Distribution of Job Postings Across Australia in 2018

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Report for
Monash University

11 June 2020

MONASH
BUSINESS
SCHOOL

Contents

1 Introduction

Job types, job locations, rising demand for certain job categories, these are just some of the aspects of job hunting that many working people around the world are intrigued by. In this report, you will find an in depth analysis into the distribution of job postings across Australia. The report will analyze 3 main sections of job distribution within Australia, broken down by:

1) The change in demand by job category

2) The change in demand for jobs by city

3) The change in demand by job type

Our motivation to choose this as our research topic is prompted by being international students ourselves. As the unemployment rate in 2018 was at 5%, which was the lowest level since May 2011 Australian Bureau of Statistics (2019), this further intrigued our interest into understanding the job market in Australia. But we particularly wanted to know what the different jobs types and categories are in Australia, with an emphasis on how the job postings on the job employment website, SEEK, changed during 2018, particularly in the major cities.

2 Dataset and Methodology

2.1 Source of Data

To portray the change of job demand in Australia, we used an Australia job listing data downloaded from Kaggle provided by PromptCloud, a web-scraping company. Originally, this data was scraped from Seek job board. This dataset has a CC BY-SA 4.0 license, where people are free to share and adapt the data.

The other data source that was also utilised in this report is a cost of living dataset from Numbeo. It is a crowd-source global database with quality of life information. From the website's term of use, it is mentioned that use, reuse, and distribution of Numbeo's content are allowed. Hence, the data can be used legally in this report. Furthermore, the table of Cost of Living Index by City 2018 was scraped using the rvest and polite packages.

2.2 Limitations of Data

- **Data collection method:** Even though the origin of data set was provided (obtained from Kaggle, collected by PromptCloud and scraped from Seek), it is hard to verify the credibility of the data set, whether the data was obtained in full and in completeness (with no observations

being collected incorrectly). Instead the data was used as at the time of obtaining it from Kaggle.

- **Sample size:** The collection period ran from 20 April 2018 to 26 October 2018 which accounted for 6 months of 2018. A sample set contained observations for less than one year period may hinder the ability to reflect seasonal cycle or pattern of the studied objects, which in turn may limit the explanatory power of the data set.

- **Scope of discussion:** The data set was tidied, visualised and interpreted from the perspective of the individuals within this group. Thus, the opinions may be viewed, to some, as bias and incompleteness based on the personal experience and knowledge of the authors.

2.3   Methodology

2.3.1   Cleaning the dataset and inspecting the missing values

This is the data set pre - cleaning:

job_title	category	company_name	city	post_date	job_description	job_type	job_board	geo	state	salary_offered
Package Lead – Pipel...	Mining, Resources & ...	FIRCROFT AUSTRALI...	Perth	2018-04-19T05:41:...	The Role: General Ex...	Contract/Temp	seek	AU		
Department Manager...	Retail & Consumer Pr...	Coles	Sydney	2018-04-19T05:42:...	The role As a Coles B...	Full Time	seek	AU	South West & M5 Cor...	
Warehouse Assistant	Manufacturing, Tran...	Private Advertiser	Bundaberg & Wide Ba...	2018-04-19T05:42:...	One of our Clients is ...	Full Time	seek	AU		
HR Truck Subcontrac...	Manufacturing, Tran...	Sands Fridge Lines	Perth	2018-04-19T03:22:...	Sands Fridge Lines W...	Contract/Temp	seek	AU		
Administrative Office...	Administration & Offi...	ANZCA	Melbourne	2018-04-19T04:11:...	Maternity leave contr...	Contract/Temp	seek	AU	CBD & Inner Suburbs	
Traffic Controller – S...	Construction	Evolution Traffic Con...	Sunshine Coast	2018-04-19T05:04:...	Opportunity to earn ...	Casual/Vacation	seek	AU		
Manager Violence Ab...	Healthcare & Medical	Hunter New England ...	Melbourne	2018-04-19T02:38:...	Employment Type:<...	Full Time	seek	AU	CBD & Inner Suburbs	
Linesmen / Line Mec...	Mining, Resources & ...	Hard Hat Recruits	Perth	2018-04-19T03:01:...	Linesmen/ Line Mech...	Full Time	seek	AU		
Parts Interpreter	Trades & Services	AHG QLD	Brisbane	2018-04-19T02:10:...	<a0> AHG is current...	Full Time	seek	AU	CBD & Inner Suburbs	
Safety Officer – Suzlo...	Human Resources & ...	Yudo	Melbourne	2018-04-19T02:35:...	Who we are Suzlon E...	Full Time	seek	AU	CBD & Inner Suburbs	
Sales Assistants – MI...	Retail & Consumer Pr...	MIDAS	Sydney	2018-04-19T02:53:...	MIDAS is an iconic sh...	Full Time	seek	AU	North Shore & North...	
Occupational Therap...	Healthcare & Medical	Western Health	Melbourne	2018-04-19T04:00:...	About Us Western He...	Contract/Temp	seek	AU	Western Suburbs	
Sub Contractor Instal...	Trades & Services	Totally Outdoors	Melbourne	2018-04-19T03:20:...	Sub contract work av...	Contract/Temp	seek	AU	Bayside & South East...	
Operations Manager	Mining, Resources & ...	Metso Australia Limit...	Perth	2018-04-19T02:44:...	Metso Australia is se...	Full Time	seek	AU	Fremantle & Souther...	
Field Officer – Group...	Human Resources & ...	TABMA Workforce & ...	Sydney	2018-04-19T02:52:...	The Company The Ti...	Full Time	seek	AU	CBD, Inner West & Ea...	
Territory Manager – ...	Healthcare & Medical	Heng & Hurst	Adelaide	2018-04-19T03:15:...	This company is a gr...	Full Time	seek	AU		
Business Developme...	Sales	National Distribution...	Sydney	2018-04-19T03:07:...	Business Developme...	Full Time	seek	AU	CBD, Inner West & Ea...	
Senior Animal Compl...	Government & Defence	City of Greater Geelo...	Geelong & Great Oce...	2018-04-19T03:00:...	About the<a0>Healt...	Full Time	seek	AU		
Agile Business Analy...	Information & Comm...	Xpert Group	Sydney	2018-04-19T02:15:...	This is a fantastic op...	Full Time	seek	AU	CBD, Inner West & Ea...	
Business Analyst	Information & Comm...	Hays Information Te...	ACT	2018-04-19T03:35:...	Canberra Federal Go...	Contract/Temp	seek	AU		
Export Co Ordinator	Manufacturing, Tran...	ImpEx Personnel Bot...	Sydney	2018-04-19T05:05:...	Our client is currentl...	Full Time	seek	AU	CBD, Inner West & Ea...	
Quality Controller – ...	Trades & Services	Ringwood City Motor...	Melbourne	2018-04-19T03:17:...	We are currently see...	Full Time	seek	AU	Eastern Suburbs	
Senior Account Mana...	Sales	Morgan Consulting	Melbourne	2018-04-19T06:22:...	Looking for an exper...	Full Time	seek	AU	CBD & Inner Suburbs	
Business Analyst	Information & Comm...	IMA Management an...	Melbourne	2018-04-19T03:00:...	A consulting career ...	Full Time	seek	AU	CBD & Inner Suburbs	
Store person / logisti...	Manufacturing, Tran...	Nepean	Mackay & Coalfields	2018-04-19T04:40:...	NEPEAN Conveyors is...	Full Time	seek	AU		
Clinical Psychologist	Healthcare & Medical	Bethlehem Hospital	Melbourne	2018-04-19T04:02:...	Calvary Health Care ...	Part Time	seek	AU	Bayside & South East...	
Medical Centre Devel...	Administration & Offi...	Private Advertiser	Sydney	2018-04-19T05:00:...	The Company: Prima...	Full Time	seek	AU	North Shore & North...	
Child Protection Prac...	Community Services ...	Department of Healt...	Sydney	2018-04-19T04:05:...	Protecting our most ...	Full Time	seek	AU		
Process Operator	Manufacturing, Tran...	Norske Skog Paper M...	Central & South East...	2018-04-19T04:21:...	Norske Skog is one o...	Contract/Temp	seek	AU		

