

2019 Projects

Version 1

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- **Categorization of Videos Using Audio and Text Features (*Funded by Ontario Centre of Innovation (OCI)*):**

Vubble, a Toronto-based media tech company, builds solutions for trustworthy digital video distribution and curation. The media tech company has a groundbreaking platform that curates, assesses and distributes personalized video content, using AI technology and human curation.

In the second collaboration with Vubble, through an OCE College Voucher for Technology Adoption (CVTA), led by Professor Vida Movahedi from Seneca's School of School of Software Design & Data Science, the Seneca team will focus on developing automated categorization of videos based on audio features. The Seneca research team will develop a proof-of-concept method for using audio feature vectors based on the frequency of keywords detected in transcribed audio.

- **Dynamic Tagging of Website Content (*Funded by NSERC*):**

Toronto-based HVR Technologies has developed a platform that brings social communication to web surfing. Using their technology, users can leave notes overlaid on any website directly in the browser window. They can also share notes, create groups, share and reply to comments, follow other users and check their social feeds of shared items. HVR's technology allows users to tag web pages or their elements (text, photos, video, etc.), however these tags often become obsolete when content is moved from one web location to another, as is common for websites to regularly update content to refresh user experience. The success of the HVR platform depends on significant enrolment and retention of users – obsolete tags are disruptive to user experience and satisfaction, so resolving this problem is important to HVR's success.

HVR partnered with Seneca to develop a method for dynamic content tagging to address this problem. The main technical challenge lies in finding an effective way for tracking the changes to the web content. Upon project completion, HVR aims to significantly expand the functionality and robustness of their platform, accelerating its market adoption. It will

allow HVR to establish itself as a market leader providing social communication solutions for web browsing. This first-to-market position will create a significant advantage, enabling HVR to engage a broad range of business partners in the area of web marketing, to generate revenue. Currently, this market in Canada is dominated by big, U.S. companies. Successful market adoption of the HVR platform will help in establishing a Canadian presence in this industry. The technology has no inherent geographic limits and has the potential of being successful globally resulting in new, high paying jobs, helping to keep Canadian talent in Canada.

- **Transition from Angular 1 to Angular 7 Platform for an Innovative Enterprise Software (*Funded by OCI*):**

Bitnobi is a privacy protected, data-sharing platform that allows a data provider to set the rules of engagement for end-user data queries. This enterprise software acts as an interface between a data provider and end-users in order to provide a more efficient way of interacting with data sources without giving raw data or making copies. In collaboration with Seneca's School of Information Communications Technology, under the supervision of **Dr. Mark Shtern**, two senior year research assistants will transition, Bitnobi's current interface is powered by Angular 1 to Angular 7. This transition will make it easier for the Bitnobi development team to use different user interface objects depending on the user application. Deliverables include: (a) mapping software code that pertains to each user interface object; (b) transition of Bitnobi's interface from Angular 1 to Angular 7; and (c) documentation of each new javascript module.

- **Data Flow Analytics to Improve Quality of Seed-to-Sale Cannabis Tracking (*Funded by NSERC*):**

Ample Organics is a world-leading cannabis technology provider. Today, their seed to sale tracking and reporting software is available on four continents and is used by seventy percent of Canada's cannabis licence holders. This comprehensive solution enables licence holders to meet regulatory requirements, tracking data about every gram produced. With continually evolving regulations, Ample Organics has identified a need for improved data collection and management. Through this collaboration, Ample Organics will understand what data is necessary to support the production of cannabis products. Seneca will facilitate this by evaluating data flow in place at cannabis facilities and recommending an optimized data collection procedure to be considered for Ample Organics' new software modules. The results of this project will enable Ample Organics to build an advanced analytics product supporting licence holders' quality control and reporting capabilities. Improving data collection at cannabis facilities requires identifying the differences between the current state of data collection and what Ample Organics' current products support. The Seneca team will expand on what data can be collected at cannabis facilities by understanding which data is important to collect. The project will

result in formal data flow diagrams describing the current status of collected data, the creation of an optimized cannabis tracking data process flow to track all required variables needed for quality control, and building a software demonstration to visualize the data structure.

- **Medical Diagnostic Data Ingestion Optimization (Funded by NSERC):**

TeleMED Diagnostic Management Inc., founded in 2000, is a Toronto-based medical data management company that designs, builds and implements customized, electronic solutions for managing and sharing electrocardiogram (ECG) and other medical test data for the medical diagnostics industry. TeleMED's solutions utilize cloud technology and feature leading-edge functionality for privacy protection, customized report generation and quality assurance monitoring. TeleMED's technology solutions have been commercially available for more than fifteen years, with their major customers being Canadian pathology laboratory networks. TeleMED's ViTELflo platform provides labs and clinicians with a vendor and network agnostic single-platform management of data that streamlines operations with up to a 40% increase in productivity. TeleMED is collaborating with Professor **Chris Tyler**, NSERC Industrial Research Chair for Colleges (IRCC), and student Research Assistants from Seneca's School of Information and Communications Technology to develop a validated ingestion tool for accepting a new file format of cardiology tests that will allow TeleMED to expand the services it offers its customers. Through the proposed collaborative applied research project, Seneca will develop new technology with TeleMED that will accept and convert all DICOM reports, from any medical diagnostic equipment, to a format that can be read and integrated into TeleMED's existing ViTELflo cardiology data management system. This project will enable TeleMED to continue to grow its business by adapting their software platform to accommodate the emerging DICOM medical diagnostics industry standard data file type, while maintaining a system that provides an efficient way for clinicians and their patients to access medical data.

