Labour Market Trends Analysis

The tech industry in Australia is growing at a rapid speed. But there is not enough jobs in Australia to fulfill the requirements of the current growth. To improve the tech industry from this situation, the Tech Council of Australia is aiming to create 1 million jobs by 2025

Currently, this is an analysis of current labour market trends to understand the distribution of employment in tech industry across the states, Capital cities and Regional areas.

Importing Libraries

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
```

Reading Dataset

In [2]:
```
employment_by_industry = pd.read_excel('ER Employment by Industry_November_2021.xlsx')
employment_by_industry.head()
```

Out[2]:

	Employment Region	State/Territory	Industry	Employment by Industry - Total	Employed Full-Time	Employed Part-Time	Employed - Male	Employed - Female	Five year growth by Industry	Employment Distribution (%)
0	Capital Region	NSW/ACT	Agriculture, Forestry and Fishing	7200	3800	3400	3900	3300	1000	2.1
1	Capital Region	NSW/ACT	Mining	500	500	0	200	300	0	0.1
2	Capital Region	NSW/ACT	Manufacturing	7800	5900	2000	5500	2300	-1100	2.3
3	Capital Region	NSW/ACT	Electricity, Gas, Water and Waste Services	2300	2000	300	1600	700	-600	0.7
4	Capital Region	NSW/ACT	Construction	28000	23700	4300	25400	2600	2600	8.3

In [3]:
```
#Different industries from the employment data
employment_by_industry['Industry'].unique()
```

Out[3]:
```
array(['Agriculture, Forestry and Fishing', 'Mining', 'Manufacturing',
       'Electricity, Gas, Water and Waste Services', 'Construction',
       'Wholesale Trade', 'Retail Trade',
       'Accommodation and Food Services',
       'Transport, Postal and Warehousing',
       'Information Media and Telecommunications',
       'Financial and Insurance Services',
       'Rental, Hiring and Real Estate Services',
       'Professional, Scientific and Technical Services',
       'Administrative and Support Services',
       'Public Administration and Safety', 'Education and Training',
       'Health Care and Social Assistance',
       'Arts and Recreation Services', 'Other Services'], dtype=object)
```

Currently, we are considering the "Professional, Scientific and Technical Services" industry for our analysis and are reading it to a new data frame

In [4]:
```
employment_by_industry = employment_by_industry.loc[employment_by_industry['Industry'] == 'P
rofessional, Scientific and Technical Services']
```

In [5]:
```
#resetting index
employment_by_industry = employment_by_industry.reset_index(drop = True)
```

In [6]:
```
#renaming columns
employment_by_industry.columns = ['Employment Region', 'State/Territory', 'Industry', 'Emplo
yment - Total', 'Employed - Full Time',
                                   'Employed - Part Time', 'Employed - Males', 'Employed - Fe
males', 'Five Year Changes', 'Employment Distribution (%)']
```

In [7]:
```
employment_by_industry
```

Out[7]:

	Employment Region	State/Territory	Industry	Employment - Total	Employed - Full Time	Employed - Part Time	Employed - Males	Employed - Females	Five Year Changes	Employment Distribu
0	Capital Region	NSW/ACT	Professional, Scientific and Technical Services	39800	32200	7600	22600	17200	8100	
1	Central West	NSW	Professional, Scientific and Technical Services	5600	4200	1500	2400	3200	700	
2	Far West Orana	NSW	Professional, Scientific and Technical Services	0	0	0	0	0	-700	
3	Hunter	NSW	Professional, Scientific and Technical Services	23700	17100	6600	14000	9700	5000	
4	Illawarra South Coast	NSW	Professional, Scientific and Technical Services	16500	12500	4000	8000	8500	4500	
5	Mid North Coast	NSW	Professional, Scientific and Technical Services	5600	2900	2700	3000	2600	-2700	
6	Murray Riverina	NSW	Professional, Scientific and Technical Services	5700	4500	1200	3000	2700	600	
7	New England and North West	NSW	Professional, Scientific and Technical Services	2100	1700	300	600	1500	-100	
8	Sydney East Metro	NSW	Professional, Scientific and Technical Services	165000	132700	32300	86700	78200	29300	