Showing 1 to 29 of 20,030 entries, 13 total columns

There are things to note before we clean:

- **city:** there are observations that have multiple cities nested in one row.

- **post_date:** dates are coupled with time stamps, thus in character format not in date format.

- **state:** nearly 30% of state information are missing. Multiple name of states are nested in one row and are not in uniform format.

- **geo:** contained both geographies of Australia and New Zealand.

- **salary_offered:** mostly absent.

In order for the data to be used, we needed to separate the nested column and observations, filter the data to include Australia only and filled out the state information, using the simplemap's list of cities

and states in Australia (*Australia Cities Database* (2019)) to match with the cities in our data set. This is the data set after we have done the cleaning, choosing only the variables needed for the analysis:

	job_title	category	company_name	city	post_date	tz	job_description	job_type	geo	state
1	Package Lead – Pipeline Install...	Mining, Resources & Energy	FIRCROFT AUSTRALIA PT...	Perth	2018-04-19	05:41:52Z	The Role: General Execution ...	Contract/Temp	AU	Western Australia
2	Department Manager – Bakery...	Retail & Consumer Products	Coles	Sydney	2018-04-19	05:42:19Z	The role As a Coles Bakery M...	Full Time	AU	New South Wales
3	Freight Handler	Manufacturing, Transport & ...	Zoom Recruitment & Tra...	Sydney	2018-04-19	04:51:51Z	Our client is a leader within t...	Casual/Vacation	AU	New South Wales
4	Warehouse Assistant	Manufacturing, Transport & ...	Private Advertiser	Bundaberg	2018-04-19	05:42:02Z	One of our Clients is looking ...	Full Time	AU	Queensland
5	Warehouse Assistant	Manufacturing, Transport & ...	Private Advertiser	Wide Bay Burnett	2018-04-19	05:42:02Z	One of our Clients is looking ...	Full Time	AU	Queensland
6	HR Truck Subcontractors	Manufacturing, Transport & ...	Sands Fridge Lines	Perth	2018-04-19	03:22:40Z	Sands Fridge Lines WA is seek...	Contract/Temp	AU	Western Australia
7	Administrative Officer, Educati...	Administration & Office Sup...	ANZCA	Melbourne	2018-04-19	04:11:11Z	Maternity leave contract endi...	Contract/Temp	AU	Victoria
8	Traffic Controller – Sunshine ...	Construction	Evolution Traffic Control	Sunshine Coast	2018-04-19	05:04:32Z	Opportunity to earn up to $6...	Casual/Vacation	AU	Queensland
9	Mortgage Broker Assistant	Banking & Financial Services	Howitt Partners	Melbourne	2018-04-19	05:11:49Z	Small but busy and very succ...	Part Time	AU	Victoria
10	Manager Violence Abuse and ...	Healthcare & Medical	Hunter New England Loc...	Melbourne	2018-04-19	02:38:34Z	Employment Type:<a0>Perm...	Full Time	AU	Victoria
11	Mortgage Broker	Banking & Financial Services	Private Advertiser	Melbourne	2018-04-19	02:53:23Z	If you are in the mortgage br...	Full Time	AU	Victoria
12	Linesmen / Line Mechanics – ...	Mining, Resources & Energy	Hard Hat Recruits	Perth	2018-04-19	03:01:04Z	Linesmen/ Line Mechanics Va...	Full Time	AU	Western Australia
13	Parts Interpreter	Trades & Services	AHG QLD	Brisbane	2018-04-19	02:10:13Z	<a0> AHG is currently seekin...	Full Time	AU	Queensland
14	Safety Officer – Suzlon Energy...	Human Resources & Recruit...	Yudo	Melbourne	2018-04-19	02:35:42Z	Who we are Suzlon Energy Au...	Full Time	AU	Victoria
15	Sales Assistants – MIDAS Warr...	Retail & Consumer Products	MIDAS	Sydney	2018-04-19	02:53:11Z	MIDAS is an iconic shoe bran...	Full Time	AU	New South Wales
16	Occupational Therapist – Age...	Healthcare & Medical	Western Health	Melbourne	2018-04-19	04:00:53Z	About Us Western Health man...	Full Time	AU	Victoria
17	Sub Contractor Installers	Trades & Services	Totally Outdoors	Melbourne	2018-04-19	03:20:47Z	Sub contract work available f...	Contract/Temp	AU	Victoria
18	Electrician – RIW	Trades & Services	Protech NSW	Sydney	2018-04-19	04:45:13Z	Protech are partnering with th...	Contract/Temp	AU	New South Wales
19	IT TECHNICAL SPECIALIST – Mi...	Information & Communicati...	Eighty20 Solutions	Sydney	2018-04-19	06:06:13Z	About the business Eighty20 ...	Contract/Temp	AU	New South Wales
20	Fulltime Chef with Asian cooki...	Hospitality & Tourism	Chinchin's At Kotomoon	Melbourne	2018-04-19	04:47:47Z	About the business We are m...	Full Time	AU	Victoria
21	Developer Programmer	Information & Communicati...	Bluetech IT Solution	ACT	2018-04-19	03:10:41Z	About the business Working i...	Full Time	AU	Australian Capital Territory
22	Operations Manager	Mining, Resources & Energy	Metso Australia Limited	Perth	2018-04-19	02:44:45Z	Metso Australia is seeking a ...	Full Time	AU	Western Australia
23	Learning & Development Speci...	Human Resources & Recruit...	West Recruitment	Sydney	2018-04-19	02:14:13Z	Our client is reputable, recog...	Contract/Temp	AU	New South Wales
24	Clerical/Admin support	Administration & Office Sup...	Hallis	Sydney	2018-04-19	06:10:37Z	Located in CBD– close to tran...	Contract/Temp	AU	New South Wales
25	Field Officer – Group Training	Human Resources & Recruit...	TABMA Workforce & Car...	Sydney	2018-04-19	02:52:38Z	The Company The Timber & B...	Full Time	AU	New South Wales
26	Territory Manager – Diabetes ...	Healthcare & Medical	Heng & Hurst	Adelaide	2018-04-19	03:15:43Z	This company is a great provi...	Full Time	AU	South Australia
27	Business Development Manager	Sales	National Distribution Ce...	Sydney	2018-04-19	03:07:16Z	Business Development Manag...	Full Time	AU	New South Wales
28	Senior Business Officer	Government & Defence	Department of Economic...	Melbourne	2018-04-19	02:48:59Z	SENIOR BUSINESS OFFICER $9...	Full Time	AU	Victoria
29	Senior Animal Compliance an...	Government & Defence	City of Greater Geelong	Geelong	2018-04-19	03:00:54Z	About the<a0>Health & Local...	Full Time	AU	Victoria

