

Additional Information

ChengDa Zheng

Extra References:	2
1. Prof. Pradicco From University of Toronto	2
2. Dr. Turpin (Economic Advisor From Environment and Climate Change Canada)	4
3. Kris Johnson (PhD Candidate and Founder of Rubus Education)	5
Work Collection	6
Bird Counting Project (Machine Learning & Computer Vision)	7
Text Analytics for Public Consultations Data. (Machine Learning, NLP, Data Visualization)	8
D3 Project (Data Visualization)	9
LINCDIRE Project. (Database, MySQL, Redis, Programming Skills)	11
Indigenous Friend APP (Mobile APP, Database System/ Mongo DB)	12
Sustainability through Ecosystem Health: Online information portal (Information Retrieval, AI -NLP, Substantial Informatics)	13
Simple Prolog programs for farmer question(AI)	14

Extra References:

1. Prof. Pradicco From University of Toronto (This is my master reference_



November 20, 2018

To whom it may concern

I am immensely pleased to have the opportunity to write a letter of recommendation for ChengDa (Dennis) Zheng, who is applying to your Master Program at the University of Toronto to pursue his graduate studies.

I first met Dennis in 2016, when we selected him to join our SSHRC funded Partnership Development Grant project *Linguistic and Cultural DIversity Reinvented* (LINCDIRE), when one of the partners who was supposed to be in charge of the development of the project online tools did not respond to the expectations of the project. Seen from a distance now, we were lucky that this happened as this gave us the opportunity to bring Dennis in the team. This was the best choice that we could ever make. Dennis was crucial to the life and success of the project. Not only he proved to be an incredibly knowledgeable and dedicated assistant, but he went well beyond the role we had envisaged for him at the beginning. The LINCDIRE project needed the development of a website and of a tool that would function as a platform for teachers and learners engaged with the implementation of the pedagogical materials developed by the team. Dennis developed both the website and the tool, which we called LITE (*Language Integration Through E-portfolio*). The latter was a particularly challenging endeavor, especially considering its innovative character. Dennis was not afraid to developed everything from scratch and with limited financial resources. The thinking process he put in the design phase of the process was exemplar. Dennis was able to understand the needs of the project team and to translate them effectively into a tool that corresponded exactly to aims and rationale of the project itself and that was user-friendly for teachers and students alike.

Throughout the project, Dennis proved highly intelligent, efficient, hardworking and at the same time a very reflective student, capable of building on the exchanges and indications provided by the team and of taking them to another level. Dennis was in fact able to interpret the wishes – almost the dreams – of the team and with an admirable modesty to come up with the most appropriate solutions. This rare capacity of listening to the team's needs and to support the project development was key in creating a sense of community and a positive atmosphere in the project life. It was also a pleasure for me to observe through our regular monthly project video-conferences how Dennis grew personally overcoming his shy attitude

to build his agency and capacity of clearly and effectively interact with each member of the team.

What I have found particularly remarkable throughout Dennis' contribution to our project is his capacity to make connections, to see the interconnectedness of the different aspects we were investigating and to translate this into practice through accessible and well-conceived tools.

One other characteristic that I particularly admire in Dennis is his sense of responsibility and commitment. Even when he stopped his active role in the project to fully dedicate himself to the completion of his undergraduate program alongside his professional engagements he continued to oversee the developments of LINCDIRE and he is still now able to guide us in our choices and provide invaluable advice.

I am particularly happy to see that Dennis is planning to pursue his studies at the Master's level and I have no doubt he will make a trailblazing contribution in the field.

All his remarkable assets together with his strong work ethic and deep interest in the field of Computer Science makes of Dennis the perfect candidate for your program. I have absolutely no reservations in giving him my strongest possible recommendation.

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'Enrica Piccardo', with a stylized, cursive script.

Enrica Piccardo PhD
Associate Professor
OISE-University of Toronto
CERLL Centre Head

2. Dr. Turpin (Economic Advisor From Environment and Climate Change Canada)



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Canada

To Whom It May Concern:

This letter is provided at the written request of Chengda Zheng, who has asked me to serve as a reference on his behalf.