9	Sydney Greater West	NSW	Professional, Scientific and Technical Services	61000	51600	9400	38800	22200	18700	
10	Sydney North and West	NSW	Professional, Scientific and Technical Services	122100	98300	23800	67200	54800	11600	
11	Sydney South West	NSW	Professional, Scientific and Technical Services	20700	17200	3600	11100	9600	3900	
12	Ballarat	VIC	Professional, Scientific and Technical Services	4500	2900	1600	1700	2800	-100	
13	Barwon	VIC	Professional, Scientific and Technical Services	10500	8400	2000	6000	4500	3600	
14	Bendigo	VIC	Professional, Scientific and Technical Services	4400	3100	1400	2800	1600	1100	
15	Gippsland	VIC	Professional, Scientific and Technical Services	5600	3100	2500	3100	2500	2000	
16	Goulburn/Murray	VIC	Professional, Scientific and Technical Services	6200	3300	2900	4100	2100	-600	
17	Inner Metropolitan Melbourne	VIC	Professional, Scientific and Technical Services	156600	124200	32300	88100	68500	29800	
18	North Eastern Melbourne	VIC	Professional, Scientific and Technical Services	49100	38700	10500	27500	21700	3900	
19	North Western Melbourne	VIC	Professional, Scientific and Technical Services	12400	10000	2400	5300	7200	2000	
20	South Coast of Victoria	VIC	Professional, Scientific and Technical Services	2700	1800	800	1000	1700	800	
21	South Eastern Melbourne and Peninsula	VIC	Professional, Scientific and Technical Services	46200	36600	9600	27300	18900	13700	
22	Western Melbourne	VIC	Professional, Scientific and Technical Services	43600	36500	7100	24600	19000	18300	
23	Wimmera Mallee	VIC	Professional, Scientific and Technical Services	3400	2400	1000	1700	1700	400	
24	Brisbane South East	QLD	Professional, Scientific and Technical Services	36900	29400	7400	22500	14400	-6300	
25	Cairns	QLD	Professional, Scientific and Technical Services	7600	6200	1400	3000	4600	1000	
26	Darling Downs	QLD	Professional, Scientific and Technical Services	4800	3700	1000	2700	2100	-1600	
27	Fitzroy	QLD	Professional, Scientific and Technical Services	3900	2500	1400	1400	2500	-2900	
28	Gold Coast	QLD	Professional, Scientific and Technical Services	35100	25400	9700	16900	18100	12800	
29	Mackay	QLD	Professional, Scientific and Technical Services	3700	3000	700	1500	2200	-400	
30	Somerset	QLD	Professional, Scientific and Technical Services	57900	47700	10200	31400	26600	12400	
31	Townsville	QLD	Professional, Scientific and Technical Services	8500	7000	1500	3900	4600	2700	
32	Wide Bay and Sunshine Coast	QLD	Professional, Scientific and Technical Services	17000	12100	4900	10700	6300	2600	
33	Wivenhoe	QLD	Professional, Scientific and Technical Services	26800	21100	5700	14700	12100	5000	
34	Adelaide North	SA	Professional, Scientific and Technical Services	26500	21400	5200	14900	11600	4200	
35	Adelaide South	SA	Professional, Scientific and Technical Services	35400	26900	8400	21000	14400	6200	
36	Mid North SA	SA	Professional, Scientific and Technical Services	2500	1100	1400	1400	1100	1400	
37	Murray and South East	SA	Professional, Scientific and Technical Services	1700	1000	700	1000	700	-200	
38	Great Southern - Wheatbelt	WA	Professional, Scientific and Technical Services	2900	1300	1500	700	2200	700	
39	Perth North	WA	Professional, Scientific and Technical Services	50800	39600	11200	29900	21000	-4000	
40	Perth South	WA	Professional, Scientific and Technical Services	43400	31500	12000	27800	15600	7600	
41	South West WA	WA	Professional, Scientific and Technical Services	4700	3500	1100	2000	2600	1800	
42	Hobart and Southern Tasmania	TAS	Professional, Scientific and Technical Services	9700	7000	2600	5700	4000	3200	
43	North and North Western Tasmania	TAS	Professional, Scientific and Technical Services	6100	4300	1800	3100	3000	1200	
44	Darwin	NT	Professional, Scientific and Technical Services	5100	4200	900	2700	2400	-500	
45	Australia	AUST	Professional, Scientific and Technical Services	1226600	948400	264800	661800	547900	209000	

For analysing the employement in different regions across states, we are splitting the data the industry dataset to 2 new datasets. One is capital cities and the other is regional areas.