Showing 1 to 29 of 20,367 entries, 10 total columns

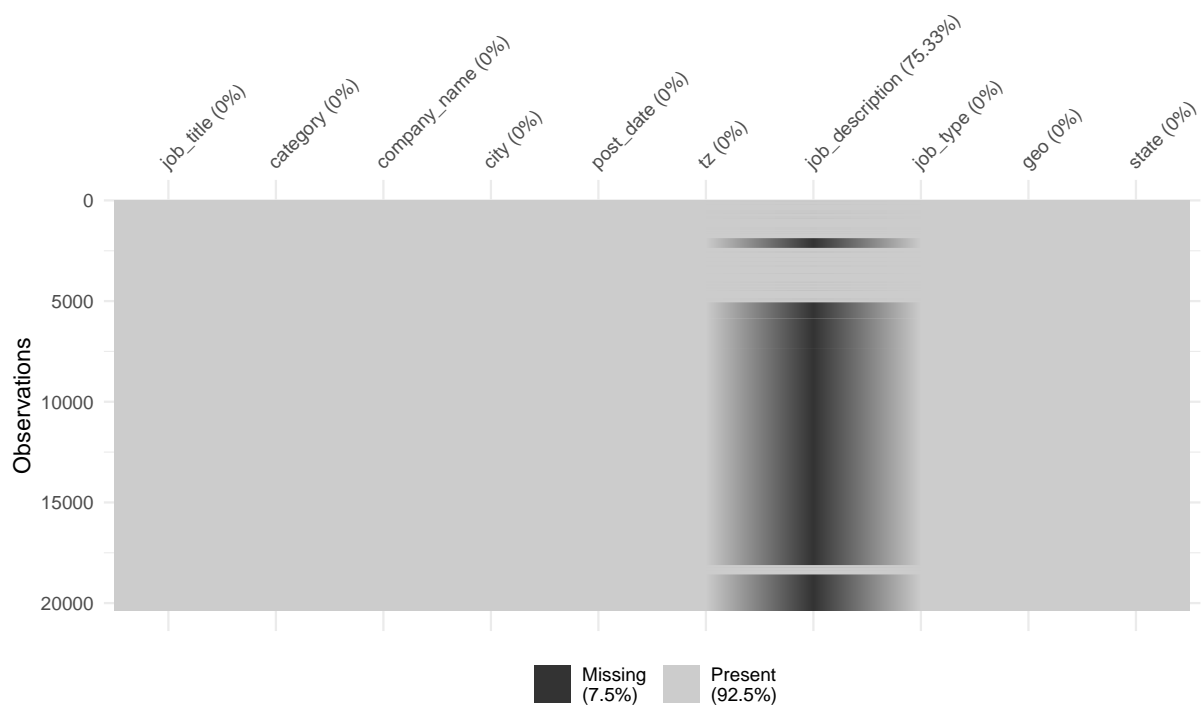After that, we inspected the missing values in the dataset.

Figure 1: *Missing values visualization after the cleaning*

Figure 1 showed that out of all variables chosen, job description is the only variable that had missing values and at a really high ratio, about 75.3%, whereas other variables are fully present. However,

job description is not of importance for this study, hence we can conclude that this data set requires no further cleaning and is ready for use.

2.4 Analyzing the data

An exploratory data analysis is performed to observe the change in job demand across Australia in 2018. We used a variety of plots using the functions in `ggplot2`. We also incorporated tables and did a correlation analysis using the Pearson coefficient correlation.

3 Analysis and Conclusion

3.1 Analyze the change in demand by job category

There are 30 job categories in this dataset and table 1 lists the number of jobs per category from April 2018 to November 2018. The job category of trades and services was the most popular job category in 2018 in Australia, followed by information and communications technology which saw the number of job postings as almost the same as the most popular job category. From the Labour Market Information Portal (*LMIP data portal* n.d.), it is known that those two categories have been in short supply in the Australian labour market. Because of the small population and culture influence (Burgess 2018), automation cannot completely replace manual labour which is why the trade and services job category occupied the top spot.

