



Candidates and Job Ads Recommender

General Assembly DSI13

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24 Apr 2020





Agenda



Problem
Statement



Approach



Usage



Findings

Problem Statement

Source:
<https://ideal.com/resume-screening/>
<https://www.businessinsider.com/how-job-seekers-look-at-job-postings-2013-5?IR=T>



52% Talent Acquisitions

Hardest part of recruitment is screening candidates from a large applicant pool.



23 hours

Time spend on screening for one hire



75% ~ 88%

Unqualified resumes



76.7 sec

To feel if the posting matches their interest and skills



49.7 sec

To decide that the job isn't right for them



38%

Good fit



Problem Statement

To create a metric that can perform matching and recommending top matches with the following objectives:

- Reducing time spent for HR / Hiring Manager, allowing them to have more time to focus on their core responsibilities
- Help job seekers to kick start their job searching process with the recommended job ads, without the need to cast a wide net and getting low or zero responses

Approach

Data Source

Source:
<https://www.jobspider.com/>
<https://www.kaggle.com/shivamb/real-or-fake-fake-jobposting-prediction>

Resumes.

- Scrape jobspider.com
- API not available
- BeautifulSoup with Regex
- Accounting & IT

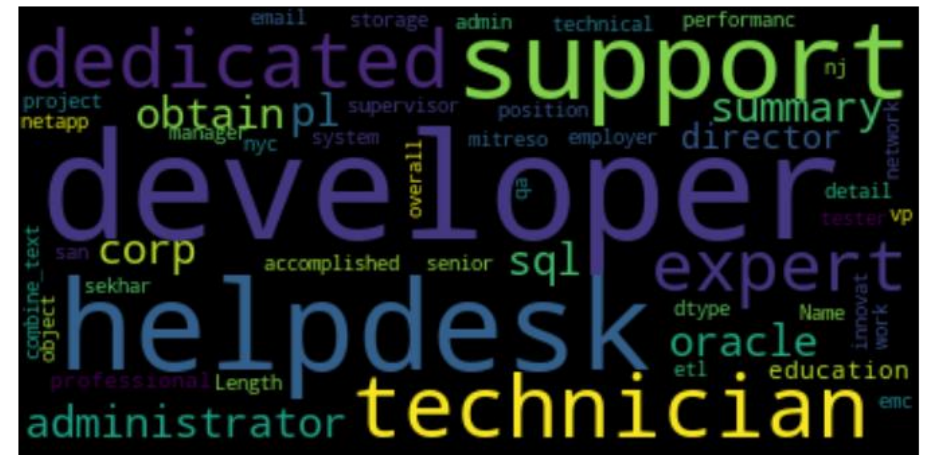
sn	date_posted	job_title	industry	state	state_name	resume_href	id	emp_type	availability	work_auth	job_level	will_travel	edu_level	will_reloc	objective	exp	edu	skills	add_info	
0	1	2/22/2020	auditor	Accounting	TX	Texas	/job/view-resume-82470.html	82470	Contractor	02/22/2020	Yes	Management (Manager, Director)	Yes, More than 75%	Masters	Yes	Strategist provides clients with more than a d...	CPA Firm Consultant, Auditgoals.com 2019 - 202...	Master of Business Administration, FinanceBach...	NaN	NaN
1	2	2/11/2020	senior accountant	Accounting	OH	Ohio	/job/view-resume-82450.html	82450	Full-Time Permanent	2/1/2020	Yes	Management (Manager, Director)	No	High School/Equivalent	No	NaN	Accomplished finance and accounting profession...	Three years at University Wisconsin Superior	BudgetsAdvanced ExcelFinancial StatementsStaff...	Software Microsoft Dynamics GPPRism HRUtliprod...
2	3	1/31/2020	senior/mid-level financial services manager	Accounting	TX	Texas	/job/view-resume-82423.html	82423	Full-Time Permanent	NaN	Yes	Management (Manager, Director)	Yes, Less than 25%	Bachelors	Yes	Growth-focused and astute executive and influe...	WELLS FARGO - DALLAS, TX (1994-2019)Senior Vice...	EDUCATIONApplied Business Administration Manag...	Banking Administration Risk Mitigation (Sta...	NaN
3	4	1/16/2020	brokerage operations	Accounting	NY	New York	/job/view-resume-82397.html	82397	Full-Time Permanent	Immediate	Yes	Management (Manager, Director)	No	Certificate	No	Analytical, performance-focused, and forward-t...	SOCIÉTÉ GÉNÉRALE - JERSEY CITY, NJ/Vice Preside...	SCS Business and Technical Institute - New York...	Trade Posting and Payment EscalationInvestment...	EARLIER CAREERMAN FINANCIAL, INC. - NEW YORK, ...
4	5	12/16/2019	full charge bookkeeper	Accounting	CO	Colorado	/job/view-resume-82338.html	82338	Full-Time Permanent	NaN	Yes	Experienced with over 2 years experience	No	Bachelors	No	Dynamic, goal-oriented, and analytical profess...	Echo River Expeditions, Cañon City, COReservat...	Coursework in Accounting and ComputerBessemer ...	Microsoft Office Applications (Excel, Word, Po...	NaN
5 rows x 21 columns																				