I have known Mr. Zheng for four months during his student COOP tenure as a data scientist, with me at Environment and Climate Change Canada. During the time he worked with me, Mr. Zheng played a valuable role by assisting me with several projects that supported my policy work such as, Microsoft excel VBA, contributing to the design of MS Access stakeholder inventory, and etc. While his main role was to work on numerous data analytics/AI projects with our Data Lab team, he found the time to assist me. His commitment, enthusiasm, and passion for his field of study is very evident.

I was impressed by Mr. Zheng's initiative, expertise and extraordinary analytical skills, and how quickly and effectively he solved problems both on the projects and policy work he performed. Mr. Zheng showed strong interpersonal and leadership skills, and communicated and collaborated very well within his team. He is a pleasure to work with, has a good sense of humour, humility, and kindness. He is a cherished team member.

In addition, he is extremely organized, reliable and computer/software literate. Mr. Zheng can work independently and is able to follow through to ensure that the job gets done. He is flexible and willing to work on any project that is assigned to him. Mr. Zheng was quick to volunteer to assist in other areas of inside the Chief Data Office, as well.

In the end, I highly recommend Mr. Zheng and believe that he will be an excellent candidate for your program. Mr. Zheng is a hard-working, trustworthy, responsible person, and an excellent team player. If you need further information, please feel free to contact me.

Regards,

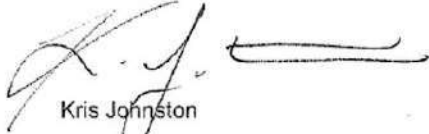
Betty Ann M. Turpin, Ph.D., CE
Economic Advisor
Data, Results and Delivery Division
Strategic Policy Branch
Environment and Climate Change Canada/Government of Canada
200 Boulevard Sacré-Coeur
Fontaine Building, Rm 1050
Gatineau, QC J8X 4C6
Betty-Ann.Turpin@canada.ca
819-938-3172
<https://www.canada.ca/en/environment-climate-change.html>

3. Kris Johnson (PhD Candidate and Founder of Rubus Education)

To whom it may concern,

My name is Kris Johnston and I work at the Department of Languages, Literatures and Linguistics at York University, as well as the York University English Language Institute. I have known Dennis for over 3 years now and am currently working with him on two different projects. One being an international academic project and the other being an entrepreneurial project that is connected to my PhD candidacy. Dennis has been an invaluable team member on both projects and has demonstrated excellent teamwork and quickly became integral to both efforts. He is hardworking, patient and communicative. He is also creative and offers excellent solutions to problems or issues that arise. He is always available when needed and very willing to help any team member when they are in need. Working with Dennis is an absolute pleasure and I wholeheartedly would recommend him for any project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kris Johnston', with a long horizontal flourish extending to the right.

Kris Johnston

PhD candidate, DLLL, York University
Instructor and Developer, YUELI, York University

Work Collection

Work Collection	6
Bird Counting Project	7
Text Analytics for Public Consultations Data.	8
D3 Project	9
LINCDIRE Project.	11
Indigenous Friend APP	12
Sustainability through Ecosystem Health: Online information portal	13

Bird Counting Project

In this project, I trained an ML model to detect the number of birds in huge satellite images for Environment and Climate Change Canada. I trained the model by VGG16 without a top, add FC-2 and FC-1024 with linear output and optimized by SGD. This model was able to recognize birds in huge satellite image collections in different scenarios, such as forest and wetland.

The screenshot shows a Jupyter Notebook with the following code snippets:

```

history = model.fit(trainX, trainY, epochs=1, verbose=1)
K.clear_session()
return model, history.history['acc'][0]

```

executed in 9ms, finished 14:35:47 2018-12-18

```

In [46]: architectures = {
    'Xception': {'model': ka.Xception, 'size': 299},
    'VGG16': {'model': ka.VGG16, 'size': 138},
    'VGG19': {'model': ka.VGG19, 'size': 138},
    'ResNet50': {'model': ka.ResNet50, 'size': 85},
    'InceptionV3': {'model': ka.InceptionV3, 'size': 152},
    'InceptionResNetV2': {'model': ka.InceptionResNetV2, 'size': 152},
    'MobileNet': {'model': ka.MobileNet, 'size': 72},
    'DenseNet121': {'model': ka.DenseNet121, 'size': 84},
    'DenseNet169': {'model': ka.DenseNet169, 'size': 84},
    'DenseNet201': {'model': ka.DenseNet201, 'size': 84},
    'NASNetMobile': {'model': ka.NASNetMobile, 'size': 4},
    'NASNetLarge': {'model': ka.NASNetLarge, 'size': 4},
    'MobileNetV2': {'model': ka.MobileNetV2, 'size': 72}
}

```

executed in 8ms, finished 14:35:48 2018-12-18

```

In [47]: def search_architectures(architectures):
    """Searches pre-trained architectures"""

```

The notebook also shows a plot of training and validation accuracy over 10 epochs, and a sample batch of images with their corresponding labels.

