Effects of Job Market on Conestoga Graduates in IT Sector

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Summary of research questions and results

The research of this study revolves around the job available in the Waterloo region and the graduates of the Conestoga college. The research comprises of the job posting on the national level, provincial level, local level. The focus of the research is mainly on the jobs in the IT industry and the IT programs in the Conestoga college. The following are the research questions with their answers:

1. Analyze trend in IT job posting for local, provincial and National level since 2001.
   Ans: The jobs with high demand in local market are different than provincial and national level, respectively.

2. Trend in IT jobs, posted in each month for the year 2018, with respect to local, provincial and national level?
   Ans: Number of jobs increase from January up to November after which we observed a significant decrease

3. How many programs does Conestoga College offers in the IT sector?
   Ans: There are 128 total programs offered by Conestoga College in IT sector. Here, 89 are unique programs, where 39 program offers coop.

4. As compared to the students graduating from the Conestoga college, are there enough job opportunities in local job market i.e. Waterloo region?
   Ans: After market analysis, we found that almost 50% of IT jobs are in Ontario whereas near about 10% jobs are in waterloo region only

5. How many IT jobs are secured by the Conestoga graduates in the year 2018 according to their related program?
   Ans: 414 students graduated in 2018, 142 secured the jobs (full time or part time) related to their program. Ratio of job secured to number of graduates is 34.299.

6. Which program offers high job opportunity among other programs, so that we could analyse the skills that are in demand?
   Ans: The graphic designing, embedded system, computer program/analyst, software engineering programs skills are high in demand.

7. Which month has highest job postings in Waterloo region for the IT sector?
   Ans: Analysis showed that in November has the highest number of jobs.

Motivation and background

Now a days, job market is changing rapidly, due to the new technology, economic status of the city or country; in the fields of the medical, education, transportation, food industry and other sectors. The job market analysis can help us in constructing and formatting the programs in the polytechnic and other vocational colleges. This can also help the job seekers can understand where the opportunities might be in job market and what skills are required the currently.

In this analysis, we mainly focused on how the IT job market is booming and how Conestoga Graduates are performing in the Job Market. The main motivation is to help students select a right program through which they can land in job market and can grab a desired job; or sharpen their skills according to the current requirement. Also, we are focusing on identifying the program which should be either removed due to rapid change in technology or update according to the job demand.

Dataset

In order to carry out the analysis, the focus was on deriving the data. For that, we contacted various people in Conestoga Administration Department, Prof. David Marsh, LinkedIn Cor., Communitech Org. After a lot of hurdles, we finally get the data from Fraser Hay, Analyst Conestoga College.

We received the structured data from the Conestoga College official. This dataset contains unique job postings for the Waterloo region, Ontario, national level. Moreover, we have the job posting in 450 NOC (National Occupational Classification) categories between the year 2001-2018, and monthly job postings for the year 2018. Also, we have a survey dataset of Conestoga college students for year 2018 which displays the number of students graduated in a program, graduates who secured the jobs (in relevant or irrelevant field), or still looking for a job along with the average salary of the graduates who were contacted.

Here we used a data-set which showed us information regarding the Job Posting Data for Conestoga College. Here the columns include field showing information about NOC, Occupation, then there were time-based fields starting from Dec 2017 to Feb 2019 giving us information regarding following areas:

1. Local Unique Postings
2. Local Entry Level Unique Postings
3. Provincial Unique Postings
4. Provincial Entry Level Unique Postings
5. National Unique Postings
6. National Entry Level Unique Postings

Here above-mentioned information was provided for 449 different Job Postings ranging from Senior Government Manager, Human Resource Manager to Electricians, Developers, Labourers and Software Technicians.

# Methodology (algorithm or analysis)

1. **Data Cleaning & Preprocessing**: We started with cleaning the data with removing redundant and unused data. We found lot of features which were not useful. We also find that the data was given in pivot table, so we wrote algorithm to convert it back to make it useful.

2. **Descriptive & Exploratory Statistics** - These do not tell us anything about probability but only allow us to take a large amount of data and put it in some understandable form. These are grouped in two major forms: Measures of Central Tendency tell us about the center of our scores and Measures of Dispersion tell us how spread out our scores are.

3. **Predictive Analysis** – We started with analyzing the data and found that it is a time series data. So, we worked on implementing the time series predictive algorithm. We worked on using the ARIMA, however as we did not work on it earlier so we could not finish it. We removed it and worked on other models such as linear model taking different variables but found that we have aggregated data and this model is not useful in this context.