5 rows x 21 columns

Job ads.

- Kaggle dataset

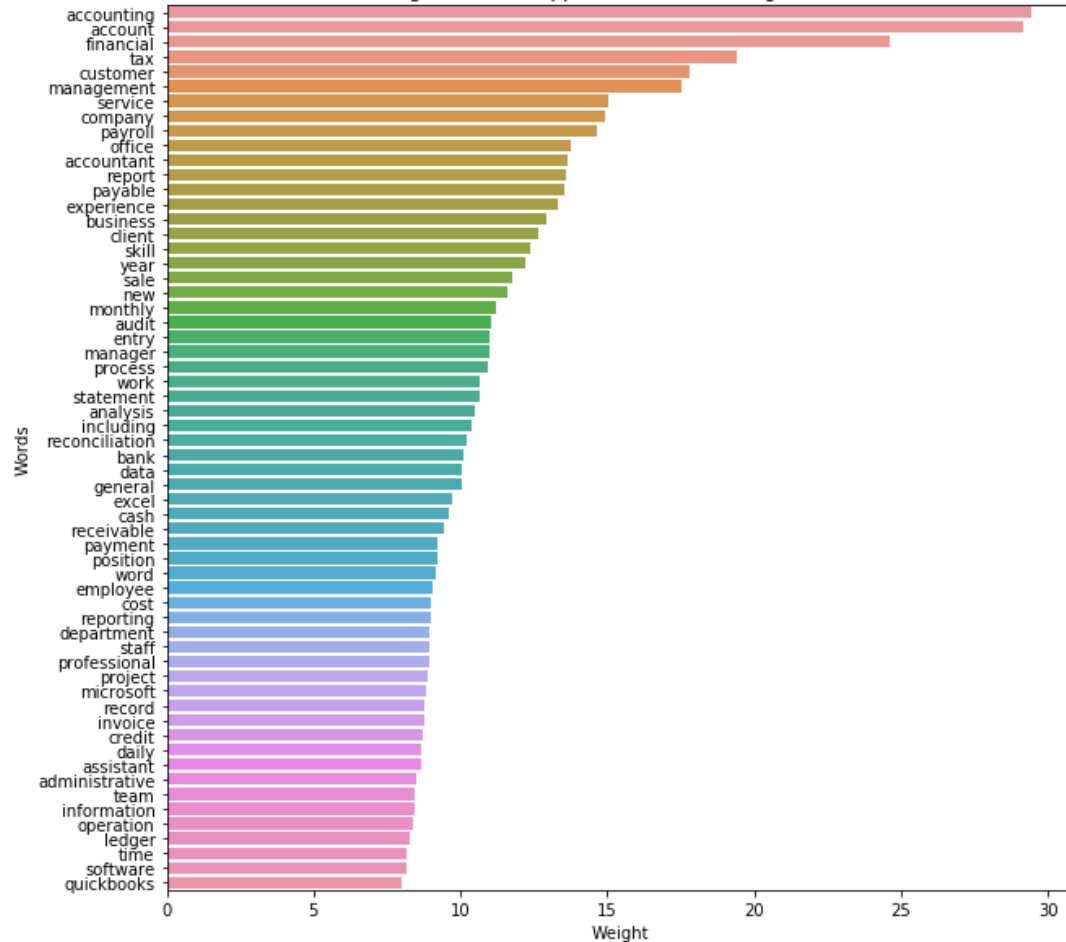
job_id	title	state	state_name	department	salary_range	company_profile	description	requirement	benefits	telecommuting	has_company_logo	has_questions	employment_type	required_experience	required_education	industry	function	
0	1	Marketing Intern	NY	New York	Marketing	NaN	We're Food52, and we've created a groundbreak...	Food52, a fast-growing, James Beard Award-winn...	Experience with content management systems a m...	NaN	0	1	0	Other	Internship	NaN	NaN	Marketing
1	2	Commissioning Machinery Assistant (CMA)	IA	Iowa	NaN	NaN	Valor Services provides Workforce Solutions th...	Our client, located in Houston, is actively se...	Implement pre-commissioning and commissioning ...	NaN	0	1	0	NaN	NaN	NaN	NaN	NaN
2	3	Account Executive - Washington DC	DC	WashingtonDC	Sales	NaN	Our passion for improving quality of life thro...	THE COMPANY: ESRI is a leading provider of GIS software and services. We are currently seeking a qualified individual to join our team in the State of Texas...	EDUCATION: A Bachelor's or Master's in GIS, or related field. A minimum of 2 years of experience in a similar role is required. A minimum of 2 years of experience in a similar role is required.	0	1	0	Full-time	Mid-Senior level	Bachelor's Degree	Computer Software	Sales	
3	4	Bill Review Manager	FL	Florida	NaN	NaN	SpotSource Solutions LLC is a Global Human Cap...	JOB TITLE: Itemization Review ManagerLOCATION: ...	QUALIFICATIONS: RN license in the State of Texa...	Full Benefits Offered	0	1	1	Full-time	Mid-Senior level	Bachelor's Degree	Hospital & Health Care	Health Care Provider
4	5	Accounting Clerk	MD	Maryland	NaN	NaN	NaN	Job Overview: Apex is an environmental consultin...	NaN	NaN	0	0	0	NaN	NaN	NaN	NaN	NaN

