

Using Machine Learning to Develop More Intelligent Labor Market Data and Applications for Low/Middle Skill Workers

April 24, 20016

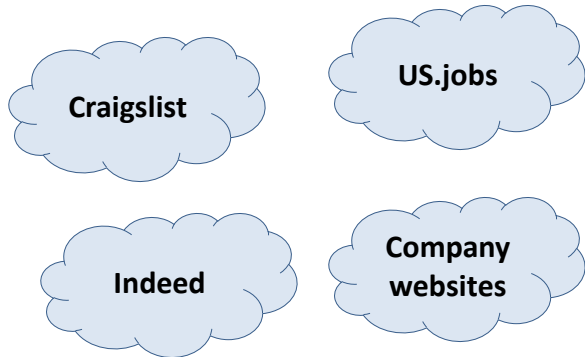
As technological advances continue to permeate the economy, occupational and geographic communities must effectively bridge skill gaps that are inherently created in the labor market.

Today, there are many intelligent platforms that connect high skill workers to potential employers, professional networks, and other occupations. However, the current data and tools available to low/middle skill worker communities are limited. Federal and state policymakers can do more to collect richer labor market data from the internet and incorporate simple machine learning models into existing platforms that personalize labor market tools for low/middle skill workers. With more data and intelligent tooling, the DOL can develop deeper insights into the labor market and labor market participants can greatly benefit from more customized applications.

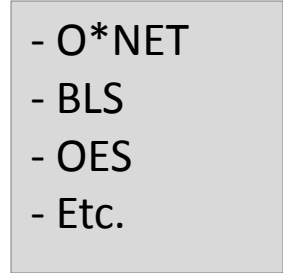
To illustrate how unstructured labor market data can be combined with existing labor market data, we developed an engine that pulls job postings from Craigslist and classifies them into standard government occupational codes. Not only are occupational/skill forecasts enhanced with finer grain data, but the same classification engine can also be leveraged in existing government applications to personalize job searches and optimize resources for low/middle skill workers.

TODAY

Nonstandard/unstructured
job postings



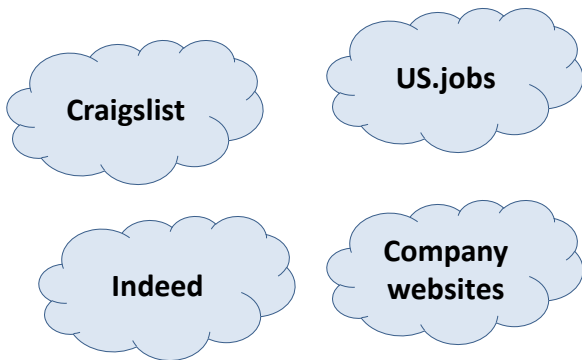
Structured
government data



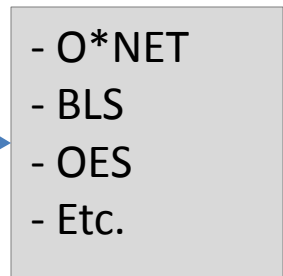
Today, middle and low skill job tracking/matching applications are limited to disjointed job posting sites and brittle tools.

OUR MODEL

Nonstandard/unstructured
job postings



Structured
government data




New applications can leverage machine learning techniques to quickly match low/middle skill job seekers to job openings

Our machine learning model can provide **richer labor market data** for low/middle skill workers

CL college station > jobs > admin/office post account

reply prohibited Posted: 4 days ago print

★ **Support Services Assistant**



compensation: \$10 to \$11

employment type: full-time

70 YEARS
INNOVATING
THE WAY WORK
GETS DONE

spherion
STAFFING SERVICES

spherion

Spherion Staffing, a noted leader in the staffing industry, is currently searching for a Support Services Assistant. A qualified candidate must be able to take direction and instruction well, without constant supervision. The ability to communicate openly and frequently and response smoothly to constructive criticism, is greatly valued. They must provide exceptional common sense and practical approaching to solving concrete problems. An ideal candidate should successfully resolve client or customer problems in a positive, calm, and professional manner. This position is full-time, starting in the summer, with the potential to continue.