Results

Trend in IT sector job market since 2001
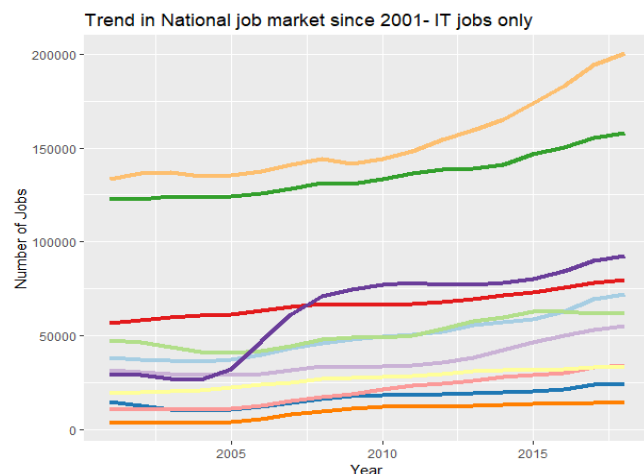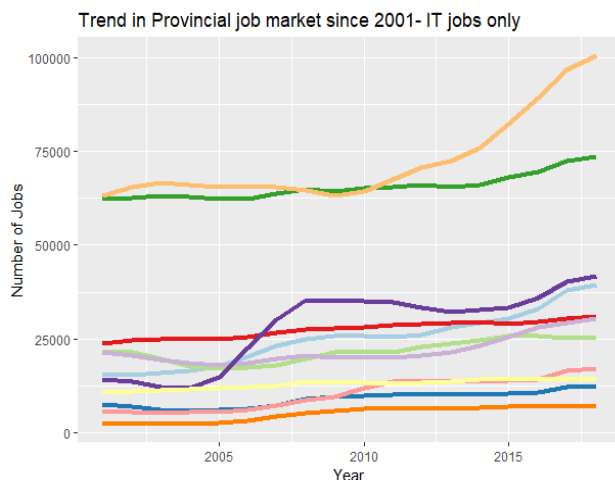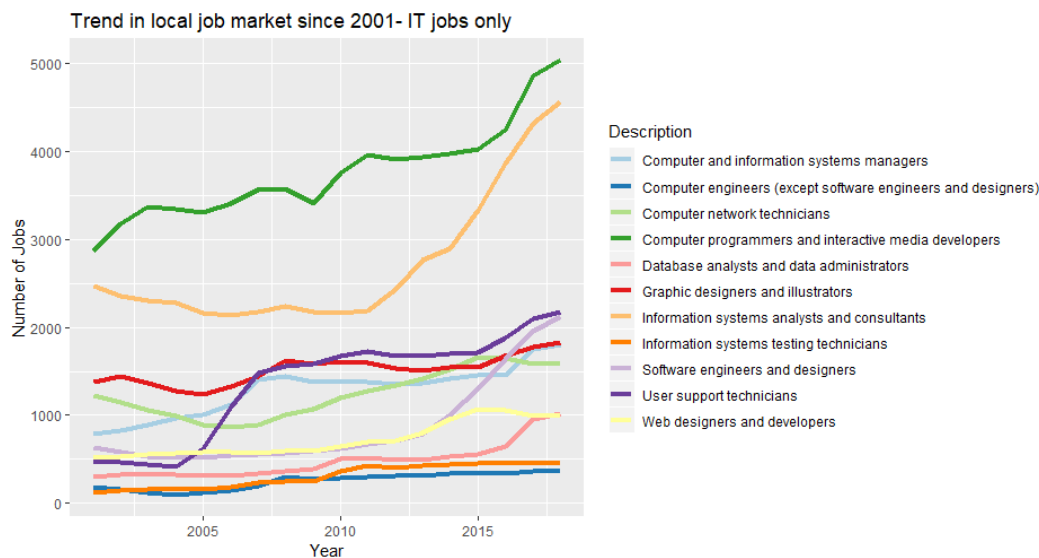
In our findings, it is significantly clear that the provincial and national job market follows the same pattern, but local job market is slightly different as Computer programmers and

interactive media developers' program is on the top demand since 2001 in Waterloo region. This is not same case in the provincial and national job market.