[illegible]

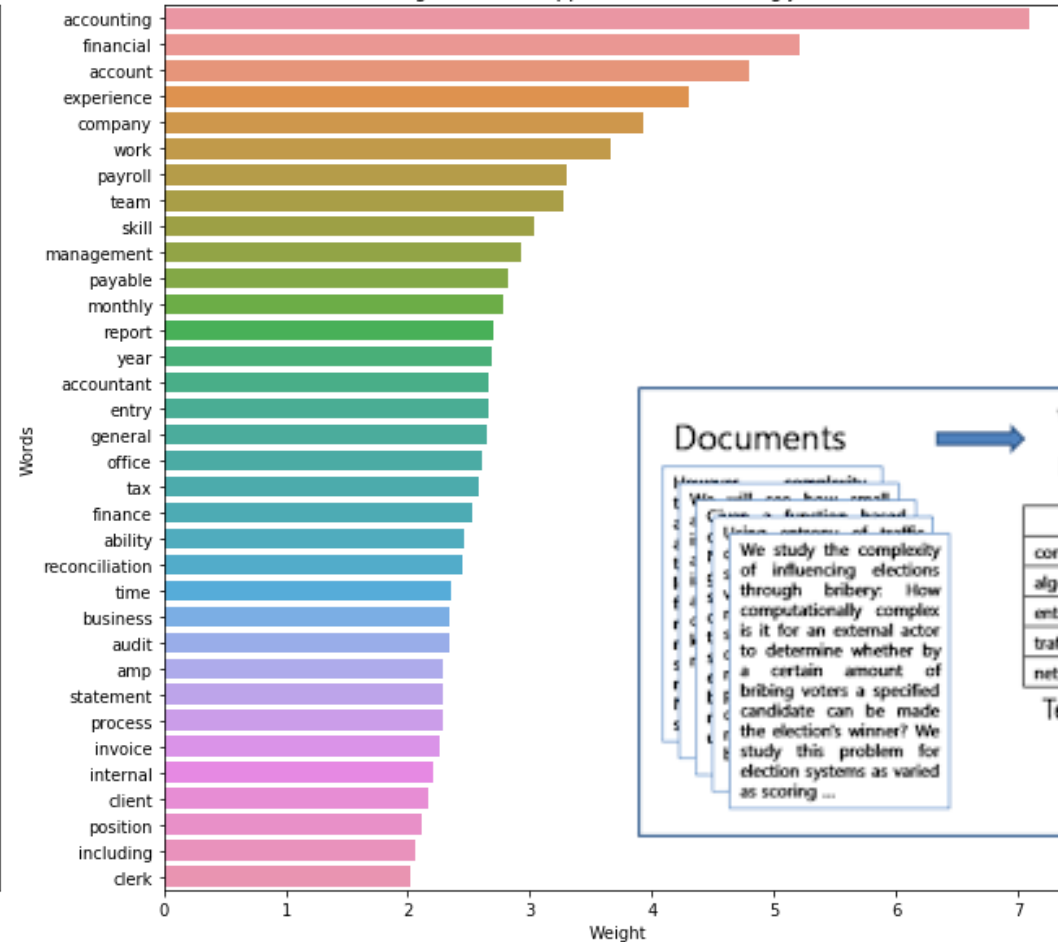
Approach

Data cleaning and EDA

Weight of words appear in all Accounting resumes



Weight of words appear in all Accounting job ads



Documents

We study the complexity of influencing elections through bribery: How computationally complex is it for an external actor to determine whether by a certain amount of bribing voters a specified candidate can be made the election's winner? We study this problem for election systems as varied as scoring ...

Vector-space representation

	D1	D2	D3	D4	D5
complexity	2		3	2	3
algorithm	3			4	4
entropy	1			2	
traffic		2	3		
network		1	4		

Term-document matrix

Approach

Feature Selection

- Datasets concatenated
- Feature select:
 - Function
 - State
 - Employment type
 - Job level
 - Education level