Code Snippets.



Sample Result

Text Analytics for Public Consultations Data.

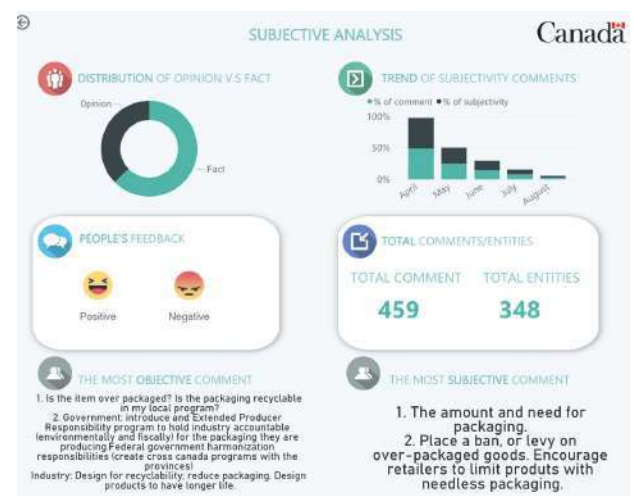
In this project, I scraped public consultations data on `placespeak.com`, structured it, and performed basic text analysis techniques on it using Natural Language Processing (NLP). Techniques used in this project, TextBlob for Sentiment Analysis, spacy for Named Entity Recognition, corpora and gensim for topic extraction. Please see slides for more information.

Objective:

1. Understand the public opinion about the plastic pollution, waste and heavy consumption
2. Find out the topics that Canadians are talking about regarding the plastic pollution
3. Find out the suggestions about plastic pollution from Canadians

The screenshot displays a Jupyter Notebook interface with the following components:

- File Explorer:** Shows the file structure, including a 'Placeseak NLP' folder.
- Code Cells:**
 - A cell defining a lambda function to extract the dominant topic from a list of topics.
 - A cell showing the output of the lambda function applied to a sample of data, resulting in a table of comments with sentiment and topic scores.
 - A cell titled 'Visualize the model' showing the preparation of a visualization.
 - A cell titled 'Top topic per comment' showing the format_topics_sentences function.
- Output:** A table of comments with columns: name, date, comment, processed, polarity, subjectivity score, sentiment, subjectivity, named entities, Dominant Topic, Topic Pairs, Controls, and Issue.
- Save to CSV:** A button to save the data to a CSV file.