In [8]:
```
#Splitting the above dataframe into two : Capital cities and other regions

capital_city_index = [0,8,9,10,11,17,18,19,21,22,24,34,35,39,40,42,44]
regional_area_index = [1,2,3,4,5,6,7,12,13,14,15,16,20,23,25,26,27,28,29,30,31,32,33,36,37,3
8,41,43]

capital_city_employment = employment_by_industry.iloc[capital_city_index]
capital_city_employment
regional_area_employment = employment_by_industry.iloc[regional_area_index]
```

In [9]:
```
capital_city_employment = capital_city_employment.reset_index(drop = True)
regional_area_employment = regional_area_employment.reset_index(drop = True)
```

In [10]:
```
regional_area_employment
```

Out[10]:

	Employment Region	State/Territory	Industry	Employment - Total	Employed - Full Time	Employed - Part Time	Employed - Males	Employed - Females	Five Year Changes	Employment Distribu
0	Central West	NSW	Professional, Scientific and Technical Services	5600	4200	1500	2400	3200	700	
1	Far West Orana	NSW	Professional, Scientific and Technical Services	0	0	0	0	0	-700	
2	Hunter	NSW	Professional, Scientific and Technical Services	23700	17100	6600	14000	9700	5000	
3	Illawarra South Coast	NSW	Professional, Scientific and Technical Services	16500	12500	4000	8000	8500	4500	
4	Mid North Coast	NSW	Professional, Scientific and Technical Services	5600	2900	2700	3000	2600	-2700	
5	Murray Riverina	NSW	Professional, Scientific and Technical Services	5700	4500	1200	3000	2700	600	
6	New England and North West	NSW	Professional, Scientific and Technical Services	2100	1700	300	600	1500	-100	
7	Ballarat	VIC	Professional, Scientific and Technical Services	4500	2900	1600	1700	2800	-100	
8	Barwon	VIC	Professional, Scientific and Technical Services	10500	8400	2000	6000	4500	3600	
9	Bendigo	VIC	Professional, Scientific and Technical Services	4400	3100	1400	2800	1600	1100	
10	Gippsland	VIC	Professional, Scientific and Technical Services	5600	3100	2500	3100	2500	2000	
11	Goulburn/Murray	VIC	Professional, Scientific and Technical Services	6200	3300	2900	4100	2100	-600	