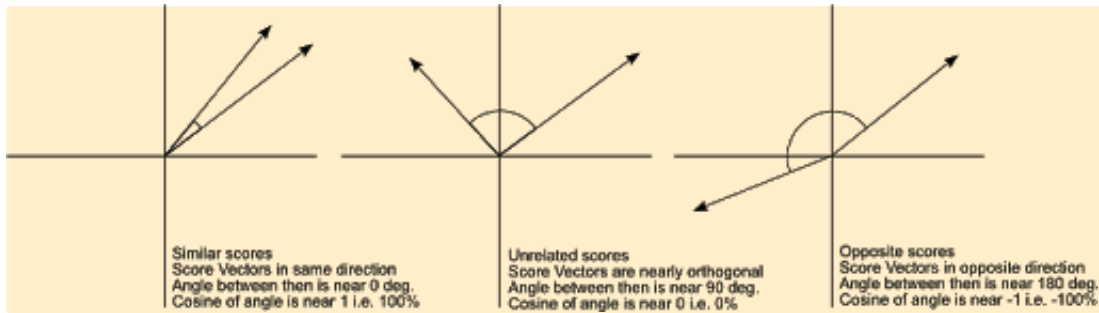
	function	state_name	emp_type	job_level	edu_level	region
index						
R_82470_auditor	Accounting	Texas	contract	mid_senior	masters	south
R_82450_senior accountant	Accounting	Ohio	full-time	mid_senior	high_school	midwest
R_82423_senior/mid-level financial services manager	Accounting	Texas	full-time	mid_senior	bachelors	south
R_82397_brokerage operations	Accounting	New York	full-time	mid_senior	certificate	northeast
R_82338_full charge bookkeeper	Accounting	Colorado	full-time	associate	bachelors	west



	function	state_name	emp_type	job_level	edu_level	region
index						
R_82470_auditor	1	41	3	4	7	3
R_82450_senior accountant	1	33	4	4	2	2
R_82423_senior/mid-level financial services manager	1	41	4	4	6	3
R_82397_brokerage operations	1	31	4	4	4	4
R_82338_full charge bookkeeper	1	5	4	3	6	1