For a better timely observation across every month, figure 2 shows each job category's requirement change in different month which not only shows the shortage job, but also that the category is saturating. It is clear that there are some job categories that are in high demand in certain months of a year, for example, accounting has a high demand in June every year before the end of financial year. Additionally, there are other job categories that have seasonal requirements and result in a high demand during Christmas.

Meanwhile, figure 3 is a graph showing the top five job categories in each month. There are 7 categories that appears most frequently in the list such as accounting; administration and office support; healthcare and medical; hospitality and tourism; information and communication technology; manufacturing, transport and logistics; trade and services. In October, there were more vacancies and labour requirements than any other month. Forbes (Whitehead (2019)) showed a statistics report indicating that most industries would figure out their labour requirements by September because the holiday season was coming up and the HR wants to finish their recruiting needs before the year-end. Thus, October became the busiest month for recruiting as the number of job postings increased. By the time November came around, the number of job postings in the whole labour market resulted in a
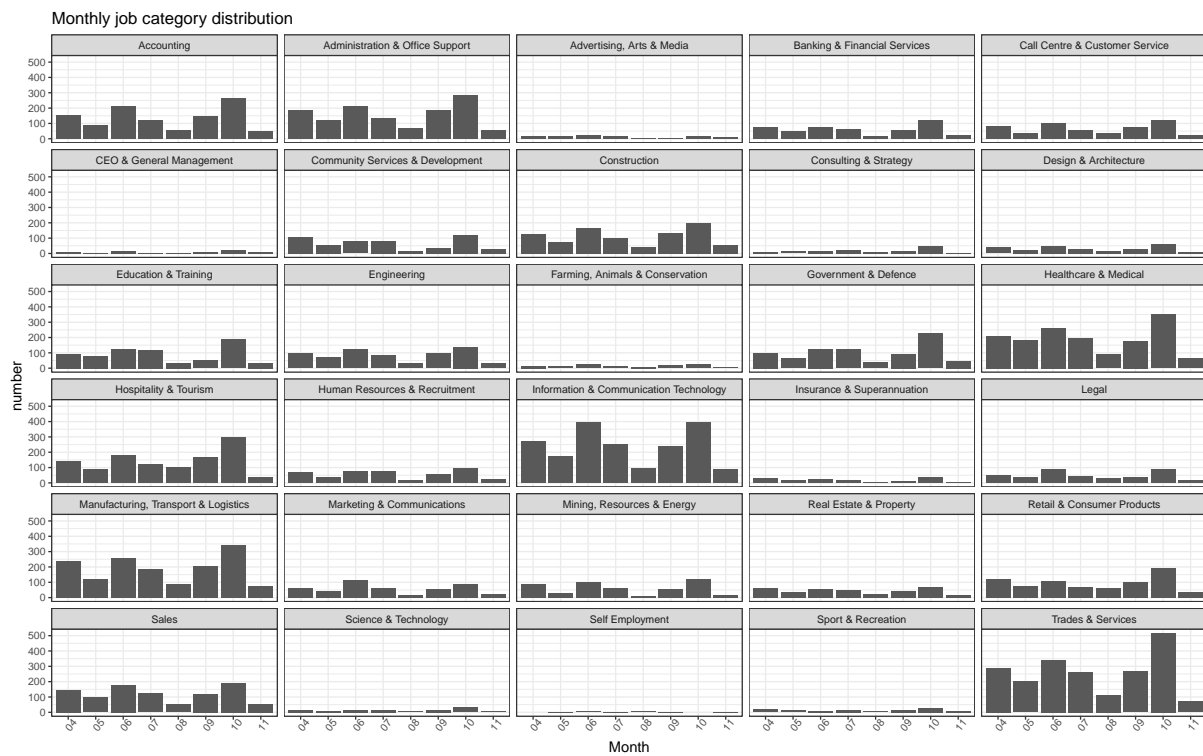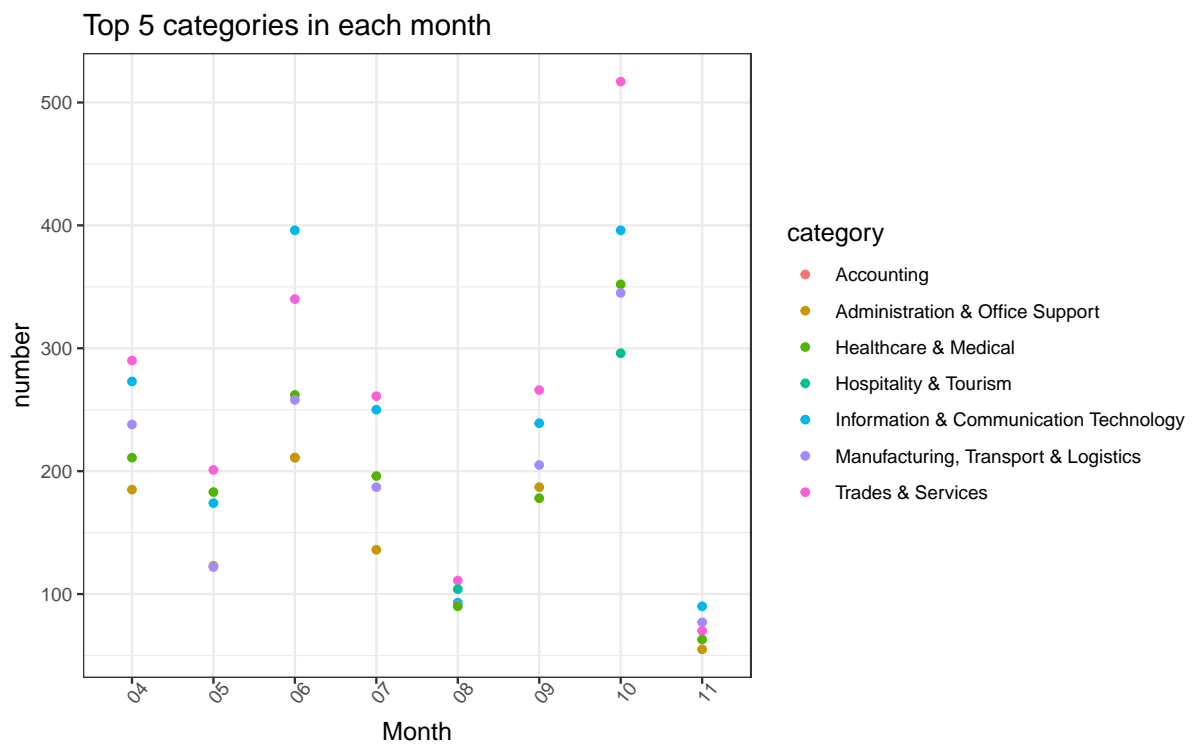
Figure 2: *Monthly job category distribution*

