

SkillTree

Your Map to Become Anything



Team Anything



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Problem

Impact of COVID-19 in Singapore's Business and Economy:

46%

Below-average(global)
employee engagement
score for Singapore
(DSRInsight 2020)

2.9%

Highest Unemployment
rate in more than a
decade (Ministry of
Manpower, Singapore
2020)

8130

Retrenchment in
Singapore more than
doubled in Q2 (Ministry
of Manpower, Singapore
2020)

-7% to -4%

Forecast for Singapore
GDP Growth
Downgraded (Ministry of
Trade and Industry,
Singapore 2020)

Business Continuity and Economic Resilience Requirement for Human Resource

- Ability to absorb, adapt, and effectively respond to change
- Diversity of skills, leadership, knowledge, and experience



Current Solutions

(A) Human Resource Management

Applicant Tracking System (ATS) and Resume Scanner like LinkedIn Recruiter, Freshteam and Manatal.

- Identify keywords
- Streamline hiring process

Limitations:

- Optimized only for recruitment
- Lost opportunities for further engagement

(B) Skills Upgrading

Government Initiatives like SkillsFuture, SGUnited Jobs and Skills Package, Workforce Skill Qualifications (WSQ) Schemes

- Recognize skills
- Lower cost for retraining
- Encourage skills upgrading

Limitations:

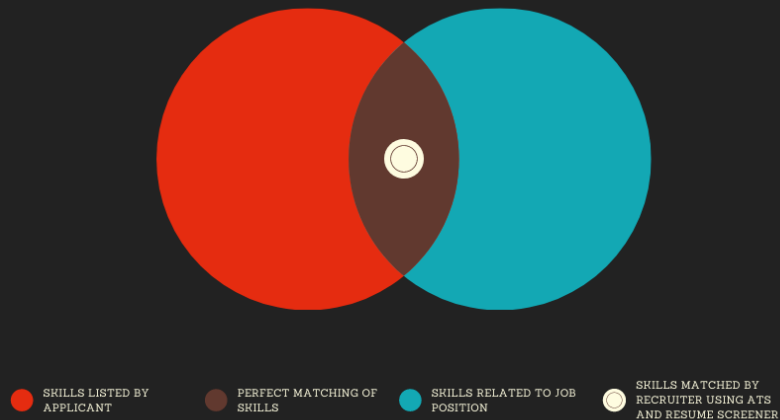
- Mismatch issue persists
- Slow reaction to trends

Solution: SkillTree

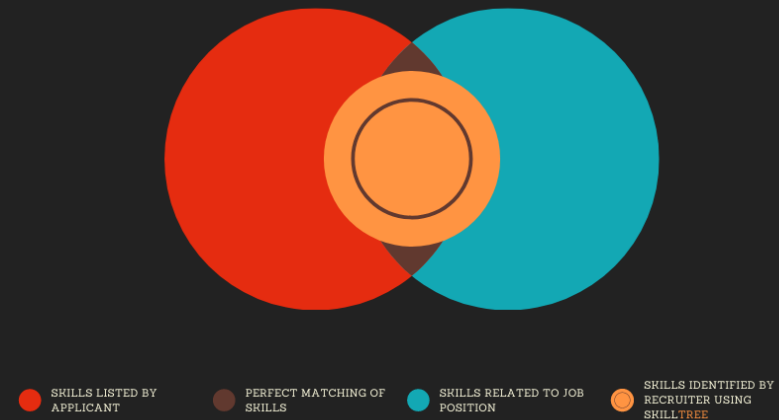


- system powered by artificial intelligence (AI) to identify and recommend relevant skills a (potential) employee is lacking based on trends and demand.

TRADITIONAL ATS AND RESUME SCREENER



SKILLTREE



User Case: Retrenched worker



Sasha

Job: Restaurant Manager

Company: Buffalo Buffet

Industry: Food and Beverages

Problem:

“Due to COVID-19, I am now jobless! I wish to upskill myself to find new jobs, but I don’t know what to learn.”

User Case: Retrenched worker



My skills:

“I have an eye for **design**. My previous work required me design simple posters for the restaurant’s Facebook page with an iPad app.”

