relationship with Happiness Finder as a helper (P2, 3, 5, 13) and a companion (P6, 8, 10): *"A companion who searches with me. (...) It's different, like, let's look for it again." [P10]*
We can assert that a new finding is that Happiness Finder, as a search support partner, could provide a sense of security and enjoyment, and when the search failed, it could become an object of blame-shifting, attributing the failure to the system rather than to oneself. For tasks like FLC searching, where the probability of success is low, utilizing AI to lower the searcher's psychological barrier and provide a sense of security and enjoyment while accommodating failure can lead to enhancing one's well-being.

4. Conclusion

We developed Happiness Finder, a tool to support the search for FLC using smartphones or tablets, and examined how the experience of searching for FLC with AI affects subjective well-being. Through a study in a real setting, we found no significant impact on their subjective well-being during the search for FLC, regardless of whether or not the Happiness Finder was used. However, Happiness Finder enhanced our participants' joy when discovering FLC while also reducing the psychological burden of failing to find them. Our results suggest that, with AI support, users may be able to sustain prolonged engagement in the inherently difficult task of searching for real FLCs.

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