Figure 3: *Top 5 category in each month*

Table 1: *The number of jobs per category*

category	number
Self Employment	16
CEO & General Management	82
Advertising, Arts & Media	104
Farming, Animals & Conservation	108
Science & Technology	108
Sport & Recreation	108
Insurance & Superannuation	133
Consulting & Strategy	139
Design & Architecture	247
Real Estate & Property	352
Legal	385
Human Resources & Recruitment	448
Marketing & Communications	461
Banking & Financial Services	468
Mining, Resources & Energy	492
Community Services & Development	526
Call Centre & Customer Service	534
Engineering	665
Education & Training	723
Retail & Consumer Products	766
Government & Defence	810
Construction	894
Sales	961
Accounting	1084
Hospitality & Tourism	1141
Administration & Office Support	1250
Manufacturing, Transport & Logistics	1523
Healthcare & Medical	1535
Information & Communication Technology	1911
Trades & Services	2056

sharp drop as the new round of hiring ended in October and hiring needs diminish before Christmas and New Year.

3.2 Analyze the change in job demand by states

3.2.1 Job demand in states

Looking at figure 4, we can see that NSW, Victoria and Queensland lead the national job pool with the highest counts observed among all the states. The pattern of job posts appeared to look similar across the states with the highest peak in April, followed by two other minor peaks in July.
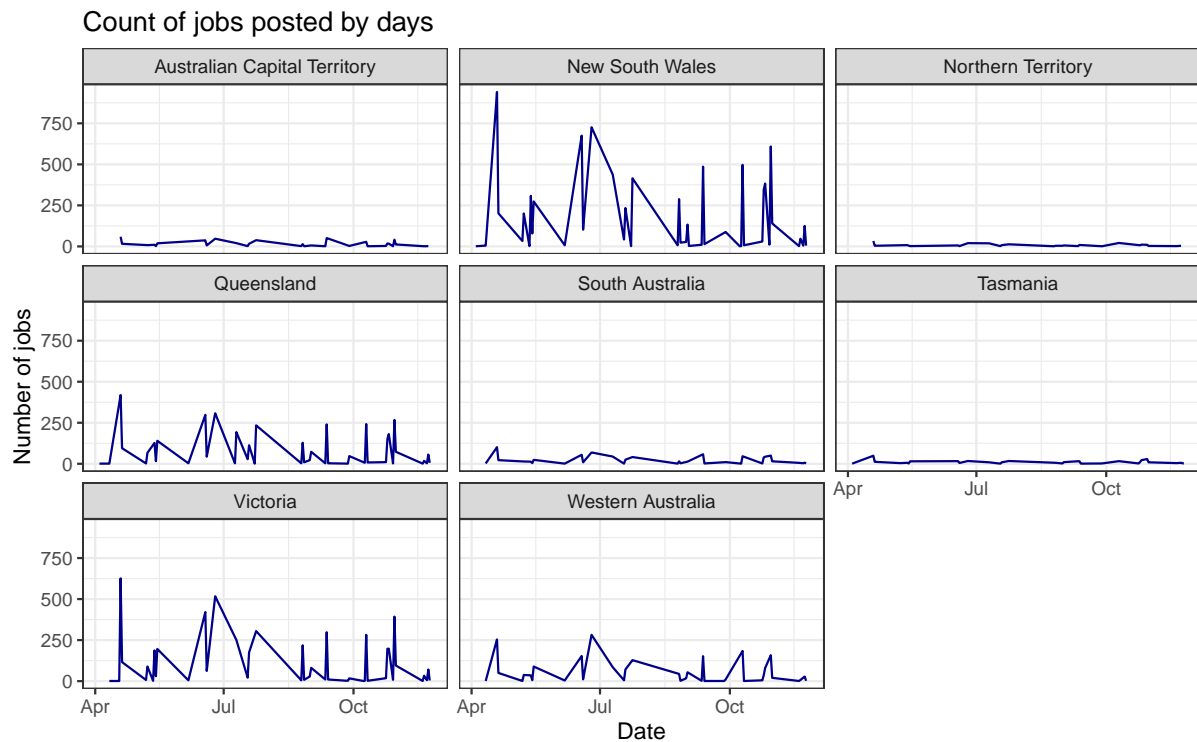
Count of jobs posted by days

Figure 4: *Daily job count by states*

To have a better look at the states with lower job counts, which are Australia Capital Territory, Northern Territory, South Australia and Tasmania, we isolated them from the high-count states and looked at the change separately.

Figure 5 shows that the other four states had roughly the same pattern of job posts.

Normally, the job hunting season usually peaks around the beginning of the year, mostly in January as most companies have robust budgets for hiring and just came out of a holiday season in December. The same situation applies for job seekers as well as people who start to come back from the holiday, usually excited with a new year's resolution. Additionally, an annual bonus has been paid at the end of last year, making people more ready to change jobs starting from January (Emswiler 2016). This data set did not include data from January to March so we cannot verify the situation. However it would be safe to assume that this new year effect lasts further into April. Another peak is around July, which marks the start of new financial year for most companies, giving them higher budget for new hiring (Emswiler 2016).