From recent job postings:

Identify **Web development** as the new trend, because many businesses are trying to digitalise

SkillTree recommends

UI/UX Designer

Relevant skills:



User Case: Human Resource



Carrie

Job: Human Resource Executive

Company: High-Techvators

Industry: Electronics

Problem:

“Due to COVID-19, budget for manpower is cut to ensure leanness but the company still needs to innovate and keep up with the latest **Cloud technologies** which I lack expertise on. What should I do?”

User Case: Human Resource

SkillTree

Input:

Cloud Architect

Output:

Employees with relevant or similar skills and what skills they can sign up for to become more relevant as Cloud Architect

Relevant Skills Listed:



Carrie:

“YES, the IT department is sizing down, but I found that Thompson from the IT department have some experience in AWS, I can engage him to learn Kubernetes such that he can relocate to the Cloud department as a Cloud Architect if he is keen!”



Technical Feasibility

<https://github.com/gau-nernst/MLDA-DLW2020-Anything>

Data input

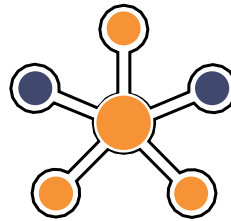
Job postings on
hiring websites



Anonymized resumes
from HR departments



SkillTree



An NLP model that links
skills with jobs

Potential models to explore:

- Word Embeddings
- Attention Models
- Transformer Models

Cloud deployment



Language model
deployed on the cloud

REST API



Web and mobile
application

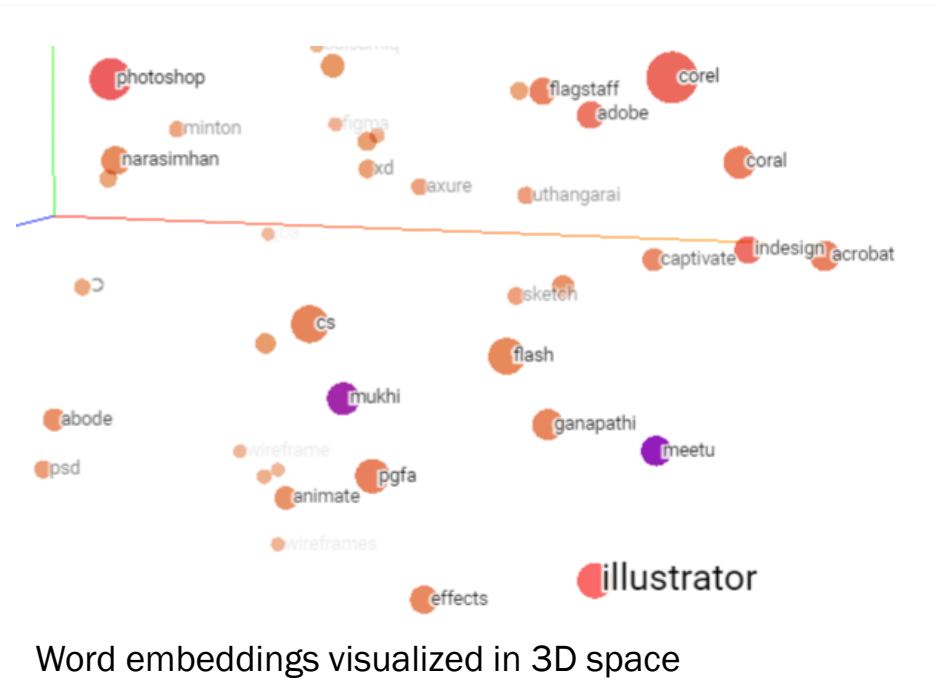
Proof of Concept

Train word embeddings on **Job description** and **Resume** datasets with FastText