Duties:

- Upload surveys, invoices, termite reports, tax certificates, payoffs, etc.
- Copy documents after closing
- Send out check and lender packages
- Send FedEx packages and mail-outs
- Upload and file 1099's
- Send copy of address sheet to all parties
- Organize and brad down documents in file
- Track file to Post Closing
- File stray documents

Requirements:

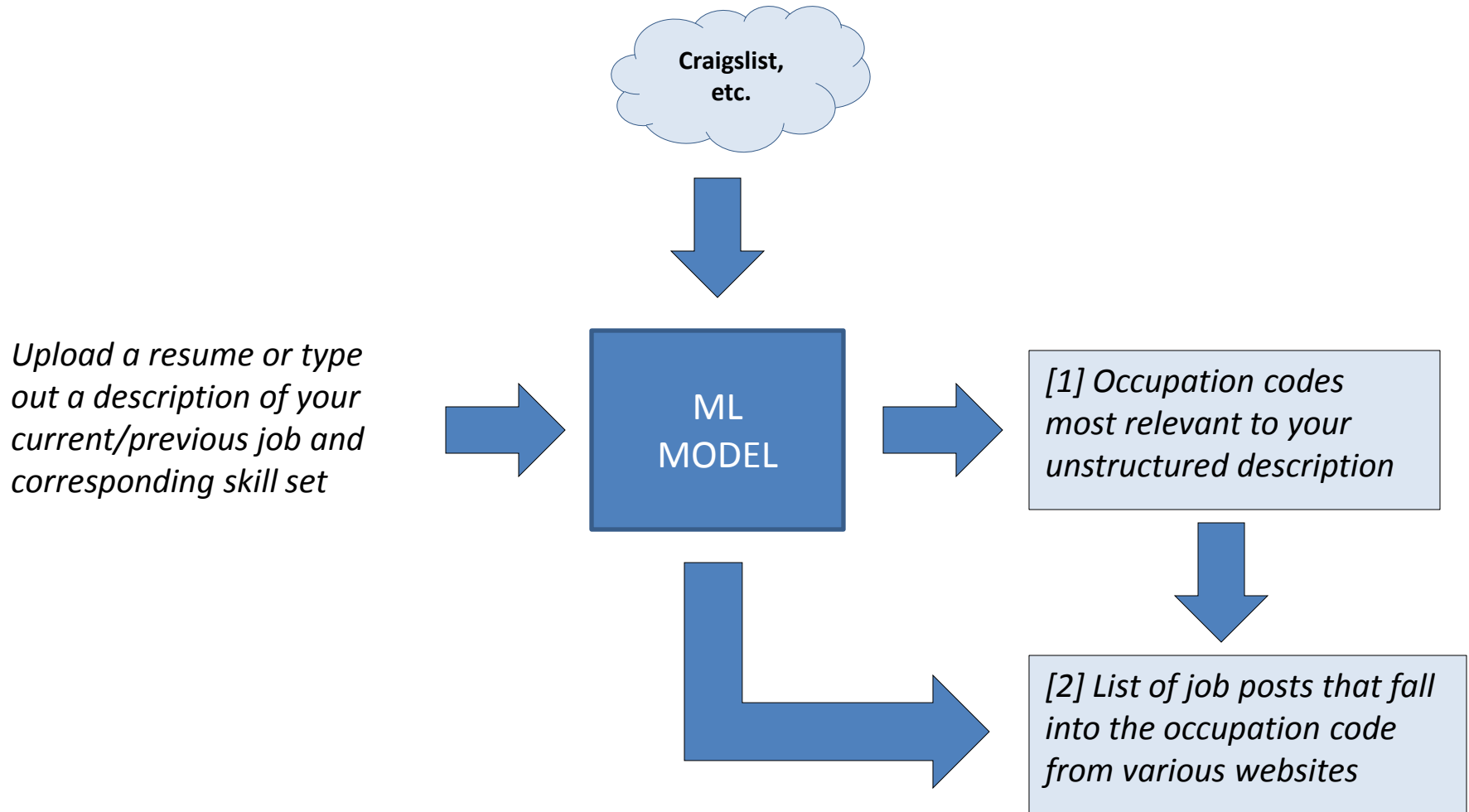
- Bachelor's degree preferred, but high school diploma or GED required

ML
MODEL

SOC Code	Occupation Title
43-4071.00	File Clerks

Based on Craigslist job posting descriptions, the machine learning model accurately classifies the job posting into the appropriate government occupation code. The ability to pull unstructured job postings from the internet and accurately classify them into standard government occupation codes allows for richer labor market data