Despite the similarity in seasonal pattern, the difference in job count was prominent across the states. Big states like NSW, Victoria and Queensland held the majority of opportunities, with the highest count reported at more than 7 times higher than the highest count in the low-demand states (NSW
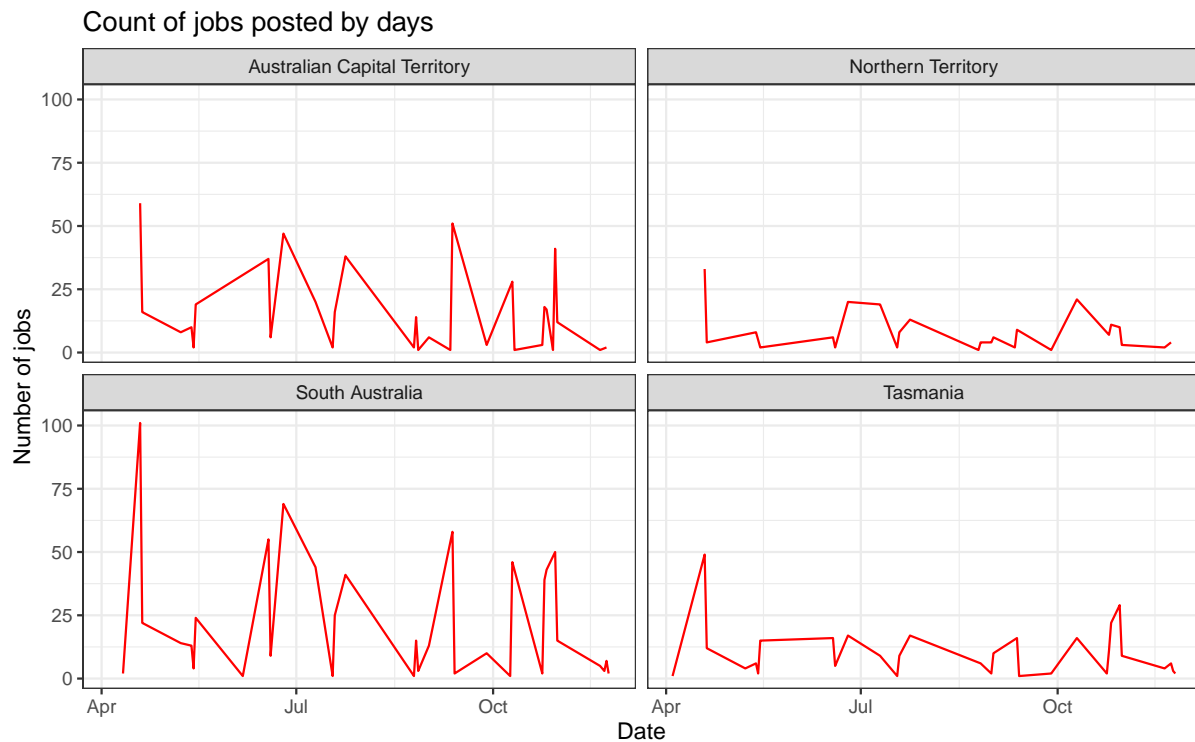
Count of jobs posted by days

Figure 5: *Daily job counts in ACT, NT, SA and TAS*

versus South Australia). Even though it is expected that big states would have more opportunities, the amount gap looked even more significant when presented visually.

3.2.2 Job demand and living cost

According to Laswell (2006), when searching for a job, cost of living should be taken into account. It also relates to the question whether the salary of the job would be enough to cover the living cost in a particular city. Therefore, in this subsection, the living cost in some cities in Australia with relatively more job postings will be observed.

Figure 6 shows that Sydney was found to be the city with the highest living cost, about 80. Whilst generally, the living cost index in most cities in Australia ranged between 60 to 68. The figure also conveys that Gold Coast was the city with the lowest living cost in Australia. It is also interesting to observe whether there is a correlation between the living cost in those cities and the number of job postings there. Hence, the number of job postings in those cities will be examined first.

Table 2 conveys that Sydney is the city with most job postings. This city had more than 1000 jobs available between April to December 2018. Meanwhile, Hobart was found to be the city with the least job postings among others. The large number of job postings in Sydney is possibly due to the fact that Sydney was placed as the city with the highest productivity in Australia (PricewaterhouseCoopers (PwC) 2015).
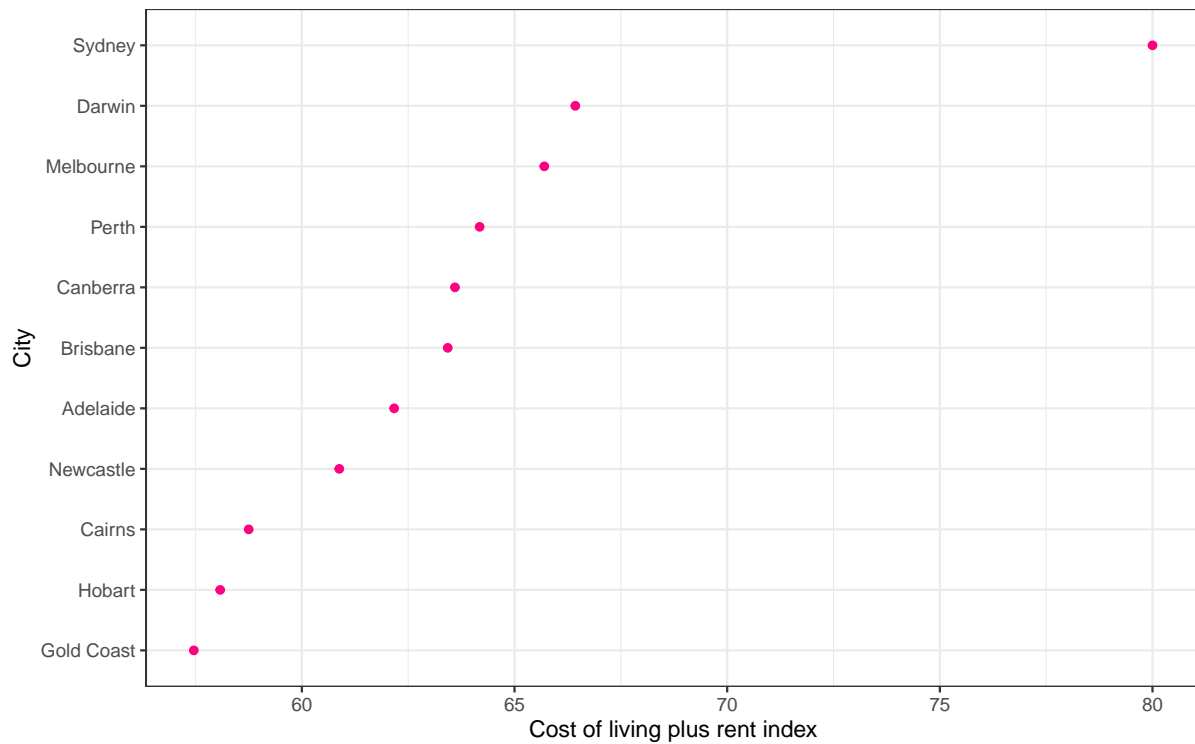
Figure 6: *Living cost of 2018 by city*

