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Harnessing AI for Organizational Restructuring: Methods, Insights, & Future Innovations

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AGENDA

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- 📖 **Background:** Overview of IT reorganization
- ⚡ **Challenge:** Realigning roles of 500+ employees
- 🔍 **Our Approach:** Data-driven methods used
- 🏆 **Outcome:** Workforce decisions from data
- 💡 **Lessons Learned:** Refinements & insights
- 🚀 **Future Innovations:** Next steps and possibilities

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BACKGROUND

TEXAS A&M'S IT REORGANIZATION

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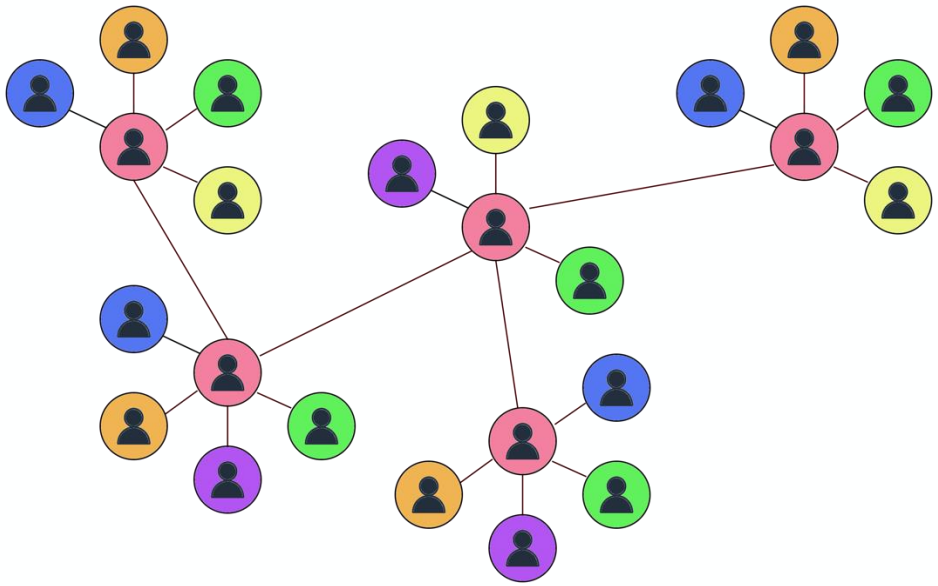
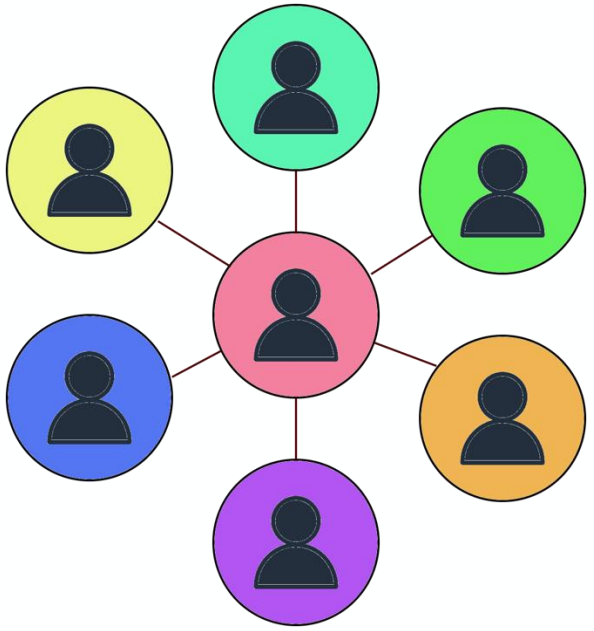
Decentralized Model



Centralized Model



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CHALLENGE

⚡ **Challenge:**
Reassign 500+ IT employees into specialized roles efficiently

🎯 **Goal:**
Use automation to accelerate skill-based role matching

⏳ **Timeframe:**
Two-week deadline required a rapid solution

AVAILABLE DATA

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Workday Export

Employee ID	Job Title	Job Description	Job Duties
—	—		50% 35% 15%

IT Skills Survey

Employee ID	Skill Cat	Skill	Other Skill	Proficiency
—				

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OUR APPROACH

DATA PROCESSING WORKFLOWS

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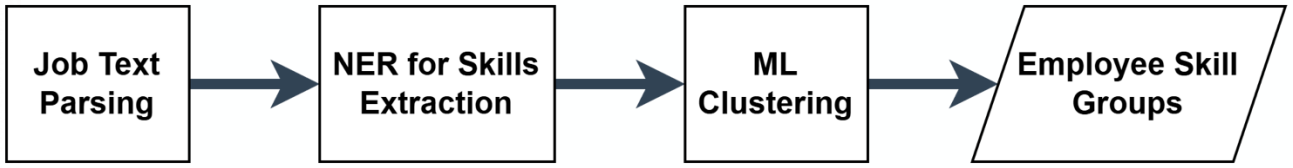
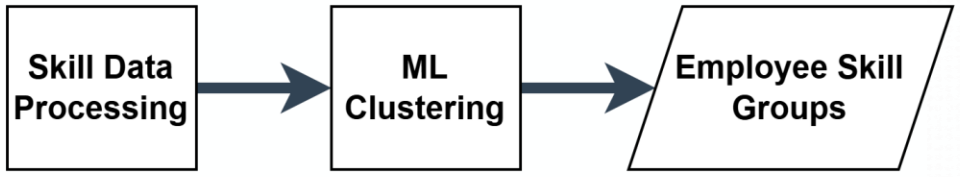
Workday Data



