A DATA PIPELINE FOR AUTOMATICALLY GENERATING IMAGES FOR ABSTRACT STEM TERMS

STEM VOCABULARY » BUILD KNOWLEDGE GRAPH » IDENTIFY TRAINING AND PREDICTION DATA » ATTNGAN - TEXT TO IMAGE GENERATION MODEL [1 2] » IMAGES FOR STEM TERM

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Thesis

Why This Is Important

- Many STEM topics are notoriously difficult for students to learn. [3]
- Extensive control (~98%) over scientific vocabulary is needed to comprehend scientific text. [4]
- Images improve learning in scientific domains for K-12 students. [3 5]

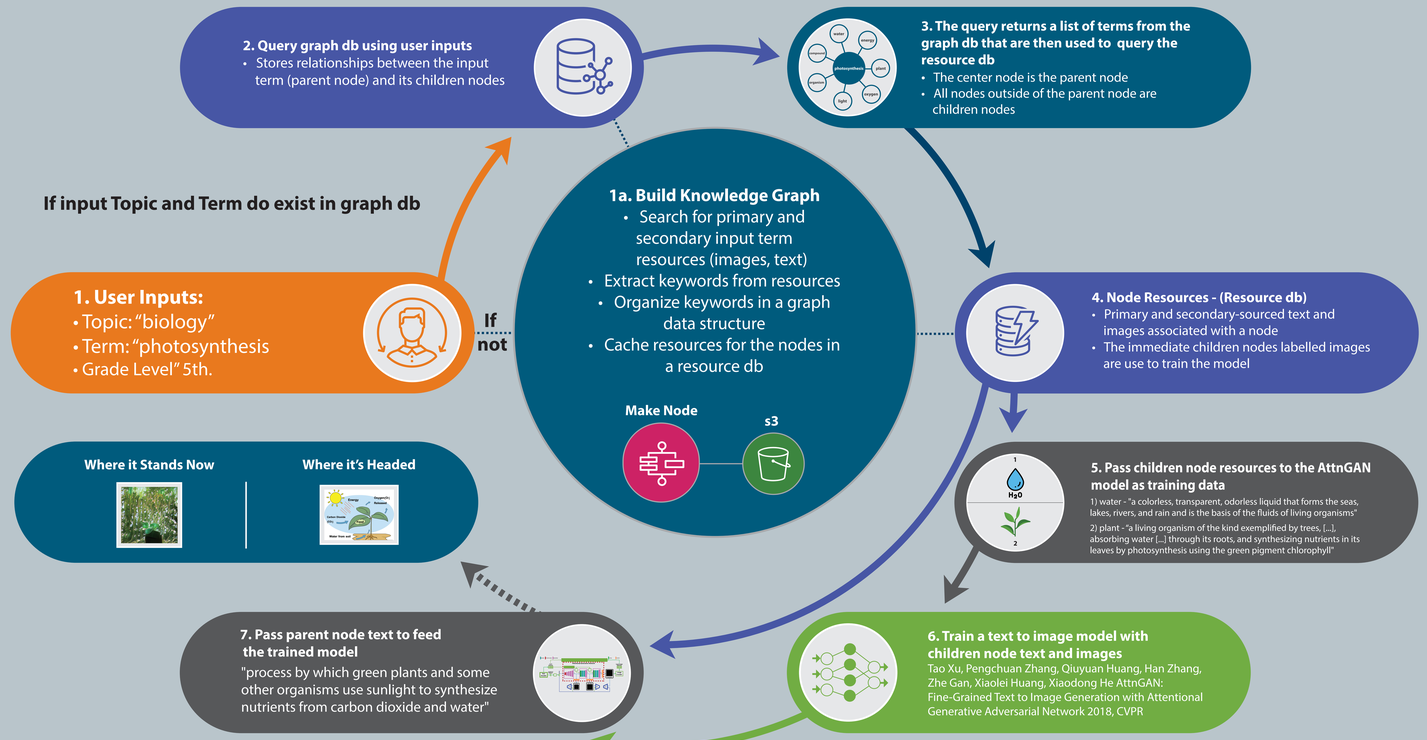
The Problem

- Images for scientific terms are difficult to create; to do so is an expensive, subjective, multidisciplinary process.
- Identifying the correct image is also difficult and images are not always available for the appropriate grade level.

Google search for "quantum computing diagram"

Google search for "photosynthesis diagram"

- "Teachers invest 7 hr/wk searching for instructional resources (free and otherwise) and another 5 hr/wk creating their own materials." [6]



Sources

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Proposal

Solution

- A data pipeline that allows the user with three inputs, term, topic, and grade level, to generate scientifically correct images.
- Appending a data handler to the AttnGAN model to do the heavy lifting.[1] The pipeline makes modeling easy. By programmatically feeding training and prediction data into a text-to-image algorithm.

Potential Uses

- Educational game-making and curriculum-ware.

Features

- Create images for underserved and complex STEM terms.[7]
- Automatically calibrate images for different age groups sensibilities.

Next Steps

- Calibrate the model.
- Programmatically determine training data size.

Tools & Libraries

- Python: davidstap/AttnGAN, Pandas, PyTorch, textacy, networkx, google-images-download, PIL, guild.ai
- AWS: s3, DynamoDB, lambda, ECS, Step Functions