Table 2: *The number of job postings in some cities in Australia in 2018*

City	Number of Job Postings
Sydney	5288
Melbourne	4078
Brisbane	1802
Perth	1136
Adelaide	542
Canberra	482
Newcastle	352
Gold Coast	297
Cairns	148
Darwin	110
Hobart	70

Figure 7 suggests that there is a possible correlation between cost of living and the number of job postings in Australia. However, the pattern can not be really seen since the number of observations is too small. Therefore, the extension of analysis was performed by using the Pearson correlation coefficient. The finding is that there was a significantly positive (0.8211368) correlation between these two variables. This is inline with what DePietro (2017) stated that the increasing living cost is
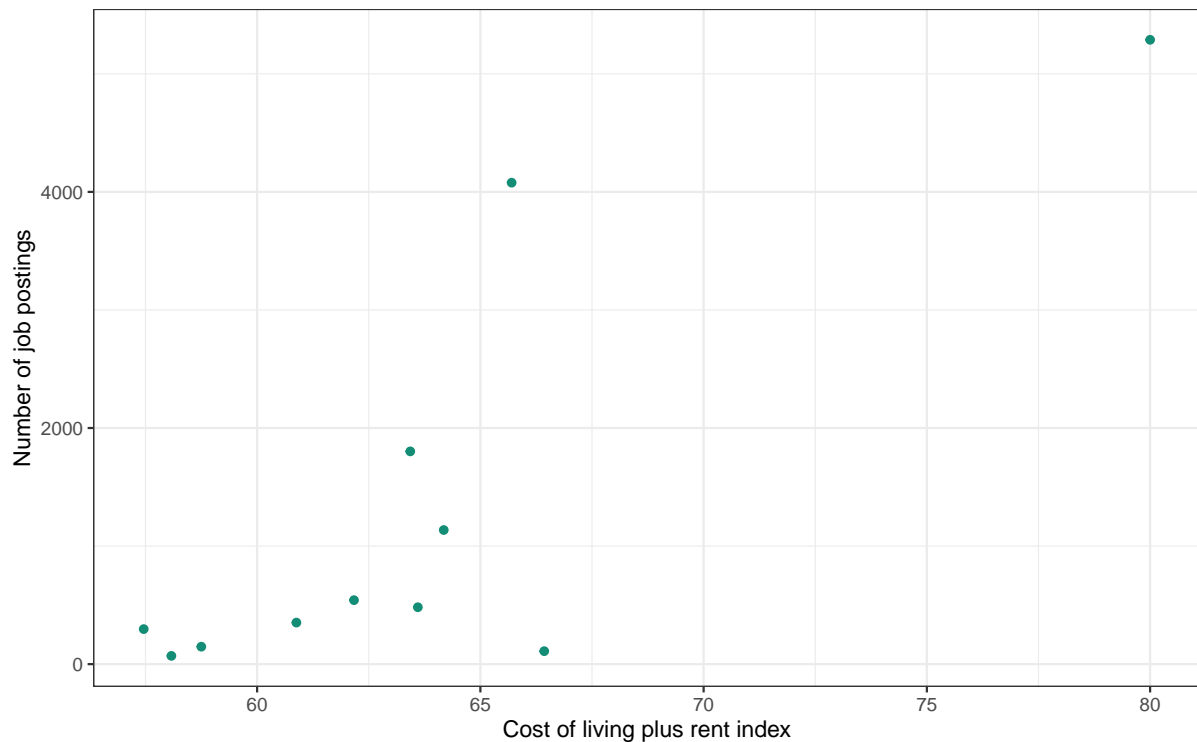
Figure 7: *Cost of living plus rent index vs Number of job postings Scatter Plot*

Table 3: *Number of jobs posted by job type*

Job Type	Number of jobs posted
Casual/Vacation	1459
Contract/Temp	3685
Full Time	13504
Part Time	1382

often associated with employment growth and income growth. Furthermore, larger cities tend to be perceived as expensive places to live (Weinstein 2014).

3.3   Analyze the change in demand by job type

In this section, our goal is to visualize the different types of jobs such as full-time, part-time, contract and casual jobs. The changes in demand to these job types will vastly differ across the months, but it will be interesting to see which job type increased in demand in 2018.

3.3.1   Number of jobs posted per job type

The different types of jobs being posted on SEEK are part time, full time, contract/temporary and casual/vacation. From Table 3, we can see that over 13500 jobs out of the roughly 20000 jobs posted are full-time jobs. It is easier to visualize just how common these types of jobs are in Figure 8, and we can see how dominant the full-time jobs are being posted by companies. We can expect such a result as many companies want to employ fresh graduates from universities for an entry-level role.
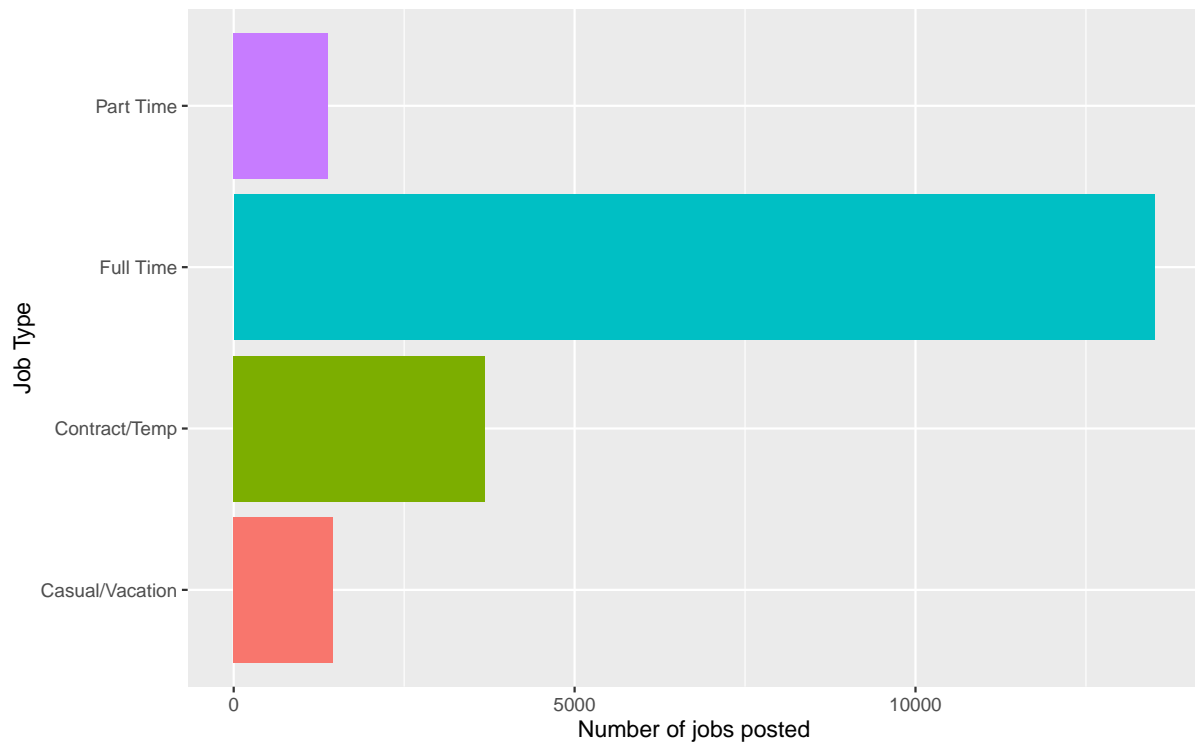
Figure 8: *Number of jobs for each job type*