<https://www.kaggle.com/bman93/dataset> - 72,292 job descriptions

<https://www.kaggle.com/avanisiddhapura27/resume-dataset> - 14,804 resumes

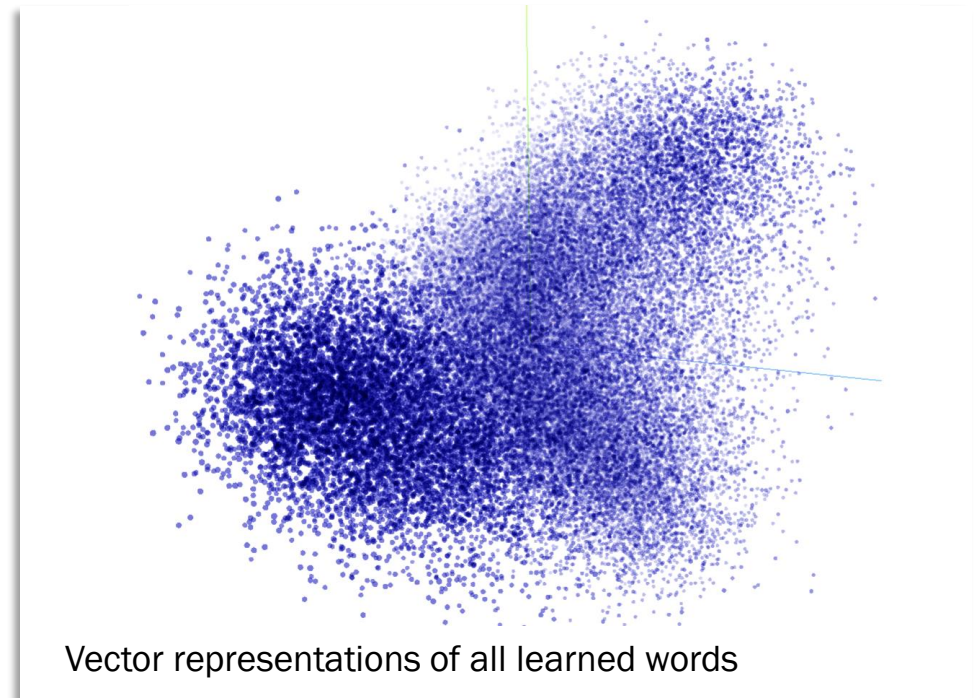
<https://www.kaggle.com/oo7kartik/resume-text-batch> - 15,052 resumes



<https://github.com/gau-nernst/MLDA-DLW2020-Anything>

Known limitations:

- The dataset is highly biased towards tech roles → not representative of all sectors
- “Dirty” data → word embeddings contain many non-sensical words



Insights from the data

The model accurately suggests relevant skills for a Python programmer

```
model.get_nearest_neighbors('python')
```

```
[(0.8788841962814331, 'django'),  
 (0.8689177632331848, 'pythonr'),  
 (0.8445206880569458, 'python.'),  
 (0.8413882851600647, 'pythondjango'),  
 (0.8320752382278442, 'flask'),  
 (0.8208838105201721, 'flaskdjango'),  
 (0.8149656653404236, 'jspython'),  
 (0.8005028367042542, 'ipython'),  
 (0.7890084981918335, 'webscraping'),  
 (0.7855991721153259, 'djangoflask')]
```

Similar words to the word 'python'

Different Job title form distinct clusters
→ Our POC can identify the different skillsets required for each job



Vectors of job descriptions, reduced dimensionality with PCA and categorized by Job title