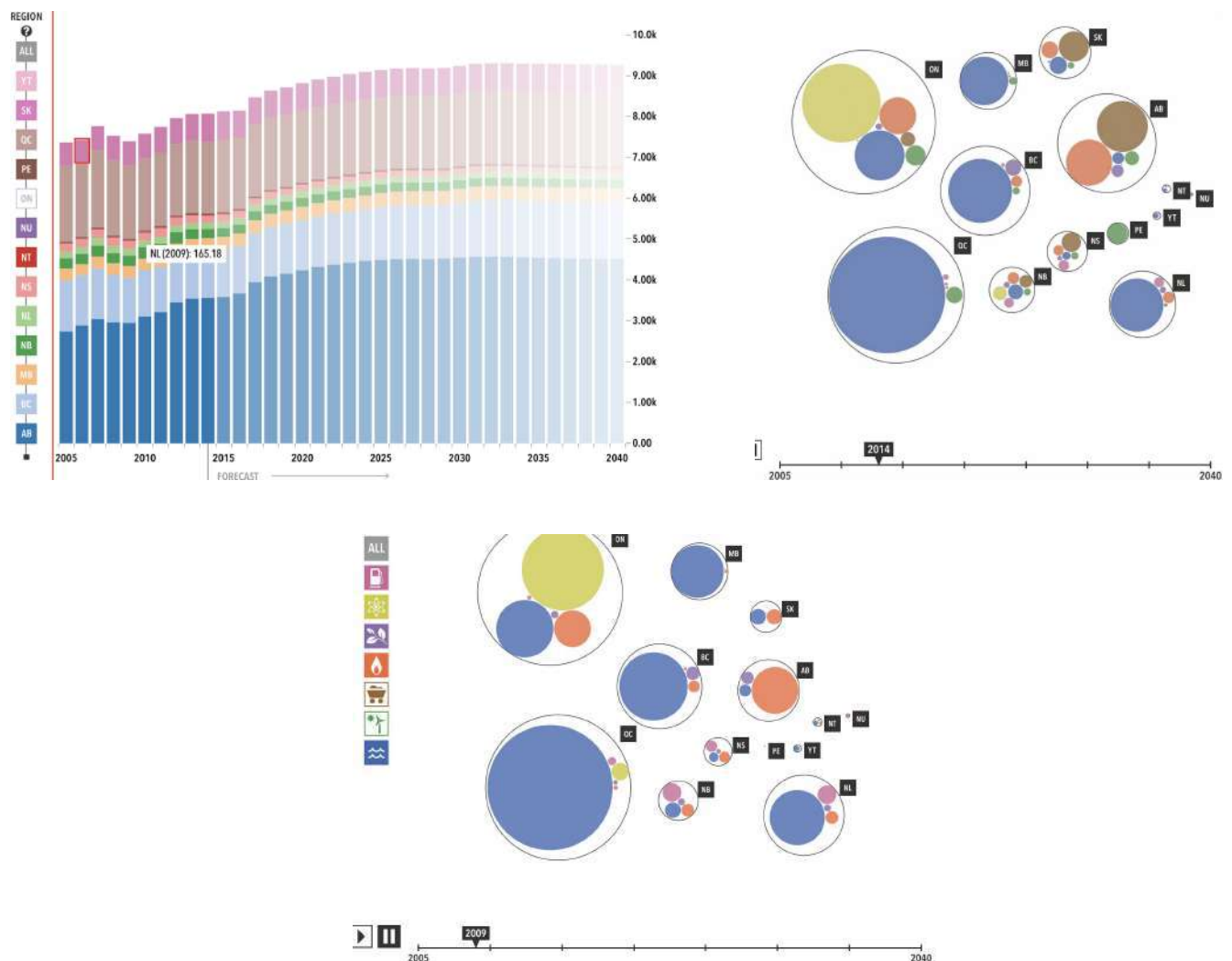
D3 Project

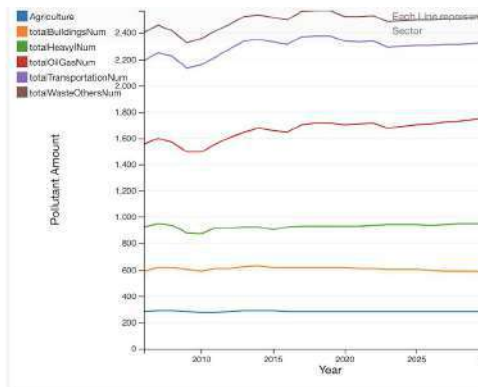
In this project, I created D3 interactive dashboards to analyze and visualize energy consumption/ mining pollution across Canada,