Our machine learning model can provide **richer labor market applications** for low/middle skill workers



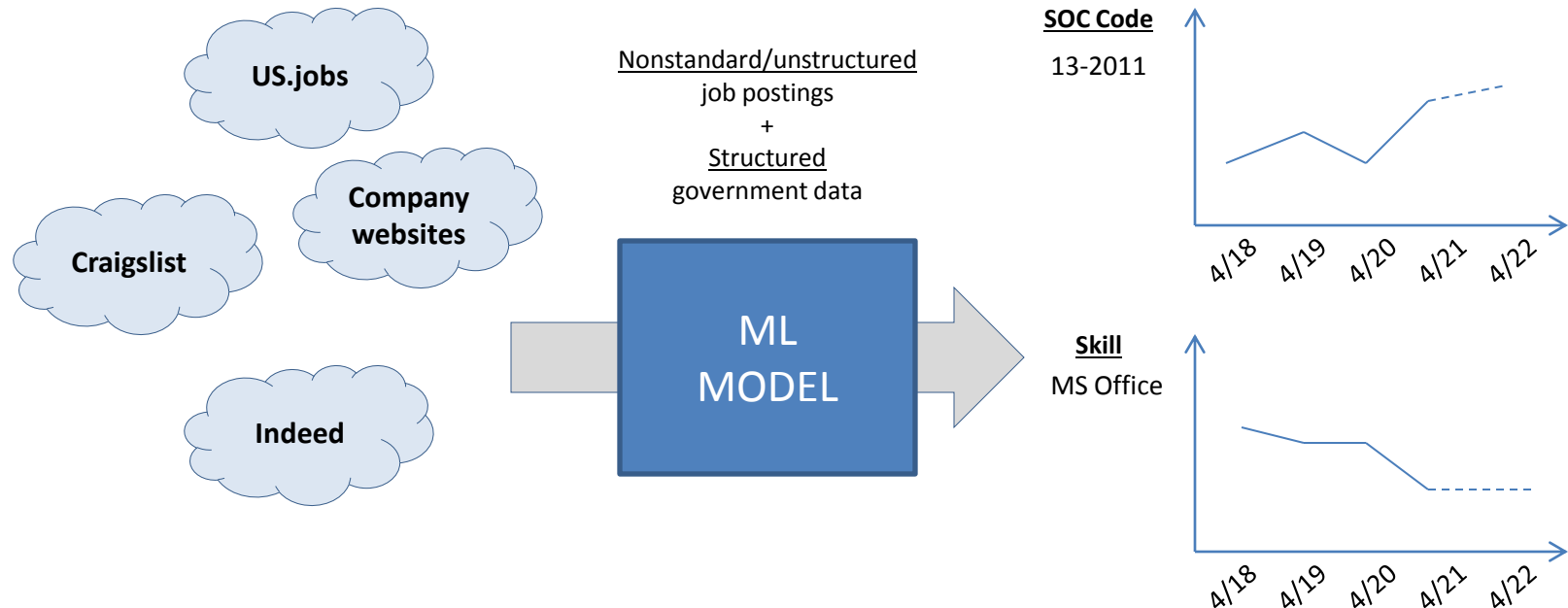
Example of richer low/middle skill job market data using machine learning

TODAY

10-year Job
Forecast by
Occupation Code

SOC Code	2014	2024	Number (in thousands)	Percent	Job openings (in thousands)
13-2011	1,332.70	1,475.10	142.4	10.7	498
27-2011	69.4	76.1	6.6	9.6	34
15-2011	24.6	29	4.4	18.1	11.7
51-9191	18.4	17.1	-1.2	-6.8	4.8
23-1021	15	14.5	-0.5	-3.6	2.2
40-6090	287.3	310.8	23.5	8.2	77.2
25-3011	77.5	83	5.5	7.1	20.1
40-848	31	32.4	1.5	4.7	11.4
41-3011	167.9	163.4	-4.5	-2.7	49.8
17-3021	11.4	11.8	0.4	3.6	3.2
17-2011	72.5	70.8	-1.6	-2.3	20.7
13-1011	19.7	20.2	0.5	2.5	6.8
19-4011	33	34.7	1.6	4.9	12.4

OUR MODEL



Example of a richer low/middle skill job market application using machine learning

INPUT

Nannies 39-9011.01

Structured
government data

- O*NET
- BLS
- OES
- Etc.