The number of new college graduates entering the workforce is always high enough for companies to post a lot of full-time jobs, which is why it is the most popular job type. Most of the full-time jobs are being generated in the healthcare and education sectors. Specifically, the National Disability Insurance Scheme (NDIS) and aged care services are seeing an increase in demand for these types of jobs. The NDIS expects an extra 80,000 full-time jobs by 2020 Toth et al. (2018).

3.3.2 Fluctuations in job posting numbers by month

However, the fluctuations of these job types say more about what kind of jobs companies are willing to offer. For example, in Figure 9, there is a large spike in full time jobs between August and October. The opposite is true when these jobs plummet down from 3100 posted jobs in October to around 700 jobs in November. Both part time and casual jobs stay relatively neutral and do not change as much throughout the months. Casual jobs have stayed the same since the past two decades, these jobs formed 20.6% of the workforce in February 2018 compared to 20.1 % in 1998. The reason for an uptick in the jobs posted for this category in October is because the largest proportion of people who take up casual jobs are aged 20-24, followed by people aged 15-19 Norman (2018). Thus around October, many of these people who are students are available to take on casual jobs as the summer break approaches. Interestingly, all the job types follow a similar pattern, reporting an increase in
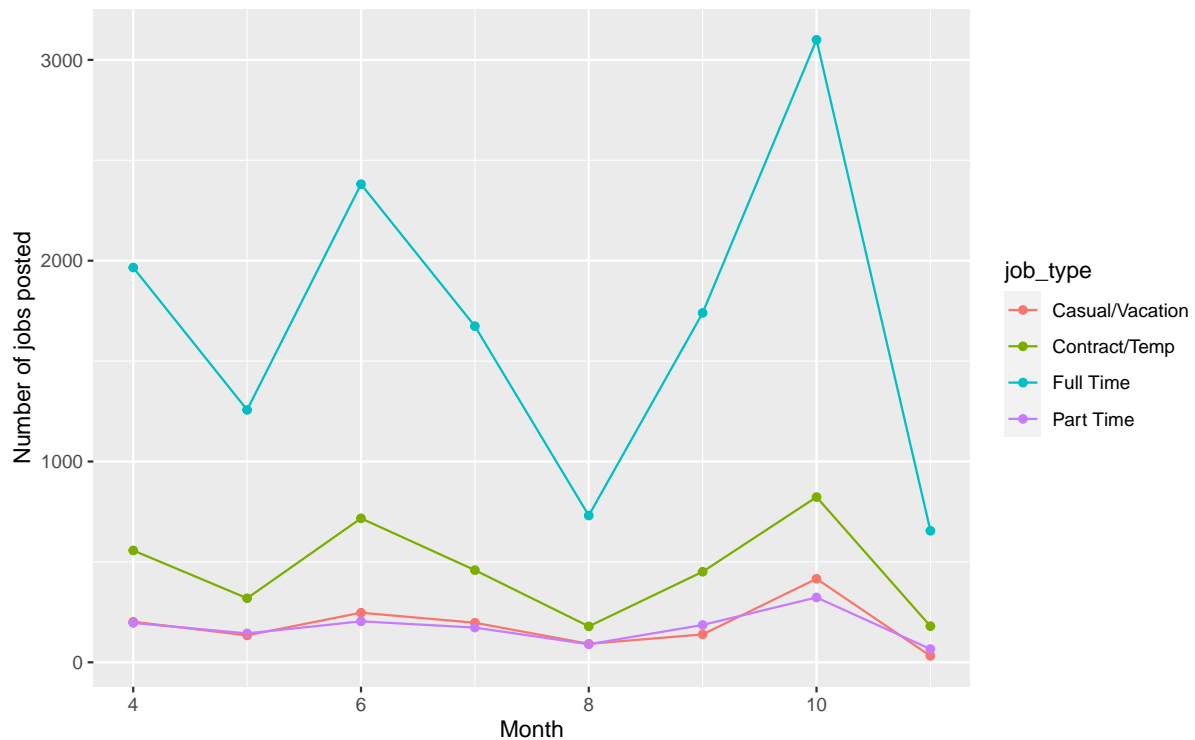
Figure 9: *Changes in job number postings by month*

the number of jobs posted in June and October as these are the time periods for winter and summer break respectively.

4 Conclusion

The most common type of job posted on SEEK are full-time jobs. With an increasing number of graduates coming out of university, companies are finding ways to offer full-time roles to these graduates. Demand for full-time jobs is predicted to be highest in the healthcare industry with approximately 80,000 jobs needing to be filled by 2020. However, part-time and casual jobs for many different industries are still popular among individuals aged 15-19 and 20-24 even though the demand for these jobs have not changed much over the last 20 years.

In 2018, there are 30 job categories that appeared in the dataset, with trade and services and information technology ranking as the top categories for the labour market requirement. Meanwhile, we found that October was the busiest month for recruiting and some job categories have seasonal demand. Furthermore, the number of job postings in a city has a positive correlation with it's living cost. Sydney recorded the highest living cost index at 80 points, and had over 1000 jobs posted between April 2018 to December 2018. As such, states that have high living costs such as New South Wales, Victoria and Queensland holds a majority of the national job pool.

5 Acknowledgements

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