Sample source data:

```
region,sector,source,scenario,value,unit,base value,comparison value,base total,comparison total,
ALBERTA,TRANSPORTATION,ELECTRICITY,HIGH CO2 PRICE,0,PETAJoule,0.42,0.958,461.0061,452.8871,0,0,20
ALBERTA,TRANSPORTATION,NATURAL GAS,HIGH CO2 PRICE,2,PETAJoule,1.108,10.9764,461.0061,452.8871,0,2
ALBERTA,TRANSPORTATION,BIOMASS AND BIOFUELS,HIGH CO2 PRICE,0,PETAJoule,12.6746,14.0537,461.0061,4
ALBERTA,TRANSPORTATION,SOLAR/WIND/GEOTHERMAL,HIGH CO2 PRICE,0,PETAJoule,0,0,461.0061,452.8871,0,0
ALBERTA,TRANSPORTATION,COAL,HIGH CO2 PRICE,0,PETAJoule,0,0,461.0061,452.8871,0,0,2015,2031,2017
ALBERTA,TRANSPORTATION,OIL PRODUCTS,HIGH CO2 PRICE,-3.000000000000027,PETAJoule,446.8035,426.899
BRITISH COLUMBIA,TRANSPORTATION,ELECTRICITY,HIGH CO2 PRICE,1,PETAJoule,0.756,2.6257,343.453699999
BRITISH COLUMBIA,TRANSPORTATION,NATURAL GAS,HIGH CO2 PRICE,2,PETAJoule,0.566,6.1198,343.453699999
BRITISH COLUMBIA,TRANSPORTATION,BIOMASS AND BIOFUELS,HIGH CO2 PRICE,1.999999999999998,PETAJoule,
BRITISH COLUMBIA,TRANSPORTATION,SOLAR/WIND/GEOTHERMAL,HIGH CO2 PRICE,0,PETAJoule,0,0,343.45369999
BRITISH COLUMBIA,TRANSPORTATION,COAL,HIGH CO2 PRICE,0,PETAJoule,0,0,343.4536999999997,343.1702,0
BRITISH COLUMBIA,TRANSPORTATION,OIL PRODUCTS,HIGH CO2 PRICE,-4.999999999999993,PETAJoule,329.6017
MANITOBA,TRANSPORTATION,ELECTRICITY,HIGH CO2 PRICE,1,PETAJoule,0,0.5982,86.5015,76.6622,0,1,2015,
MANITOBA,TRANSPORTATION,NATURAL GAS,HIGH CO2 PRICE,2,PETAJoule,0,1.2114,86.5015,76.6622,0,2,2015,
```

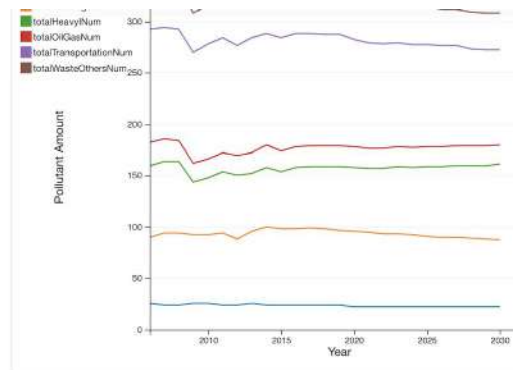
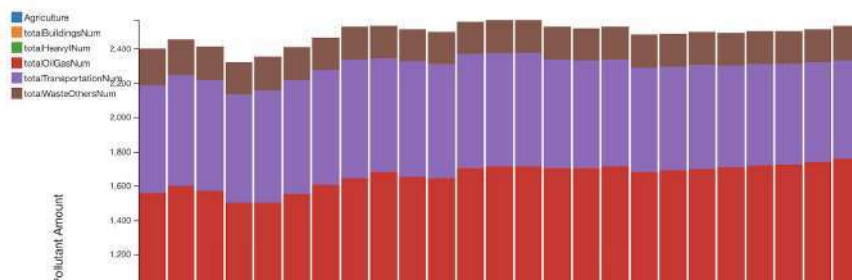
Sample of the Dashboards:





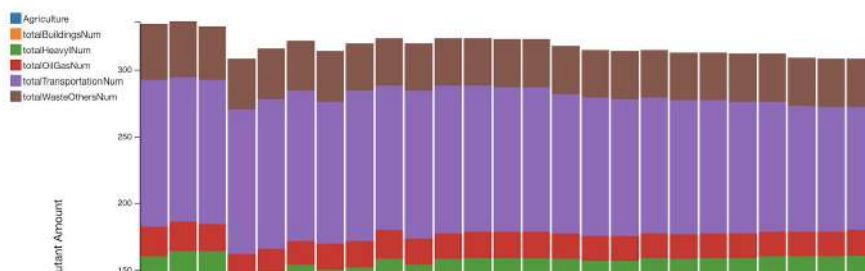
Stacked bar Chart

Stacked bar Chart



Stacked bar Chart

Stacked bar Chart



LINCDIRE Project

As a lead web developer, I led to developing (Developed the most parts of) the LINCDIRE E-portfolio (LITE) (www.lincdireproject.org) , which is used in language classrooms in secondary and post-secondary institutions across Canada, USA, and France.