Programs offered by Conestoga College related to the NOC in IT sector

Following programs have high number of graduates (i.e. more than 30) in Conestoga college:

- Information Technology Support Services (Co-Op),
- Design & Communications Fundamentals,
- Project Management, Mobile Solutions Development (Co-Op),
- Embedded Systems Development (Co-Op),
- Wireless Network Infastructure

Graduates from IT Program in Conestoga College, Year 2018
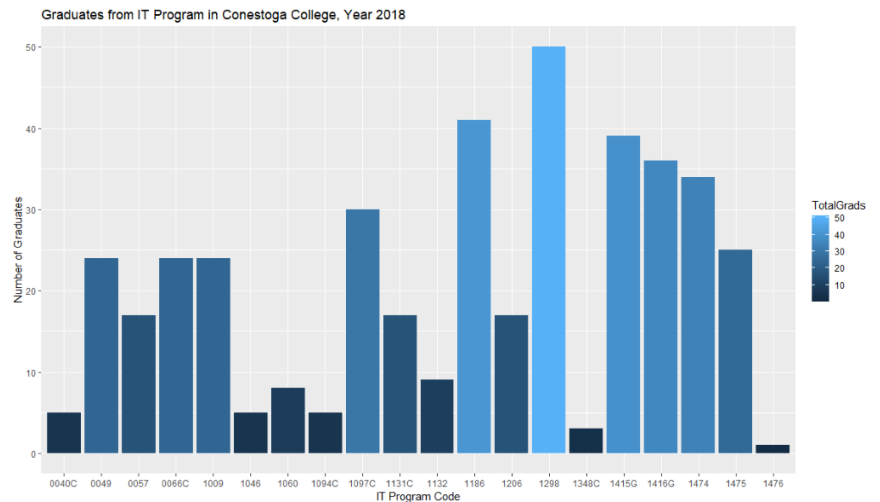
Jobs secured by Conestoga graduates in year 2018, related to their program

From the graph, we can analyse the total graduates in the program and the graduates who found job in their related program. Here the following 2 programs have maximum number of students who secured jobs:

- Mobile Solutions Development (Co-Op)
- Embedded Systems Development (Co-Op)

Graduates from Conestoga working in full time and part time jobs in related programs
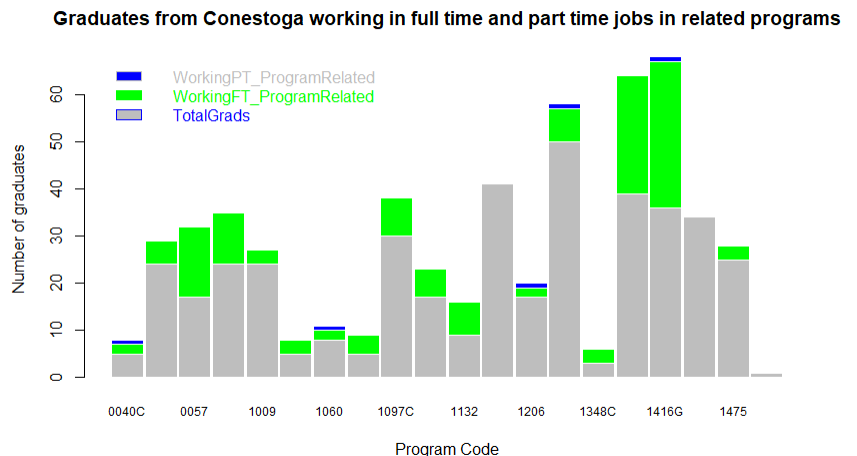
IT Program in Conestoga having high job opportunity

There are following 9 programs in which more than 40% of graduates have secured the jobs.

- Packaging Engineering Technician
- Embedded Systems Development (Co-Op)
- Computer Programmer/Analyst
- Bachelor of Advanced Technology - Electronic Systems (Co-Op)

- Software Engineering technology
- Mobile Solution Development (Co-op)
- IT Innovation & Design (Co-op)
- Software Engineering Technician
- Computer Application Development (Co-op)

