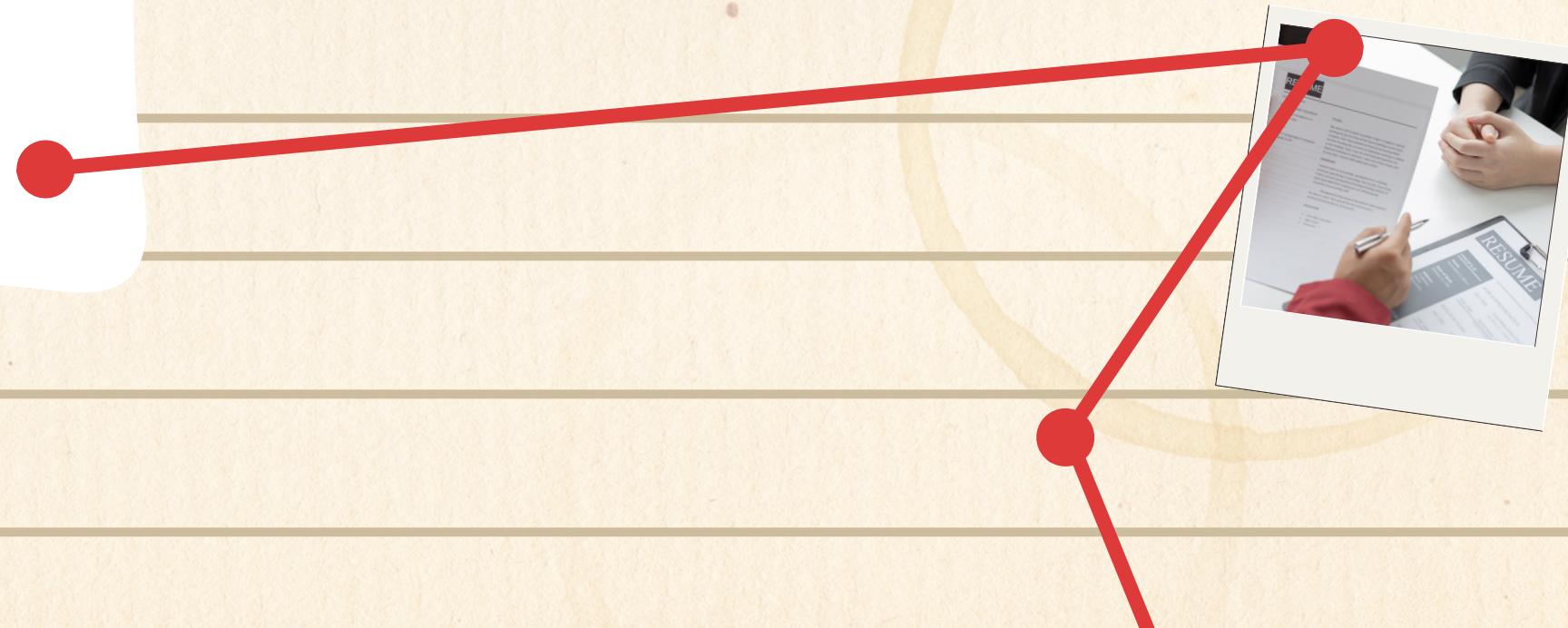


Why do some job openings remain unfilled for months, while countless job seekers struggle to find employment?

THE JOB SKILL MISMATCH DILEMMA



How accurate is
the match between
the job
requirements and
the applicants'
skills?

THE JOB SKILL MISMATCH DILEMMA





HIRING DETECTIVE:

