# AUTOMATING VIDEO CATEGORIZATION

Seneca Innovation has partnered with a privately-owned video technology company to develop a scalable machine learning algorithm to categorize videos.

Vubble, an Ontario-based company, serves its media and educational clients by collecting informational videos from online channels, curating them around topics the client has identified, then distributing them through a Vubble app on the client's web site. As part of the curation process, journalists assess the quality of the video and append a rich array of metadata, including a credibility rating assigned by the editorial team. Various AI tools are used to support this process.

In 2018, Vubble launched a project to automate video categorization in partnership with Dr. Vida Movahedi, a professor at Seneca College's School of Software Design and Data Science. "Vubble wanted to use AI to eliminate some of the easier, repetitive tasks so that the editorial team could focus on areas that require human creativity and judgment," Dr. Movahedi says.
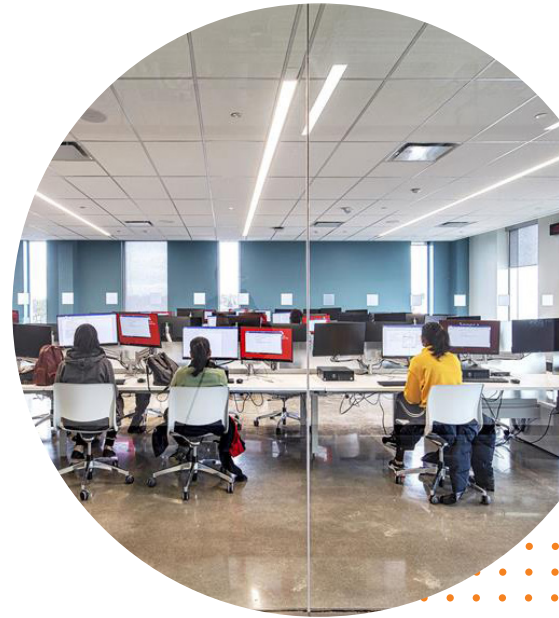
Photos courtesy of Seneca

Dr. Vida Movahedi

Dr. Movahedi and her students completed three projects between 2018 and 2021, using high-performance compute capacity provided by SOSCIP, a Canadian academic-industry consortium. The Seneca team designed an algorithm to predict one or more categories (up to 16 categories), such as Science, News, etc. for each video. Their initial data set included 80 sampled frames for each of 20,000 videos that had already been categorized and tagged by Vubble. Allowing any video to receive more than one category label increased the complexity of the problem.

Automatic video categorization is difficult. Changing backgrounds, viewpoints and levels of resolution interfere with accurate object recognition. Another key factor is context. Identifying the objects seen in a video is not sufficient for detecting the semantics. Consider an image of a person wearing a surgical mask. Is it an ad for a medical clinic, a public health announcement or an anti-masking message? Without context, it's difficult to say.

Dr. Movahedi and her team solved this problem by adding audio transcripts to the sample images in their dataset. Keywords in the audio file provided important context that increased the algorithm's accuracy.

In subsequent stages of the project, Dr. Movahedi's team expanded the number of video and audio cues and experimented with techniques such as stream learning, that allowed for continuous training of the categorizer as well as introduction of new tags, such as the COVID-19 pandemic. At each stage, the algorithm's category assignments were compared against the category assignments provided by Vubble's human journalists. Analyzing the mismatches allowed the team to fine-tune the algorithm. The Seneca team's work eventually became a key tool for Vubble — the Vubble Video Categorizer.

The video categorizer project is a wonderful example of the value of industry-academic collaboration. "Our students had a great learning experience," Dr. Movahedi says, and two went on to careers at Vubble. This project experience also helped to secure funding for an AI Research Centre at Seneca. "I'm delighted that we now have two years of funding to pursue more projects like this," Dr. Movahedi says.