

AI Snap! Blocks for Speech Input and Output, Computer Vision, Word Embeddings, and Neural Net Creation, Training, and Use

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Abstract

We will demonstrate blocks integrated into Snap! capable of a wide range of AI services, interactive AI programming guides, and a selection from thirty sample projects. Sessions and workshops in both school settings and informal learning contexts have been held in many countries. The full version of this paper includes descriptions of the Snap! blocks and unpublished descriptions of student experiences in India.

Summary^{1,2}

The Snap! AI library includes blocks that support word embeddings by reporting the embeddings, finding nearest words, and mapping words to two-dimensional locations in 15 languages (eCraft2learn 2021). There are blocks that perform image classification, object detection and segmentation, pose detection, style transfer, sentence and image encoding, and audio recognition. TensorFlow.js is used to support neural network creation, training, prediction, and hyper-parameter optimization. These blocks run online or offline on the user's devices thereby avoiding application installation, latency from network access, and possible privacy violations from data being sent to servers.

A tutorial guide to all the Snap! AI blocks is provided as a web site. The tutorial material is interleaved with discussions of societal impact, history, background material, project suggestions, and more. Each section of the guide contains several frames that provide a means to interact with the Snap! blocks discussed directly without leaving the page and its guidance. The guide includes thirty sample artificial intelligence programs in a form suitable for enhancement by non-expert programmers. These projects have been designed to be modifiable by school students and have been iteratively developed with over 100 students. The projects involve speech synthesis, speech and image recognition, natural language processing, and deep machine learning. They illustrate a variety of AI capabili-

ties, concepts, and techniques. The intent is to provide students with hands-on experience with AI programming so they come to understand the possibilities, problems, strengths, and weaknesses of AI today (Kahn and Winters 2021).

We carried out a pilot program in India with AI Education courses curated for K-12 children. Scratch for AI blocks and Snap! for AI blocks were recently introduced to students in India to help them deduce and understand various AI functions by creating programs which gave them access to real time AI services. The curriculum and course for the pilot program were created under the guidelines as outlined by the Artificial Intelligence for K-12 initiative. Previous publications describe similar efforts in Indonesia (Kahn et al 2018) and China (Kahn et al 2020).

We hope to give learners and hobbyists the ability to creatively use AI in their projects thereby acquiring a first-hand understanding of some elements of a technology that is rapidly changing our world.

Ethical Concerns

AI programming resources for school children do not raise any special ethical concerns. On the contrary, one way to deal with ethical concerns of AI in general is to increase the proportion of the population that have more than a superficial understanding of AI and its potentials and dangers.

References

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²<https://ecraft2learn.github.io/ai/publications/EAAI-2022.pdf>