12	South Coast of Victoria	VIC	Professional, Scientific and Technical Services	2700	1800	800	1000	1700	800	
13	Wimmera Mallee	VIC	Professional, Scientific and Technical Services	3400	2400	1000	1700	1700	400	
14	Cairns	QLD	Professional, Scientific and Technical Services	7600	6200	1400	3000	4600	1000	
15	Darling Downs	QLD	Professional, Scientific and Technical Services	4800	3700	1000	2700	2100	-1600	
16	Fitzroy	QLD	Professional, Scientific and Technical Services	3900	2500	1400	1400	2500	-2900	
17	Gold Coast	QLD	Professional, Scientific and Technical Services	35100	25400	9700	16900	18100	12800	
18	Mackay	QLD	Professional, Scientific and Technical Services	3700	3000	700	1500	2200	-400	
19	Somerset	QLD	Professional, Scientific and Technical Services	57900	47700	10200	31400	26600	12400	
20	Townsville	QLD	Professional, Scientific and Technical Services	8500	7000	1500	3900	4600	2700	
21	Wide Bay and Sunshine Coast	QLD	Professional, Scientific and Technical Services	17000	12100	4900	10700	6300	2600	
22	Wivenhoe	QLD	Professional, Scientific and Technical Services	26800	21100	5700	14700	12100	5000	
23	Mid North SA	SA	Professional, Scientific and Technical Services	2500	1100	1400	1400	1100	1400	
24	Murray and South East	SA	Professional, Scientific and Technical Services	1700	1000	700	1000	700	-200	
25	Great Southern - Wheatbelt	WA	Professional, Scientific and Technical Services	2900	1300	1500	700	2200	700	
26	South West WA	WA	Professional, Scientific and Technical Services	4700	3500	1100	2000	2600	1800	
27	North and North Western Tasmania	TAS	Professional, Scientific and Technical Services	6100	4300	1800	3100	3000	1200	

In [11]:
```
#grouping the data by state for each regional and capital cities
capital_city_employment1 = capital_city_employment.groupby(['State/Territory']).sum()
regional_area_employment1 = regional_area_employment.groupby(['State/Territory']).sum()
```

In [12]:
```
regional_area_employment1
```

Out[12]:

State/Territory	Employment - Total	Employed - Full Time	Employed - Part Time	Employed - Males	Employed - Females	Five Year Changes	Employment Distribution (%)