IT Programs with max job opportunities by survey 2018 in Conestoga
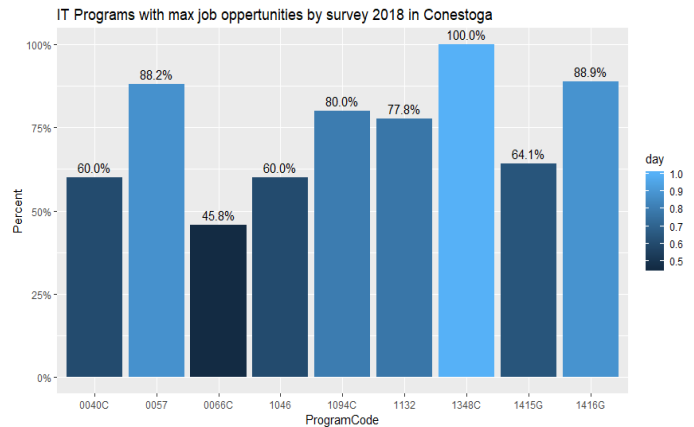
Analyzing IT Job's on monthly basis for the year 2018

While Analyzing Local, Provincial and National IT Jobs data, we found that there was a similar trend in all level i.e. Number of jobs increase at all level which peak in the month of number but decrease in December which is fair as most of the people do enjoy winter holidays.
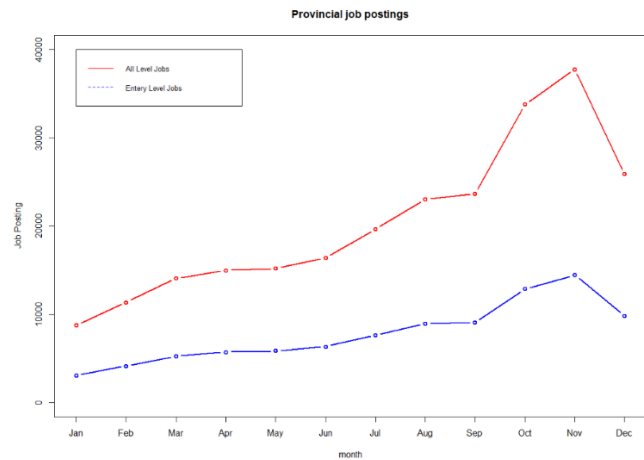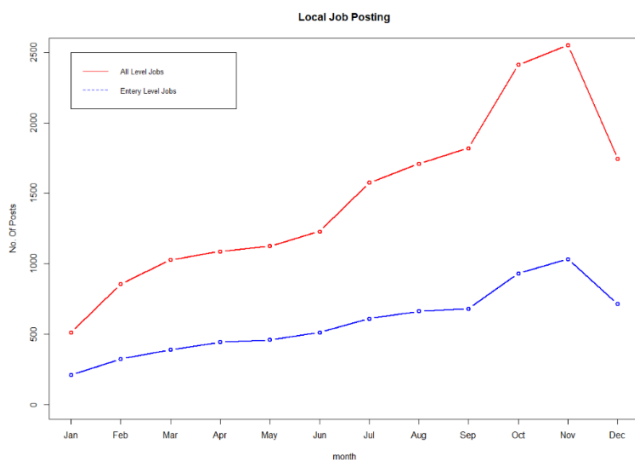

Are there enough IT jobs for IT graduates from Conestoga College

We observed that Ontario has almost 50% job of IT jobs which is a good sign for Conestoga Students. However, In the waterloo region, it shows only 10% of the IT jobs. As per our knowledge, there should be high percentage of the IT jobs. Which leads to the further investigation into others important regions or factors.

No. of Graduates Vs Jobs in 2018
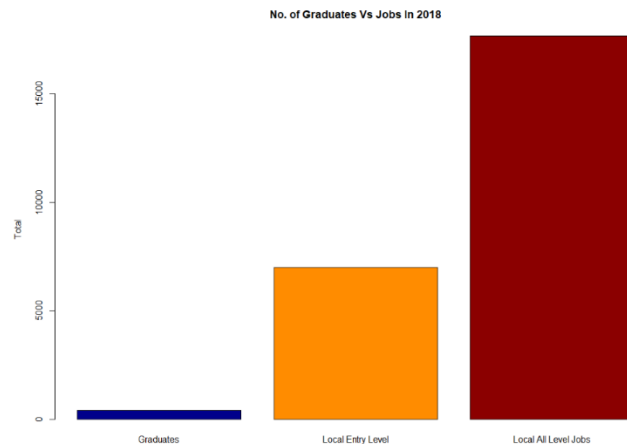
Analyze Graduates who are working or seeking a job, (considering full time only)

From the following graph, it is clear that all graduates of program 0057, 1132, 1415G, etc. have secured job, which could be relevant or irrelevant to the program. The number of students seeking jobs is very less. This clearly states that the opportunity of getting IT jobs in Waterloo region is high.