Objective

- 1) recognize linguistic and cultural diversity at the individual and social level
- 2) validate their existing linguistic and cultural competences/capital
- 3) become aware of (and build on) the added cognitive and metalinguistic value of plurilingualism
- 4) develop a plurilingual attitude and acquire life-long learning skills

The screenshot displays the LINCDIRE LITE web application. At the top is a navigation bar with links: Home, LINCDIRE, Logout, Register, English, Deutsch, Français, Italiano, and Ojibwe. Below this is the LITE logo and a secondary navigation bar with links: GET STARTED, RECENT ACTIVITY, MY PLURILINGUAL JOURNEY, SOCIAL, TASKS, POSTS, REFLECTIONS, LEVEL, and RESOURCES. A language selection dropdown is set to 'LANGUAGE:'. The main content area is titled 'What is LITE?' and explains that LITE is LINCDIRE's online portfolio, an acronym for 'Language Integration Through E-portfolio', which promotes reflection on one's identity, languages, and cultures, and on one's learning process and experiences.

Below the text are two images: a group of people in a park and a circular diagram with icons for a head, a heart, a flame, and a person. To the left is a user profile for 'Dennis Zheng' with a circular profile picture, a message notification ('You have 0 message unread.'), and a 'View Your Plurilingual Journey' button. To the right are four donut charts labeled 'Mind', 'Spirit', 'Heart', and 'Body'. Below the profile is a task section titled 'Fall Feast' by Newton Raimundo Kuru Arachiche, showing 8 lessons in Level A1, with 0 of 8 lessons completed. A 'VIEW RESULTS' button is at the bottom right of this section.

Below the task section is a 'Level Check for - B1' section with a radar chart showing progress in English, Listening, Reading, Writing Production, and Written Interaction. At the bottom is another user profile for 'Dennis Zheng' with a circular profile picture, a gear icon, and contact information: English, Chinese, zcd1995@gmail.com, and a note: 'Lincdire Lead Web Developer. Bug report or any question please contact : zcd1995@gmail.com?'. Below the profile are tabs for 'FOLLOWERS' (7) and 'FOLLOWING' (1). At the very bottom is a dark navigation bar with links: About, Activity, Posts, Comments, Messages, and Courses.