NSW	59200	42900	16300	31000	28200	7300	29.7
QLD	165300	128700	36500	86200	79100	31600	58.7
SA	4200	2100	2100	2400	1800	1200	6.5
TAS	6100	4300	1800	3100	3000	1200	5.0
VIC	37300	25000	12200	20400	16900	7200	34.2
WA	7600	4800	2600	2700	4800	2500	9.3

In [13]:
```
capital_city_employment1 = capital_city_employment1.reset_index()
regional_area_employment1 = regional_area_employment1.reset_index()
```

In [14]:
```
capital_city_employment1
```

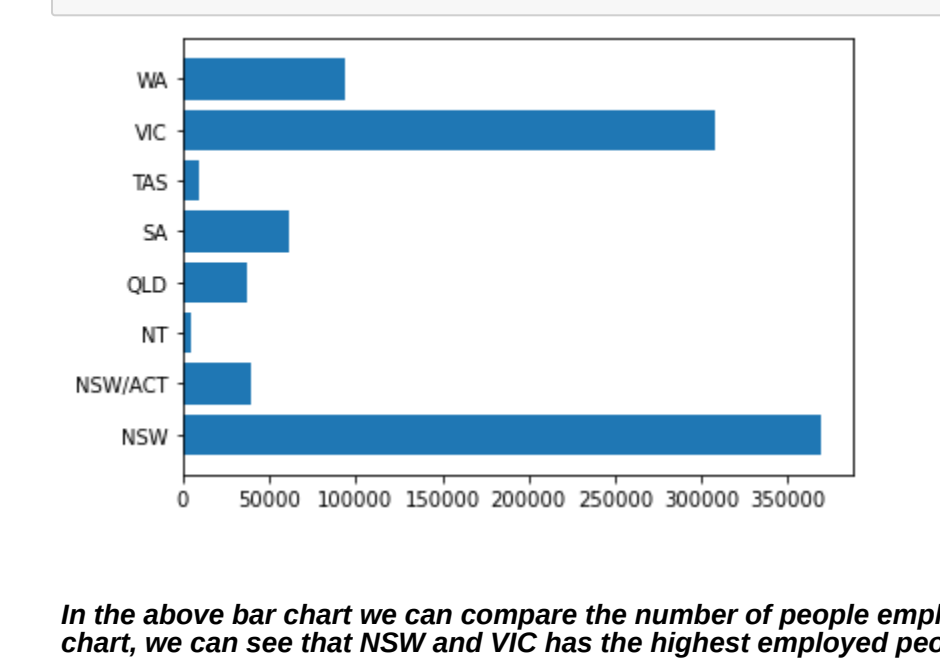
Out[14]:

	State/Territory	Employment - Total	Employed - Full Time	Employed - Part Time	Employed - Males	Employed - Females	Five Year Changes	Employment Distribution (%)
0	NSW	368800	299800	69100	203800	164800	63500	47.5
1	NSW/ACT	39800	32200	7600	22600	17200	8100	11.7
2	NT	5100	4200	900	2700	2400	-500	6.2
3	QLD	36900	29400	7400	22500	14400	-6300	7.4
4	SA	61900	48300	13600	35900	26000	10400	18.0
5	TAS	9700	7000	2600	5700	4000	3200	7.0
6	VIC	307900	246000	61900	172800	135300	67700	49.9
7	WA	94200	71100	23200	57700	36600	3600	16.6

Data Visualisation and Analysis

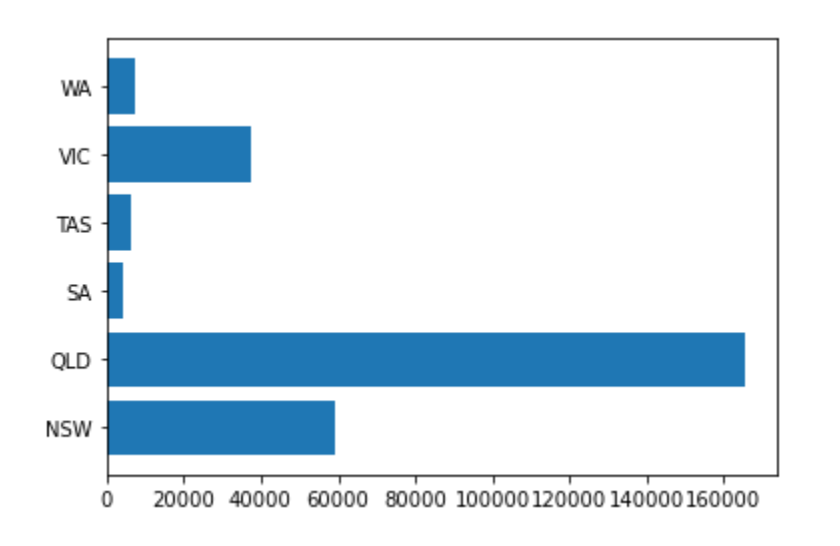
Analysing the employemnt in capital cities

In [15]:
```
#Employment by capital cities
x = capital_city_employment1['Employment - Total']
index = capital_city_employment1['State/Territory']
plt.barh(index, x)#autopct='%1.1f%%')
plt.show()
```



In the above bar chart we can compare the number of people employed in capital cities of each state. In the above chart, we can see that NSW and VIC has the highest employed people, whereas NT has the lowest.

In [16]:
```
#Employment in regional areas
x = regional_area_employment1['Employment - Total']
y = regional_area_employment1['State/Territory']
plt.barh(y, x)
plt.show()
```



In this second chart, we can see the employment in regional areas we can see which states has the highest employment and which states has the lowest employment. In this chart, we can see that QLD has the highest number of jobs in regional areas, followed by NSW. SA has the lowest number of jobs.