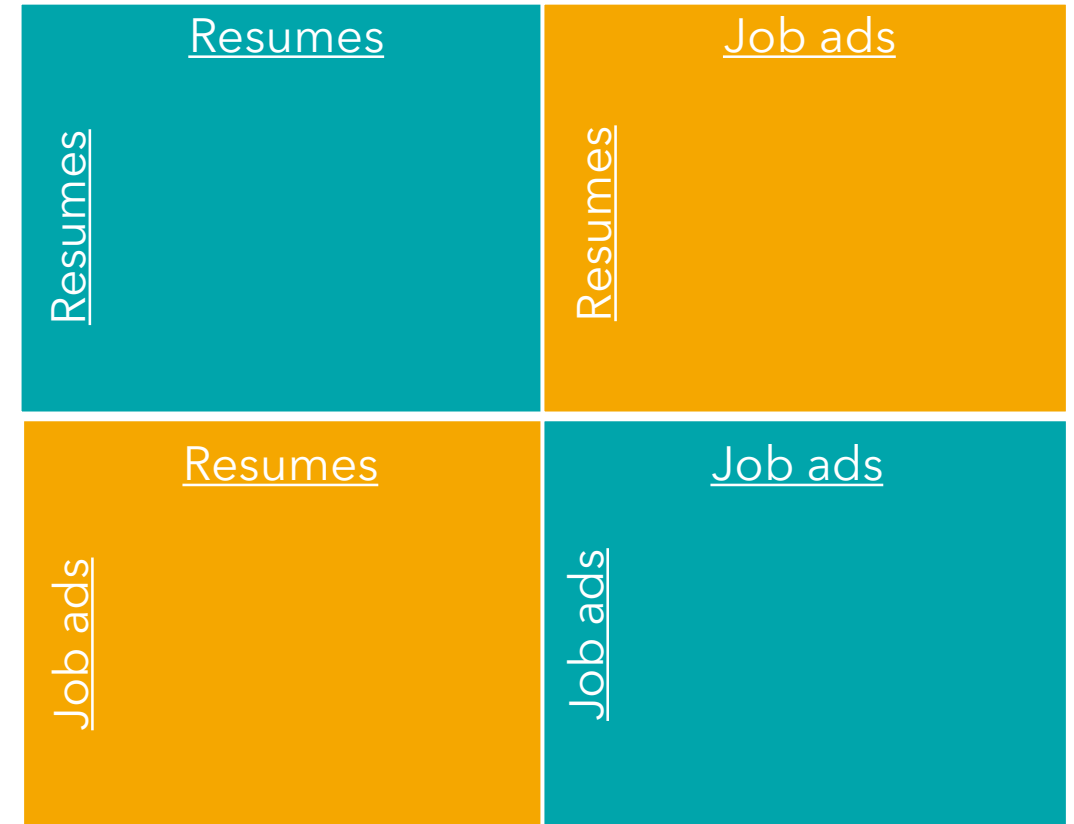
Approach

Recommender System



index	R_82470_auditor	R_82450_senior accountant	R_82423_senior/mid-level financial services manager	R_82397_brokerage operations	R_82338_full charge bookkeeper	R_82293_remote bookkeeper or ranch management	R_82266_financial analyst	R_81922_financial analyst
index								
R_82470_auditor	1.000000	0.989553	0.999157	0.995230	0.492707	0.454494	0.998301	0.315750
R_82450_senior accountant	0.989553	1.000000	0.994157	0.996556	0.424512	0.514949	0.989081	0.242434
R_82423_senior/mid-level financial services manager	0.999157	0.994157	1.000000	0.997760	0.481347	0.472953	0.998337	0.303130
R_82397_brokerage operations	0.995230	0.996556	0.997760	1.000000	0.444331	0.480659	0.996805	0.263734
R_82338_full charge bookkeeper	0.492707	0.424512	0.481347	0.444331	1.000000	0.557370	0.502186	0.981155