UNMASKING KEY PATTERNS IN

LinkedIn JOB POSTINGS

WITH FREQUENT ITEMSET MINING



OUTLINE



problem statement



dataset & methodology



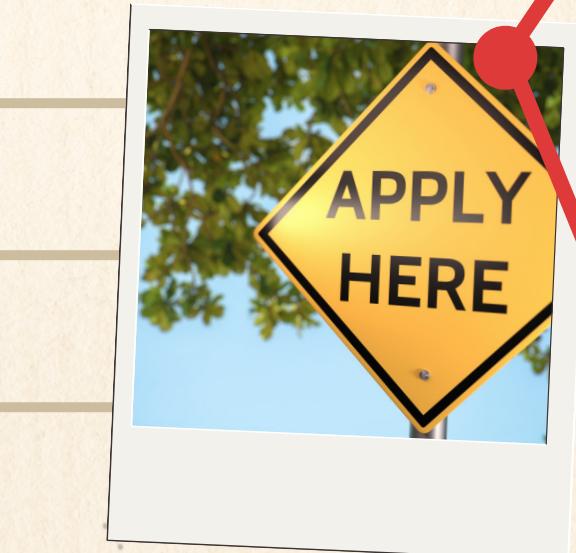
use cases

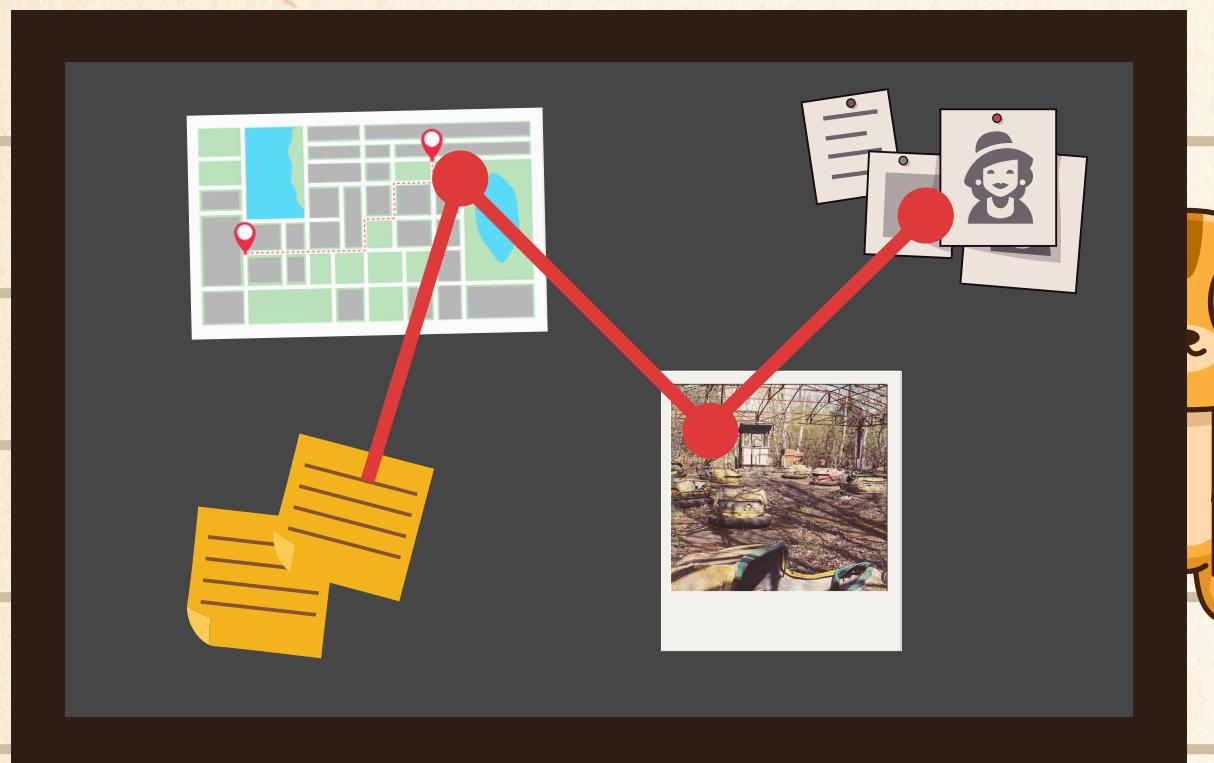


business value



further studies





THE PROBLEM

Address the job skill
mismatch dilemma,
which causes
inefficiencies in
hiring processes.