In [17]:

```
#Employment in capitals vs regional areas
df3 = regional_area_employment1[['State/Territory', 'Employment - Total']]
Employment_Total_capitals = capital_city_employment1['Employment - Total'].tolist()
Employment_Total_capitals.pop(5)
Employment_Total_capitals.pop(2)
Employment_Total_capitals
df3['Employment_Total_Capitals'] = Employment_Total_capitals
x= df3['State/Territory']
a = df3['Employment - Total']
b = df3['Employment_Total_Capitals']
df3 = df3.set_index("State/Territory")
df3[['Employment - Total','Employment_Total_Capitals']].plot(kind = "bar")
plt.xlabel("State/Territory")
```

```
<ipython-input-17-60401d2fa669>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guid
e/indexing.html#returning-a-view-versus-a-copy
  df3['Employment_Total_Capitals'] = Employment_Total_capitals
```

Out[17]: `Text(0.5, 0, 'State/Territory')`

But in this third chart we can see that the employemnt is very high in capital cities compared to the regional areas. This indicates that regional areas need to have more ICT based companies and in order to increase the number of jobs in tech industry in Australia, there should be a good increase of jobs in regional areas.

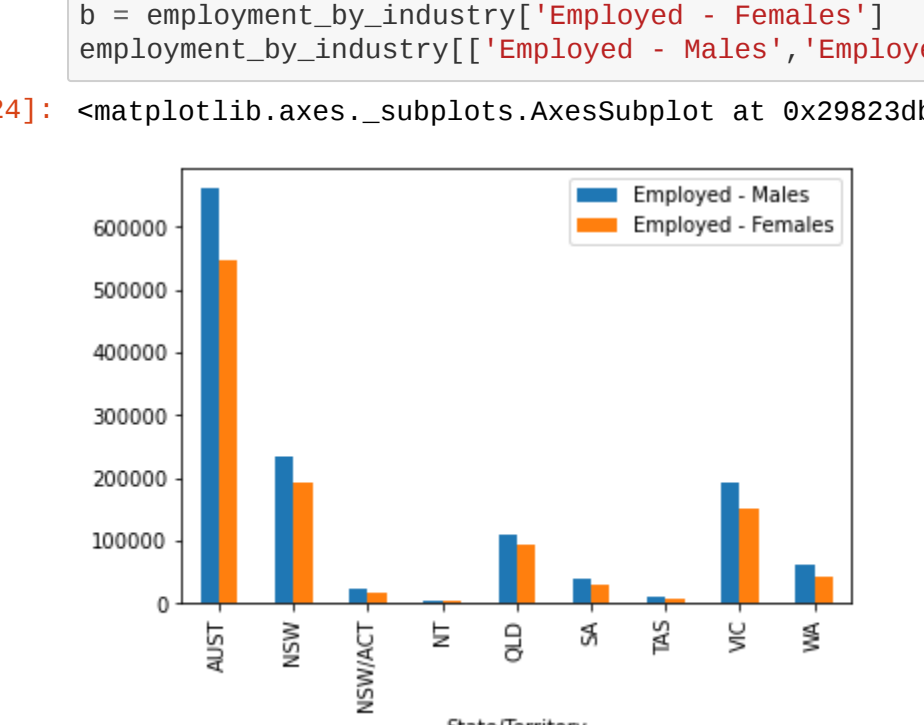
In [20]:

```
employment_by_industry = employment_by_industry.reset_index(drop=False)
```

In [24]:

```
#Employement by Gender
employment_by_industry = employment_by_industry.groupby(['State/Territory']).sum()
a = employment_by_industry['Employed - Males']
b = employment_by_industry['Employed - Females']
employment_by_industry[['Employed - Males','Employed - Females']].plot(kind = "bar")
```

Out[24]: `<matplotlib.axes._subplots.AxesSubplot at 0x29823db99d0>`



In the above chart we see the gender disparity of employment between men and women in tech industry. Even though this dataset, doesn't entirely focuses on ICT jobs, the disparity is high. In the ICT sector the difference is very high. Also, the enrolment of women in tech based courses is very low when compared to men.