- **AI/Deep Learning to Support Marketing and Sales Information Systems Related to Liquor (Funded by OCI):**

Ample Organics is the leading cannabis software technology provider in Canada, dedicated to assisting licensed cannabis producers in their tracking of cannabis from seed-to-sale. In 2018, the company acquired Last Call Analytics, a retail data visualization platform designed to service the beverage alcohol industry. With this acquisition, Ample Organics is expanding to support liquor producers and distributors, as there is an opportunity to improve the sales of products by understanding their placement on store shelves. Ample Organics is currently collaborating with Seneca to develop a deep learning solution to support marketing and sales information systems regarding liquor. This applied research will utilize a computer vision system that will analyze a series of photos

of liquor store shelves with a wide range of liquor bottles. The vision system will extract the count and identity of bottles on the shelves, to provide information on their shelf location and their neighbouring products, and to supplement the metadata in the photos of geolocation, time, and date. This is Seneca's second project with Ample Organics, which will engage Professor **Mark Buchner** from the School of Information and Computer Technology as Principal Investigator to lead a group of student Research Assistants to use their expertise to solve this challenge. It is expected that many pictures of liquor store shelves will be taken to generate an algorithm capable of choosing and separating, counting and identifying, the liquor/wine bottles on the shelves from each other. For Ample Organics, this business opportunity to support the liquor distribution industry represents a pivotal step to broaden their goals as a company.

- **Cardiology Laboratory Test Data-Transfer System and Clinician-Validated Viewing Platform (Funded by NSERC):**

Founded in 2000, TeleMED Diagnostic Management Inc. is an Ontario-based medical data management company that designs, builds, and implements customized, electronic solutions for managing and sharing ECG and other vital-sign test data. TeleMED's solutions utilize cloud technology and feature leading-edge functionality for privacy protection, customized report generation and quality assurance monitoring. TeleMED's current solution, ViTELflo, for managing cardiology tests, is used by 70 percent of Canadian pathology laboratory networks and decreases clinician time by 15 minutes per test through short loading times, streamlined mark up and analysis, and report generation. Following on our previous collaboration funded by NSERC, TeleMED is working with Professor **Catherine Leung** and student Research Assistants from Seneca's School of Information and Communications Technology to expand the types of tests that are compatible with ViTELflo to include image-based diagnostics. The challenge is not simply to develop an image-viewer, but to create an image viewer with tools and manipulators, annotation capabilities, and reporting tools that support the workflow of the clinician. With this primary goal in mind, the Seneca team will be developing and applying methods to reduce loading and latency times for very large file sizes, and examine the potential for tablet support to provide clinicians more flexibility in where and when they review diagnostic tests. With the ability to quickly and seamlessly load image- and non-image-based diagnostics data, TeleMED will be able to expand its client services, attract new clients, and provide clinicians with better and faster access to medical diagnostics data.

- **Development of Alteeve ScanCoreAI Decision Engine (Funded by NSERC):**

Alteeve is a Toronto-based developer of high-availability clusters for enterprise computing. Their Anvil! Platform, driven by their Intelligent Availability software, is designed to operate autonomously providing complete redundancy and fault-tolerance that can survive single hardware failure without interruption, achieving >99.9999% of historical uptime across all

of its deployments. Alteeve has partnered with Seneca to develop an AI-based version of the Anvil's decision engine, ScanCore. The current decision engine uses hardcoded heuristic algorithms to determine the best course of action in order to keep the system up and running. The downside of such approach is that it may not be able to effectively deal with scenarios when a sequence of, never seen before, rare events occurs. In order to provide a solution to this type of situations, Alteeve decided to engage Professor **Chris Tyler** and **Dr. Allan Randall** to collaborate on development of the ScanCoreAI. In this project the Seneca team will use Anvil's SimEngine, a simulation software developed by Professor Tyler's team in the previous Alteeve-Seneca collaboration. It will be used to simulate behaviour of the system under various conditions, to generate massive amounts of data. Subsequently this dataset will be used to develop Machine Learning algorithms for the ScanCoreAI. Once the project is completed, it will provide Alteeve with a robust improvement for their high-availability Anvil! Platform.

- **Method of Implementation of Internet-of-Things Compatible Blockchain for Supply-Chain Application (Funded by NSERC):**

Agile Blockchain Corporation is Toronto-based company that provides management solutions to food and manufacturing supply chains to generate a connected marketplace in a globalized world. Their supply chain process will enable the consumers to track product information, such as its origins and journey. Users will get access to vital information, which will facilitate to the consumers to be able verify certifications and product labels that are displayed on retailer shelves. Agile Blockchain Corp. approached Seneca to understand, develop, and optimize the novel blockchain architecture to create a proof-of-concept implementation. Currently, Agile is working with Professor **Tanvir Alam** and two student Research Assistants of Seneca's School of Information Technology Administration & Security to develop a transparent supply chain solution and asset management software platform, with the purpose to optimize process and workflow to any segment of the supply chain. The advantage of Agile's solution is that it is built on blockchain technology to enable distributed ledger immutability and non-repudiation of transaction and tracking data. This new solution will allow Agile to get a new product into the market, as well as facilitate the commercialization process in Canada's supply chains for a high-data volume solution, bringing a high impact to the multi-billion-dollar blockchain technology market.