Feasibility

Government Deployment

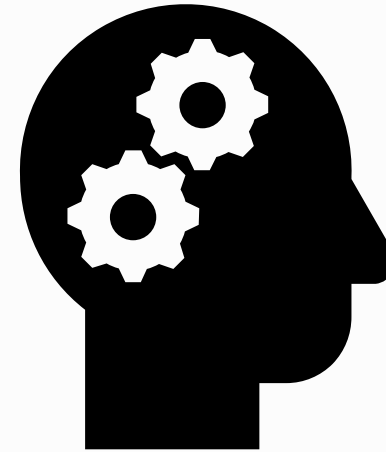


Policies Formulation

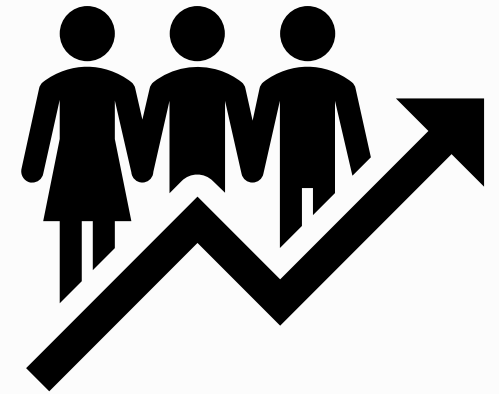


Re-equipping
Workforce

Internal Deployment



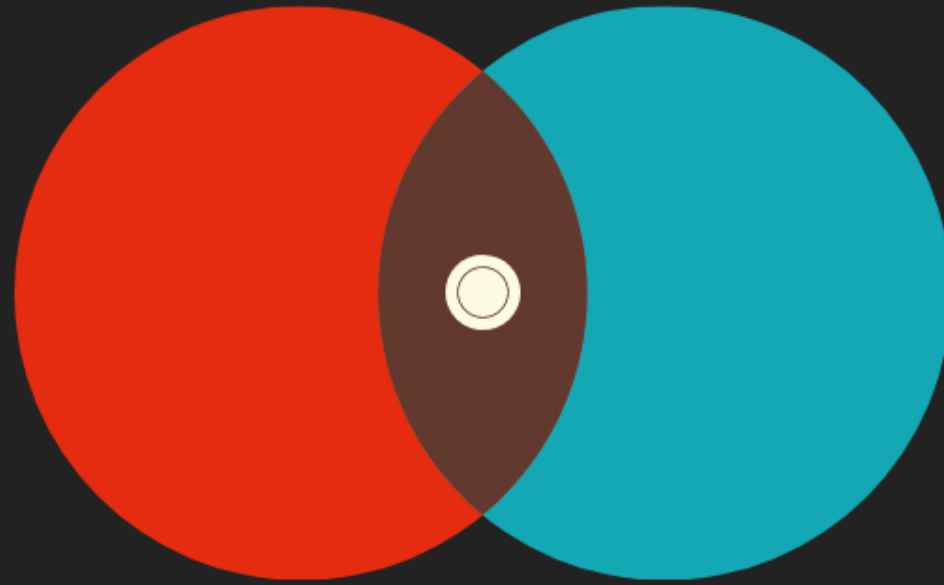
In-built Adaptability
& Resiliency



Engagement &
Reallocation

Appendix

TRADITIONAL ATS AND RESUME SCREENER



SKILLS LISTED BY
APPLICANT



PERFECT MATCHING OF
SKILLS

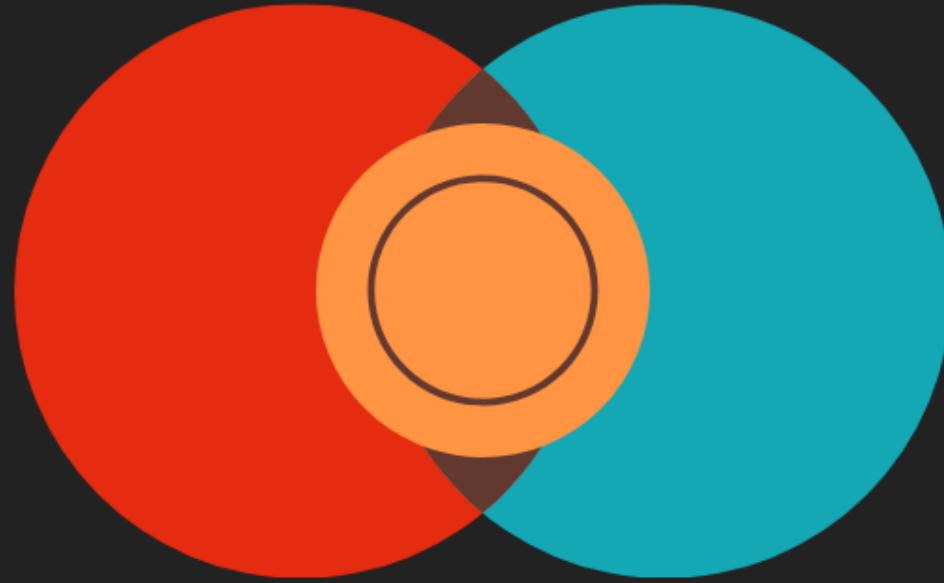


SKILLS RELATED TO JOB
POSITION



SKILLS MATCHED BY
RECRUITER USING ATS
AND RESUME SCREENER

SKILLTREE



SKILLS LISTED BY
APPLICANT



PERFECT MATCHING OF
SKILLS



SKILLS RELATED TO JOB
POSITION



SKILLS IDENTIFIED BY
RECRUITER USING
SKILLTREE