Occupation Title	Occupation Code
Preschool Teachers, Except Special Education	25-2011.00
Teacher Assistants	25-9041.00
Social and Human Service Assistants	21-1093.00
Self-Enrichment Education Teachers	25-3021.00
Childcare Workers	39-9011.00
Occupational Therapy Assistants	31-2011.00
Recreation Workers	39-9032.00
Fitness Trainers and Aerobics Instructors	39-9031.00
Personal Care Aides	39-9021.00
Residential Advisors	39-9041.00

INPUT

Nanny Resume Sample

322 East 65th Street, New York City, NY 10065
(917) 255-9643
jane.doe@gmail.com

PROFESSIONAL PROFILE

- Nanny with over 5+ years of experience providing exceptional care to children aged 2 to 14
- Adept at organizing children's daily schedules, including meals, school, and recreational activities
- Proficient in communicating with children at different developmental stages, and strong ability to assist children with school work
- Consistently receive outstanding feedback from parents and children, with numerous referrals

PROFESSIONAL EXPERIENCE

The Brown Family (NY, Brooklyn) New York, NY
Live-in Nanny September 2014 – Present

- Care for two boys, aged 2 and 4
- Prepare and serve meals with balanced nutrition, ensuring food safety for 4-year-old's peanut allergy, while trained on emergency response
- Organize fun and educational games, read storybooks that increased children's interest in story time, and plan outdoor activities such as walking to the local playground and park
- Perform light housekeeping duties and run errands including grocery shopping that saved parents 20 weekly hours from house-related tasks
- Meet with parents on a weekly basis to discuss plans for following week, as well as other issues

The Leigh Family (NY, Upper East Side) New York, NY
Nanny May 2010 – August 2014

- Cared for three children, aged 7 (girl), 9 (boy), and 14 (girl)
- Managed an active calendar of appointments including school, art classes, sports clubs, and piano lessons
- Handled all transportation pick up and drop off of children
- Provided tutoring to children in Math and English, assisting with homework and school projects, that resulted in 35% average improvement in all children's grades
- Intervened during strong disagreements, establishing open and safe environment for communication

EDUCATION

Blue Ridge Community College, Weyers Cave, VA
Associate of Arts in Music, May 2013
GPA: 3.5/4.0

ADDITIONAL SKILLS

- Ability to play the guitar, piano, and harmonica
- New York Driver's License

Nonstandard/unstructured
job postings

+
Structured
government data

ML
MODEL

Occupation Title	Occupation Code
Nannies	39-9011.01
Childcare Workers	39-9011.00
Kindergarten Teachers, Except Special Education	25-2012.00
Preschool Teachers, Except Special Education	25-2011.00
Child, Family, and School Social Workers	21-1021.00
School Psychologists	19-3031.01
Elementary School Teachers, Except Special Education	25-2021.00
Education Administrators, Elementary and Secondary School	11-9032.00
Middle School Teachers, Except Special and Career/Technical Education	25-2022.00
Bus Drivers, School or Special Client	53-3022.00
Personal Care Aides	39-9021.00

Technology Stack of Sample Use Case

Nanny Resume Sample	
322 East 65th Street, New York City, NY 10065 (917) 215-9662 jane.doe@gmail.com	
PROFESSIONAL PROFILE	
<ul style="list-style-type: none">Nanny with over 10 years of experience providing exceptional care to children aged 2 to 14Adept at organizing children's daily schedules, including meals, school, and recreational activitiesProficient in communicating with children at different developmental stages, and strong ability to assist children with school workConsistently receive outstanding feedback from parents and children, with numerous referrals	
PROFESSIONAL EXPERIENCE	
The Brown Family (NY Brooklyn)	New York, NY September 2014 - Present
<ul style="list-style-type: none">Care for two boys, aged 2 and 4Prepare and serve meals with balanced nutrition, ensuring food safety for 4-year old's peanut allergy, while trained in emergency responseOrganize fun and educational games, read storybooks that increased children interest in story time, and plan outdoor activities such as walking to the local playground and parkPerform light housekeeping duties and run errands including grocery shopping that saved parents 20 weekly hours from house related tasksMeet with parents on a weekly basis to discuss plans for following week, as well as other issues	
The Leigh Family (NY Upper East Side)	New York, NY May 2010 - August 2014
<ul style="list-style-type: none">Cared for three children, aged 7 (girl), 9 (boy), and 14 (girl)Managed an active schedule of appointments including school, art classes, sports clubs, and piano lessonsHandled all transport when pick up and drop off of childrenProvided tutoring to children in Math and English, assisting with homework and school projects, that resulted in 15% average improvement in all children's gradesIntervened during strong disagreements, establishing open and safe environment for communication	
EDUCATION	
Blue Ridge Community College, Weyers Cave, VA Associate of Arts in Music, May 2013	
<ul style="list-style-type: none">GPA: 3.5/4.0	
ADDITIONAL SKILLS	
<ul style="list-style-type: none">Ability to play the guitar, piano, and harmonicaNew York Driver's License	