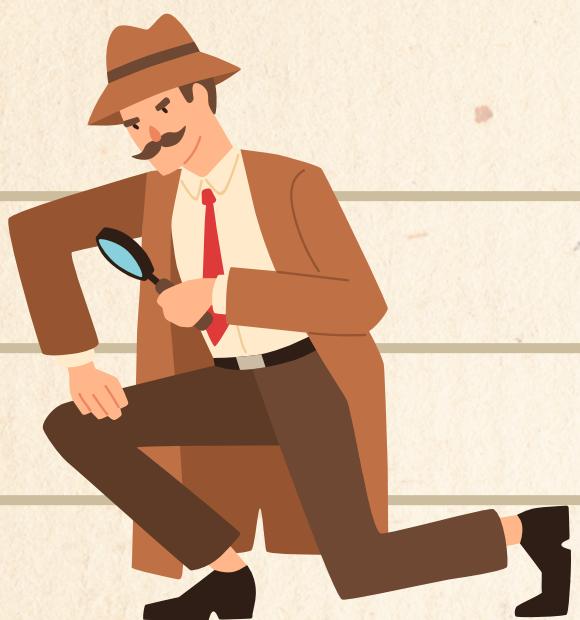


SKILLS DATABASE

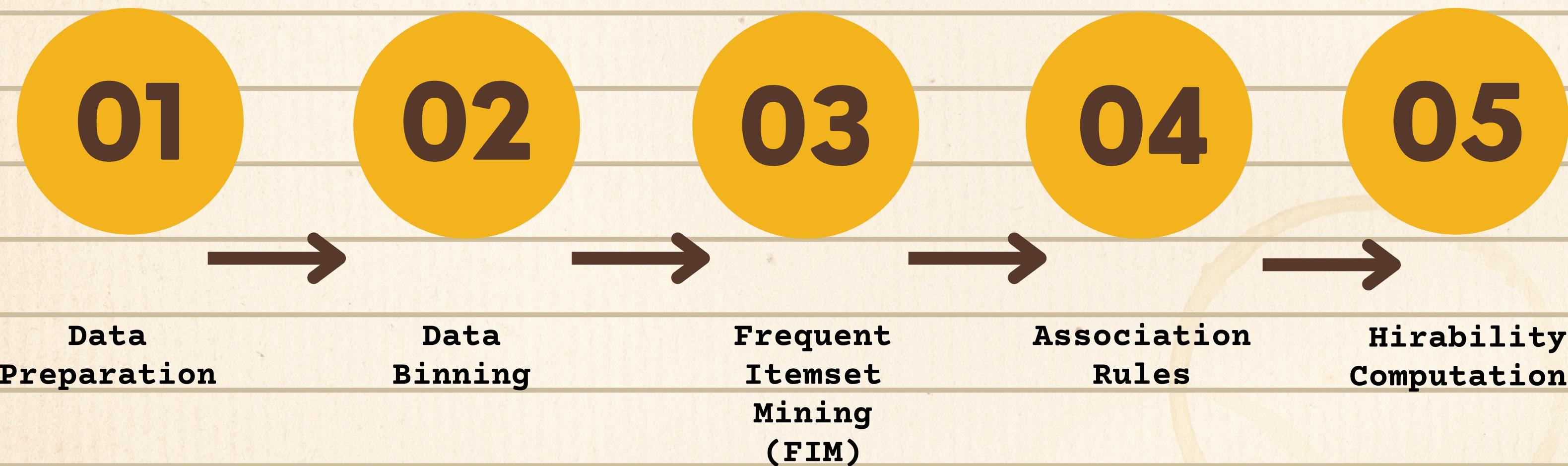
- The LinkedIn dataset contains **12,217 job postings** focusing exclusively on **tech job opportunities**.
- Each entry in the dataset offers detailed information, including job titles, company profiles, geographical locations, and relevant search parameters.

Columns	Content
job_link	actual job link of the job posting
job_title	full job title of the job opening (Ex. Senior Data Warehouse Developer / Architect)
job_skills	list of skills needed for the job opening



