

# Threshold Designer Adaptation: Improved Adaptation for Designers in Co-creative Systems

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## 1 Supplementary Materials

### 1.1 Additional Detail Regarding KiaiTime

Users can play and pause the song at any time using the space bar, and can navigate forward and backward in time by fixed increments using the arrow keys. Advancing to the right goes forward in time in the song, and advancing to the left goes backward. The purple rectangle in the middle of the timeline shows the current position of the song, which also has its timestamp displayed in the top left corner. Users can “export” their current chart to a playable Taiko format using the Export button. Once a chart is exported, a player can later play the chart by attempting to match each button press in time with the music as it plays. All of the pictured buttons also have associated hotkeys for ease of use.

The editor features a button for advancing to the next song to chart, as well as a timer that tracks how long the user has been charting. These two features were implemented for use in the human subject study which is discussed in Section 5.

The KiaiTime interaction model is depicted in Figure 1. While developing the model we referred to an established turn-based interaction framework for co-creative systems [Guzdial and Riedl, 2019]. This interaction framework is appropriate for investigating designer adaptation due to the flexibility of the AI partner’s role within the system. The user interacts with the AI partner in distinct “turns.” We decided that the AI partner would not take actions during the user’s turn to avoid the potential for user frustration found in similar systems [Jacob *et al.*, 2013; Guzdial *et al.*, 2019].

For this design we drew on a common collaborative chart creation strategy employed by human designers, based on one of the author’s experience in this community. This collaboration strategy entails splitting a chart into multiple discrete sections which are each assigned to a separate designer. We made the choice to allow the user to specify the area for the AI to alter to allow for a higher level of control compared to prior PCGML co-creative tools [Guzdial *et al.*, 2019]. While the human user is free to both add and delete objects, we only allow for the AI partner to add new objects within its allotted region during its turn. This avoids the possible frustration that could arise from the AI partner deleting the human user’s work.

KiaiTime’s front-end user interface was developed in the Godot game engine, and the AI partner’s predictions are han-

dled by a Python server. As well, the Python server handles the adaptation of the ML model to the human designer, and exporting charts to a playable format.

A video of the KiaiTime system can be found at the following anonymized link. The video will be updated if the paper is accepted to the conference.

<https://streamable.com/i3ar76>

## References

- [Guzdial and Riedl, 2019] Matthew Guzdial and Mark Riedl. An interaction framework for studying co-creative ai. *arXiv preprint arXiv:1903.09709*, 2019.
- [Guzdial *et al.*, 2019] Matthew Guzdial, Nicholas Liao, Jonathan Chen, Shao-Yu Chen, Shukan Shah, Vishwa Shah, Joshua Reno, Gillian Smith, and Mark O Riedl. Friend, collaborator, student, manager: How design of an ai-driven game level editor affects creators. In *Proceedings of the 2019 CHI conference on human factors in computing systems*, pages 1–13, 2019.
- [Halina and Guzdial, 2021] Emily Halina and Matthew Guzdial. A demonstration of kiaiTime: A mixed-initiative pcgml rhythm game editor. In *The 17th AAAI conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*. AAAI, 2021.
- [Jacob *et al.*, 2013] Mikhail Jacob, Gaëtan Coisne, Akshay Gupta, Ivan Sysoev, Gaurav Verma, and Brian Magerko. Viewpoints ai. In *Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*, volume 9, 2013.

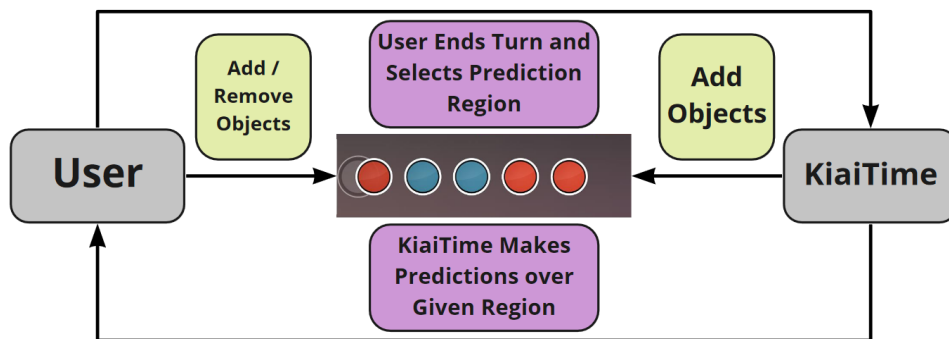


Figure 1: Depiction of the KiaiTime interaction framework [Halina and Guzdial, 2021]. The human user and AI partner contribute to the Taiko chart in a turn-based, mixed-initiative format.