WEB APP

SUBMIT RESUME

Where are your top occupations?



**YOUR TOP OCCUPATIONS
BASED ON RESUME/TEXT:**

[1]
[2]
[3]

CL LINKS BY SELECTED STATE:

[1]
[2]
[3]

Low/Middle
Skill Worker

[A] RESUME
OR
[B] UNSTRUCTURED TEXT

ML
MODEL

HEROKU

Postgress DB

Craigslist

I'm a nanny with 5 years of experience. I love kids and am very family oriented. Most of my experience is taking care of preschool children.

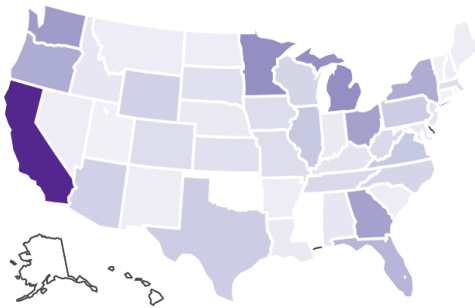
Proof of Concept: Personalized Job Recommendations for Low/Middle Skill Workers

machine welder plant manager operator steel worker

Choose File No file chosen

Upload

Related Jobs



	soc	Title
0	51-4041.00	Machinists
1	51-8099.00	Plant and System Operators, All Other
2	51-8013.00	Power Plant Operators
3	51-8031.00	Water and Wastewater Treatment Plant and Syste...
4	51-9011.00	Chemical Equipment Operators and Tenders
5	51-9012.00	Separating, Filtering, Clarifying, Precipitati...
6	53-7071.00	Gas Compressor and Gas Pumping Station Operators
7	11-3051.00	Industrial Production Managers
8	47-2221.00	Structural Iron and Steel Workers
9	51-8092.00	Gas Plant Operators
10	51-9199.00	Production Workers, All Other

Ohio		
Get Jobs!		
56	http://cleveland.craigslist.org/trp/5548714796...	Dedicated Owner Operator Trucking Jobs
61	http://columbus.craigslist.org/lab/5548164025....	26 Production Jobs! QA, Line Leads, Machine Op...
75	http://detroit.craigslist.org/wyn/mnu/55479217...	MACHINIST TRAINEE
135	http://jxn.craigslist.org/mnu/5502076506.html	Machinist
136	http://jxn.craigslist.org/mnu/5547802169.html	IMMEDIATE OPENINGS
210	http://pittsburgh.craigslist.org/lab/554791915...	Natural Gas Workers for 2016!
225	http://parkersburg.craigslist.org/trd/55488516...	Equipment Operator (Crushing Plant)
228	http://pittsburgh.craigslist.org/trd/554809224...	Machinist/Automotive
236	http://pittsburgh.craigslist.org/bus/554801012...	Looking for a career? Click here!
237	http://pittsburgh.craigslist.org/mnu/554801089...	Manufacturing Maintenance Manager
350	http://youngstown.craigslist.org/ofc/552913316...	I-commute and save gas
352	http://toledo.craigslist.org/trd/5548211686.html	Machinest
361	http://youngstown.craigslist.org/trd/554810967...	Machinist/ Automotive
363	http://youngstown.craigslist.org/trp/550589350...	Hiring Owner Operator OTR
379	http://zanesville.craigslist.org/trp/550665634...	Are You Driven To Drive?
387	http://windsor.craigslist.ca/lab/55482603...	Forklift Operator - Afternoon Crossdock Operat...

Low/Middle Skill Job Engine: Future Work

- Collect more data from Craigslist and other job posting websites
- Automate the data collection process from these sources
- Tune machine learning model to refine job recommendations
- Build tools to summarize occupation/skill trends and forecasts by geography

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