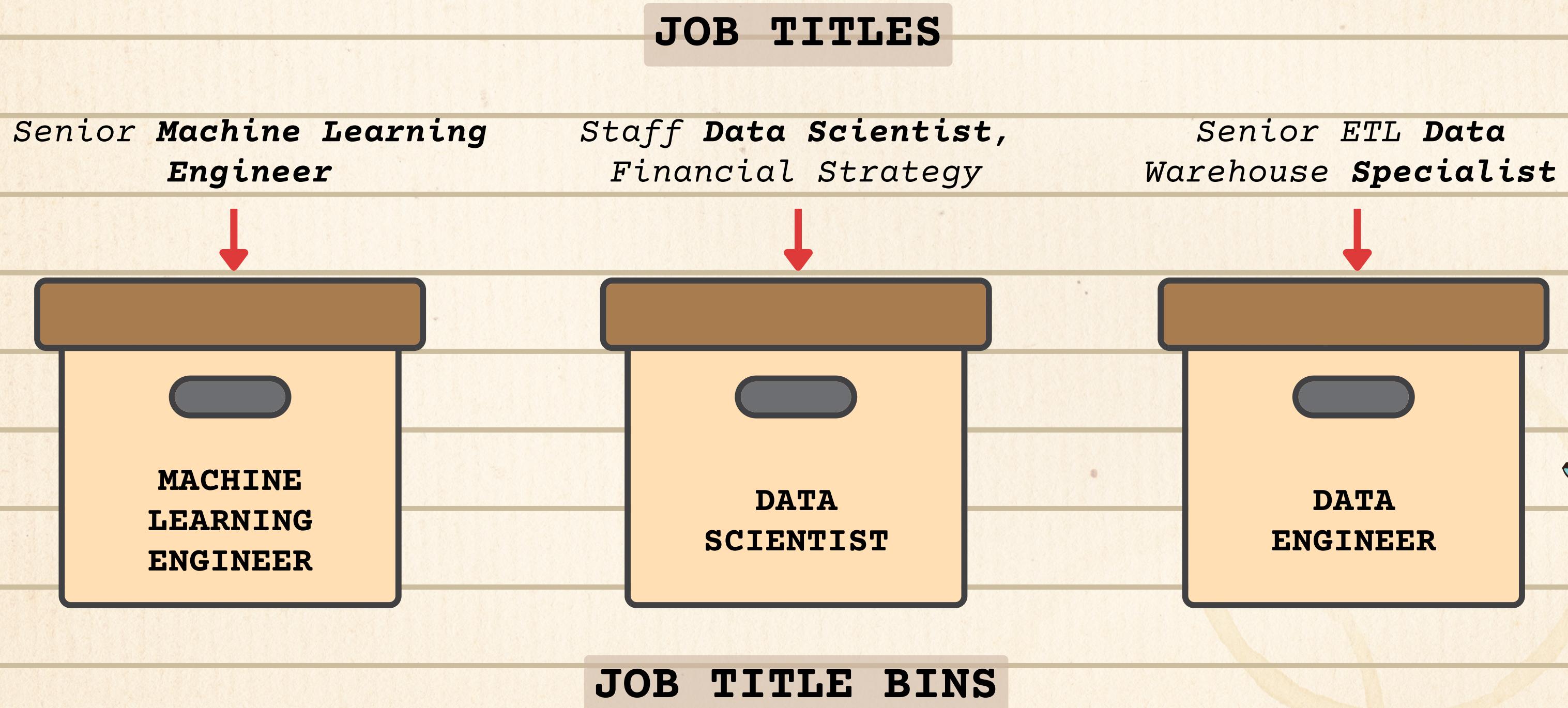


METHODOLOGY



DATA PREPARATION - JOB BINS

methodology



TOP SKILLS IN OUR DATABASE methodology



RECOMMENDING SKILLS

methodology

Step 1:

Set the Parameters:

Target Job: Tech/Data Lead

Current skills: {hadoop, sql, python, spark}

Number of skills to be added (n) : 2



RECOMMENDING SKILLS

methodology

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Number of skills to be added (n) : 2

Step 2:

Apply Frequent Item Mining:

- **Antecedent/s** are formed from current skills
- **Consequent/s** are based on ↑ lift and
↑ confidence





RECOMMENDING SKILLS

methodology

Step 1:

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antecedents	consequents
{hadoop}	{sql}
{sql, python}	{spark}
{sql}	{python}
{python}	{data warehousing}
{hadoop, spark}	{data architecture}

RECOMMENDING SKILLS

methodology

Step 1:

Set the Parameters:

Target Job: Tech/Data Lead

Current skills: {hadoop, sql, python, spark}

Number of skills to be added (n) : 2

Step 2:

Apply Frequent Item Mining:

- **Antecedent/s** are formed from current skills
- **Consequent/s** are based on ↑ lift and ↑ confidence

Step 3:

Identify Added Skills:

- recommend 'n' unique skills that is **not in the current skills**

antecedents	consequents
{hadoop}	{sql} {sql}
{sql, python}	{spark} {spark}
{sql}	{python} {python}
{python}	{data warehousing}
{hadoop, spark}	{data architecture}