Jobs Obtained By Conestoga Graduates
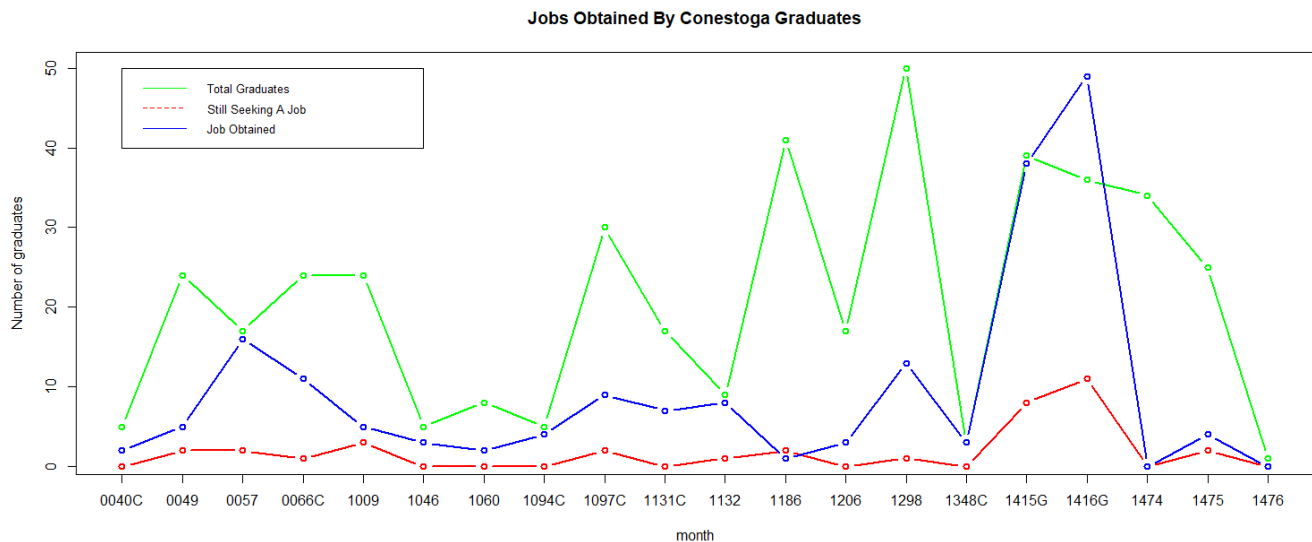
Reproducing your results

To reproduce the result, you need to download the project along with the dataset and R files. Dataset include three files. It includes two R files, one file for data transformation so that it can be used for further analysis. However, it takes almost 2-3 minutes to execute and store a new file. Second file is the analysis where we worked data analysis part. Once this file is executed, it will display all the result in the R console and graphs in the graphs section.

Collaboration

Neeraj: He was responsible for collecting the real time data set in the job postings.

Jiwant Singh: The Original Data-Set had information spread in lot of columns and as such it was nearly impossible to perform some good quality analysis on that Data-Set. As a result, it was important to develop algorithm which could rearrange the information into a form suitable for analytical operations. As a result, I worked on developing algorithm which fetched data form pivot table and converted into original data table. Developing such algorithm was a challenge as no academic literature was available to execute the task.

Munish Kumar & Satvir Kaur: We worked on analyzing the dataset, constructing the questions to be solved and finding the solution for the respective questions. We also worked on preparing the report and presentation.

Reflection

While working on the project, first thing we learned is how to work efficiently in a team. We divided the work into sub-parts and assigned to each member. We conducted several meetings and solve the issues of each member. On the technical side, we learned the importance of data manipulation and how to start with project. We learned to analyse the data and represent it graphically. However, we wish we had learnt to work with time series data, its preparation and using prediction algorithm as our data depend on time only. Also, we should have understood the dataset properly as we could have asked the Conestoga team to provide disaggregated data. For the upcoming students, we would advise them to work more on data understanding and pre-processing as this the most important and time consuming part.

Scope

We are planning to extend the analysis for other jobs categories and programs. While analyzing we found that it is a time series data, so we are planning to implement time series prediction algorithm to predict the jobs future the specific regions and province.