5 rows x 2078 columns



Approach

Recommender System

Job seeker id 82470 is looking for auditor job

Top 10 job recommendations:

```
: index
J_915_IT- Auditor 0.999812
J_6736_Senior Accountant 0.999472
J_4871_CPA Accounting Manager / Medical Billing 0.999157
J_701_Accountant / Book Keeper 0.999058
J_4873_Controller - High Growth Specialty Finance Company 0.999058
J_10433_Payroll Accountant 0.998922
J_4193_Corporate Controller 0.998922
J_268_Sr. Accountant 0.998922
J_2128_Accounts Payable Supervisor 0.998844
J_6081_Corporate Controller 0.998634
Name: R_82470_auditor, dtype: float64
```

Job ad position: Technical Project Manager

Top 10 candidates recommendations:

```
index
R_78734_it service desk lead analyst\it service desk manager 1.000000
R_81761_sql server database administrator 1.000000
R_79802_business system analyst 1.000000
R_72842_it support, it technician, systems administrator 1.000000
R_74072_windows systems engineer 0.999971
R_74244_technical writer/editor 0.999971
R_81453_systems administrator 0.999971
R_75521_network engineer 0.999971
R_74692_business analyst / business systems analyst 0.999971
R_79968_system administrator 0.999971
Name: J_38_Technical Project Manager, dtype: float64
```

	function	state_name	emp_type	job_level	edu_level	region
index						
R_82470_auditor	Accounting	Texas	contract	mid_senior	masters	south
J_915_IT- Auditor	Accounting	North Carolina	contract	mid_senior	bachelors	south
J_6736_Senior Accountant	Accounting	Texas	contract	associate	bachelors	south
J_4871_CPA Accounting Manager / Medical Billing	Accounting	Texas	full-time	mid_senior	bachelors	south
J_701_Accountant / Book Keeper	Accounting	Virginia	full-time	mid_senior	bachelors	south
J_4873_Controller - High Growth Specialty Finance Company	Accounting	Virginia	full-time	mid_senior	bachelors	south
J_2128_Accounts Payable Supervisor	Accounting	Oklahoma	full-time	associate	bachelors	south
J_687_Accountant	Accounting	New York	full-time	mid_senior	bachelors	northeast
J_3057_Accounting Manager	Accounting	Maine	full-time	mid_senior	bachelors	northeast
J_6081_Corporate Controller	Accounting	New York	full-time	mid_senior	bachelors	northeast
J_10433_Payroll Accountant	Accounting	Pennsylvania	full-time	mid_senior	bachelors	northeast