Additional Skills: {data warehousing, data architecture}

HIRABILITY COMPUTATION

methodology

$$\text{probability to get a job} = \frac{\text{no. skills matched}}{\text{no. of skills required by job}}$$

$$\text{hireability} \\ (\text{probability of getting any job in the DB}) = \frac{\sum_{i=1}^n \text{probability to get } job_i}{\text{total transactions in the DB (n)}}$$

BASE CASE

skills that the subject has now

STOCHASTIC CASE

add a number of **random** skills to subject's skill set

FIM CASE

add a number of **recommended** skills to subject's skill set

USE CASE

using frequent itemset mining
with association rules to
increase hirability



THE CASE OF A FRESH GRAD WANTING TO LAND A DATA SCIENTIST JOB

BASE CASE



current skills:

python
pandas
numpy



HIRABILITY: 4.01%

THE CASE OF A FRESH GRAD WANTING TO LAND A DATA SCIENTIST JOB

STOCHASTIC CASE



current skills:

python, pandas,
numpy

recommended

skills (random):

nlp, operations
research, tensorflow,
mathematics, sql



HIRABILITY: 4.11%

**100 iterations on average

THE CASE OF A FRESH GRAD WANTING TO LAND A DATA SCIENTIST JOB

FIM CASE



current skills:

python, pandas,
numpy

**recommended
skills (fim):**

statistics, machine
learning,
tensorflow, scikit
learn, data science



HIRABILITY: 13.24%



CASE #1 RECAP

fresh grad wanting to land
a data scientist job

BASE

HIRABILITY: 4.01%

**LIKELY TO GET INTO
32 OUT OF 799 JOBS**



STOCHASTIC

HIRABILITY: 4.11%

**LIKELY TO GET INTO
33 OUT OF 799 JOBS**

FIM

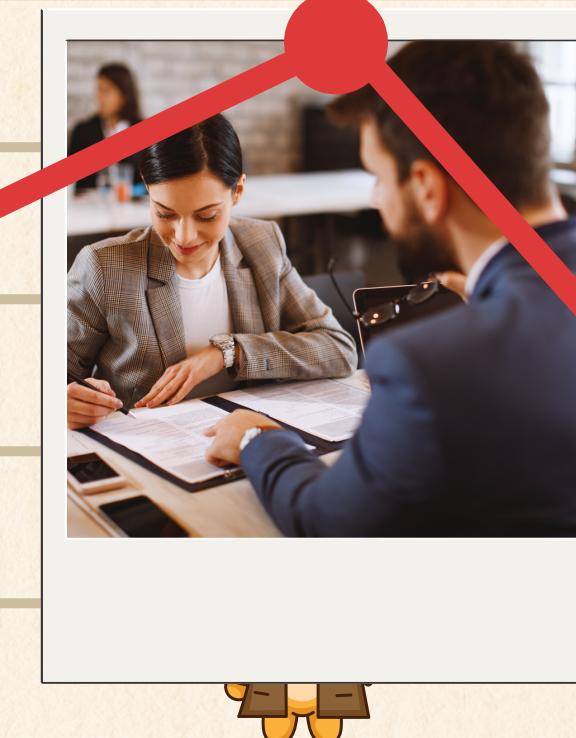
HIRABILITY: 13.24%

**LIKELY TO GET INTO
106 OUT OF 799 JOBS**

USE CASE FOR EMPLOYERS

01

Avoid blindly adding skills to job postings and reduce instances of **over qualifying** applicants



02

Develop programs aimed at **advancing the skills** of current employees



BUSINESS VALUE

Using frequent itemset mining with association rules in job skills can help with the following:

- **increase hirability** through prioritizing relevant skills
- **decrease cost implications** from blindly learning skills
- **reduce hiring costs** through efficiently creating job skills with reasonable requirements
- **create a more effective career progression track** for existing employees



FURTHER INVESTIGATION



MORE DATA

Add the following to the transaction database:

- years of experience
- job level
- company industry



ACTUAL

IMPLEMENTATION

Implement FIM in actual hiring scenarios and gather efficiency KPIs to test and refine the approach accordingly.



THANK YOU

MSDS PT 2025 A LT5 | CAMADO, M. | ITUCAL, V.
LACSON, A. | MANUEL, Y. | SACMAN, R.