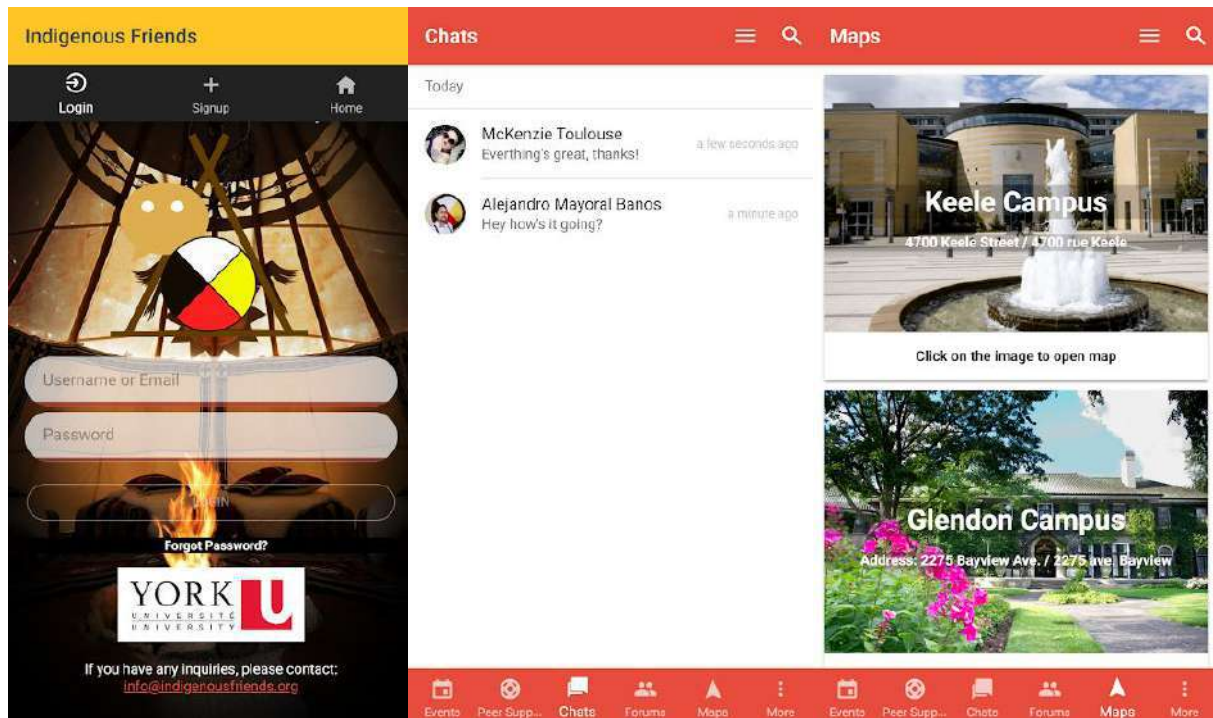
Indigenous Friend APP

The Indigenous Friends App is a mobile application that seeks to create a safe space for Indigenous Youth (First Nations, Métis, and Inuit) in Canada. This app is implemented at York University and the University of Manitoba.

Objective: Create Indigenous Networks between Indigenous Youth.

Access to Traditional Indigenous Counseling.

Access to Information about the available resources in the community.



Sustainability through Ecosystem Health: Online information portal



Sustainability through Ecosystem Health: On-line Information Portal

Updated: 2018.11

Learn • Assess • Evaluate • Contribute

The Background

Ecosystems provide a range of services, many of which are of fundamental importance to human well-being, for health, livelihoods, and survival. In the past few decades, there have been many studies focused on estimating the value of a wide variety of ecosystem services and ecosystem services economic valuation methods have been the major concern in the field of environmental economics. Although there are many articles sharing the ecosystem services valuation cases in real world, ecosystem services valuation is still within the theory and is difficult to acquire without proficient analysis.

Database and Datasets




Figure 1. The Data structure of the ESVP system. The whole database includes 12 tables with all the indicators, ecosystem services and references

Figure 2. The distribution of the indicators and studies over the United States

The ESVP

We present an online ecosystem services valuation portal (ESVP), which can provide a suggested value and some basic analysis of a specific ecosystem, such as an ocean ecosystem. By approaching this online portal, we try to put the efficient ecosystem services valuation concept into practice and attract public by increasing environmental protection awareness. The database of the ESVP consists of 58 (155 as of Nov 2018) standard bibliographical sources which can support the valuation process.

Logic of ESVP



Platform Development

An information retrieval system had been designed, implemented and more than 520 related journal (1280 Related Journal retrieved as of Nov 2018) articles were retrieved from ScienceDirect (the world's leading source for scientific, technical, and medical research) (and Elsevier as of Nov 2018). Those articles were filtered and classified using various text mining techniques, including TextRank with Word2Vec and LDA. A database was designed in Microsoft Access and transformed to Oracle 11g in order to build a knowledge base. In the meantime, an online portal had been built using different techniques and open source packages including PHP, and MySQL (Oracle after Nov, 2018). The website was powered by Google Cloud and developed via Google Cloud PaaS (Platform as a service). A member function with login and logout, article/news functions and part of the environmental assessment function were already built-in and are available online.

Valuation Methods

Valuation Method	Description	Biogenesis service/function
Direct-based Valuation Methods		
Cost Marketing Pricing	Estimates economic value (exchange value) for ecosystem services that are bought and sold in commercial markets.	Promoting Functions
Factor Income	Estimates the income generated from the ecosystem goods and services in commercial markets.	
Indirect Market Valuation Methods		
Hedonic Pricing	Estimates economic values of ecosystem services considering the prices reflected by other associated goods.	Information Functions
Benefit Transfer	Estimates economic values by transferring existing benefit estimates from studies already completed for another location or issue.	
Travel Cost	Assuming that the value of a site is at least how much people are willing to pay to travel to visit the site.	
Hypothetical Valuation Method		
Contingent Valuation	Estimates economic values by posing hypothetical questions and asking people to directly state their willingness to pay for specific ecosystem services.	
Cost-based Valuation Methods		
Avoided Cost	Estimates economic values based on how much costs that would occur if the ecosystem services were absent.	Regulation Functions
Replacement Cost	Estimates economic values based on the costs to replace the ecosystem services with human-made systems.	

ChengDa Zheng Supervisor: Peter Khaiteer
School of Information Technology
York University

13