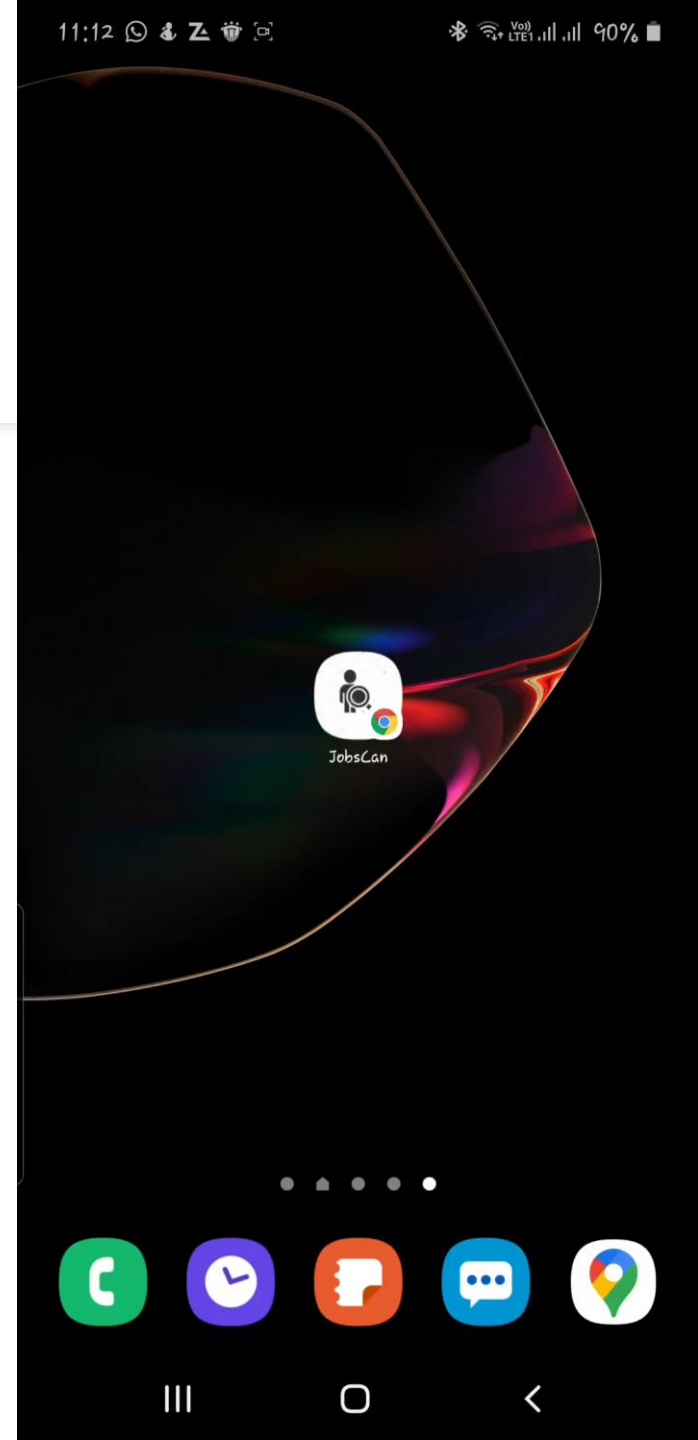
	function	state_name	emp_type	job_level	edu_level	region
J_38_Technical Project Manager	Information Technology	New York	full-time	associate	bachelors	northeast
R_72842_it support, it technician, systems administrator	Information Technology	New York	full-time	associate	bachelors	northeast
R_79802_business system analyst	Information Technology	New York	full-time	associate	bachelors	northeast
R_78734_it service desk lead analyst\it service desk manager	Information Technology	New York	full-time	associate	bachelors	northeast
R_81761_sql server database administrator	Information Technology	New York	full-time	associate	bachelors	northeast
R_74072_windows systems engineer	Information Technology	New Jersey	full-time	associate	bachelors	northeast
R_74244_technical writer/editor	Information Technology	New Jersey	full-time	associate	bachelors	northeast
R_75521_network engineer	Information Technology	New Jersey	full-time	associate	bachelors	northeast
R_81453_systems administrator	Information Technology	New Jersey	full-time	associate	bachelors	northeast
R_74692_business analyst / business systems analyst	Information Technology	New Jersey	full-time	associate	bachelors	northeast
R_79968_system administrator	Information Technology	New Jersey	full-time	associate	bachelors	northeast

Usage

App: JobsCan

index function state_name emp_type job_level edu_level region

R_82470_auditor	Accounting	Texas	contract	mid_senior	masters	south
J_915_IT- Auditor	Accounting	North Carolina	contract	mid_senior	bachelors	south
J_6736_Senior Accountant	Accounting	Texas	contract	associate	bachelors	south
J_4871_CPA Accounting Manager / Medical Billing	Accounting	Texas	full-time	mid_senior	bachelors	south
J_701_Accountant / Book Keeper	Accounting	Virginia	full-time	mid_senior	bachelors	south
J_4873_Controller - High Growth Specialty Finance Company	Accounting	Virginia	full-time	mid_senior	bachelors	south
J_2128_Accounts Payable Supervisor	Accounting	Oklahoma	full-time	associate	bachelors	south
J_687_Accountant	Accounting	New York	full-time	mid_senior	bachelors	northeast
J_3057_Accounting Manager	Accounting	Maine	full-time	mid_senior	bachelors	northeast
J_6081_Corporate Controller	Accounting	New York	full-time	mid_senior	bachelors	northeast
J_10433_Payroll Accountant	Accounting	Pennsylvania	full-time	mid_senior	bachelors	northeast





Findings

Limitation and future works

1. Unsupervised learning

Collection of more data


2. Adapt to local data

Currently, both dataset are US based data. Next, we need to explore to scrape local data, otherwise collect data through the app.

3. Include all functions and focus

To include more functions so that the app can cater to wider community.

4. Skill sets



Question?

Thank you

General Assembly DSI13

Shilin Huang

24 Apr 2020