Workflow #1

Skills Survey Data



Workflow #2

BIGML CLUSTER VISUALIZATION

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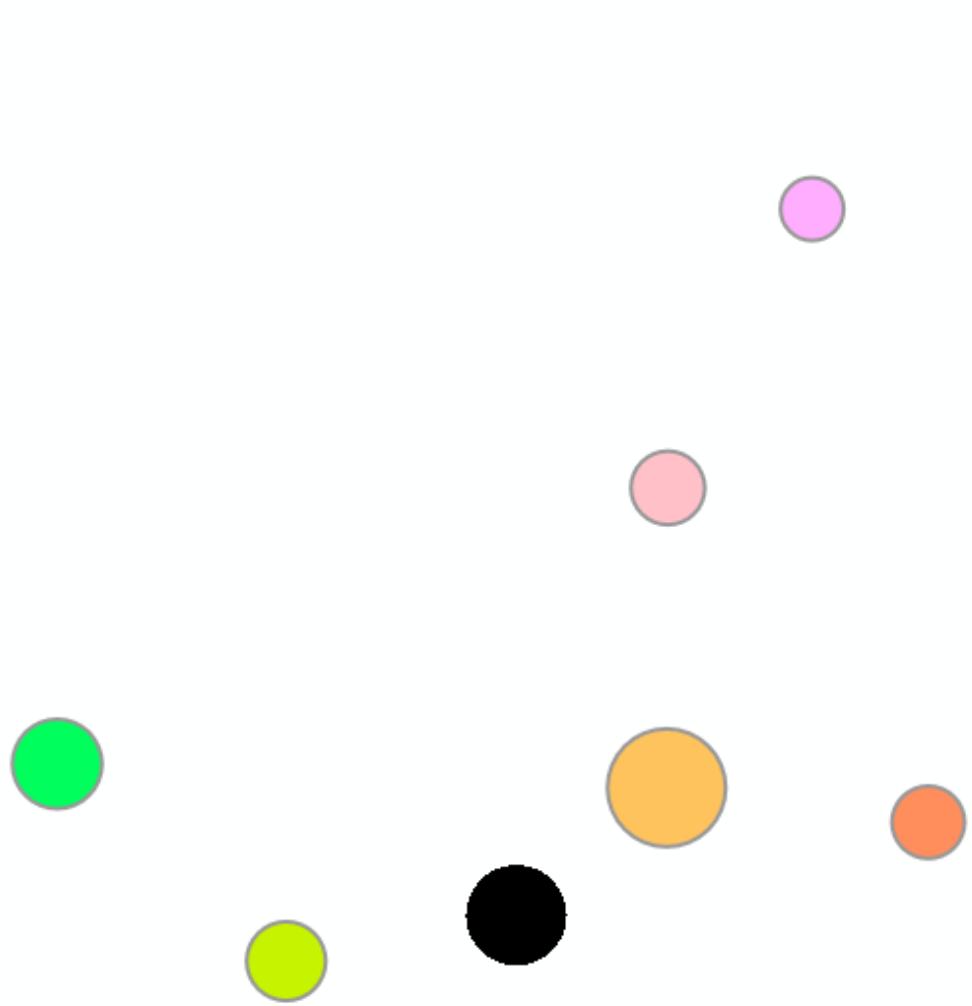

Cluster 3

DISTANCE HISTOGRAM

σ

54 instances

Centroid

Skill_Programming:	0.89
Skill_Project Manag...	0.54
Skill_Risk manage...	0.04
Skill_Server Admini...	0.26
Skill_ServiceNow:	0.11
Skill_SharePoint:	0.04
Skill_Storage Admi...	0.00
Skill_Virtualization:	0.09
Skill_Vulnerability a...	0.07
Skill_Wireless Netw...	0.02

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OUTCOME

OUTCOME

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- ✗ Clustering not used as planned
- ✓ Skill profiles enabled talent identification
- ✓ HR facilitated internal recruitment
- ✓ Successful employee role transitions

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LESSONS LEARNED

LESSONS LEARNED

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⚡ Speed vs. Feature Refinement

- ✅ Fast implementation with low-code ML tools
- 🔄 More stakeholder input could have improved skill selection

🛠️ Iteration Strengthens Results

- ✅ The tools worked well; refinements improved clustering
- 🔄 Iteration happened after the project, due to time limits

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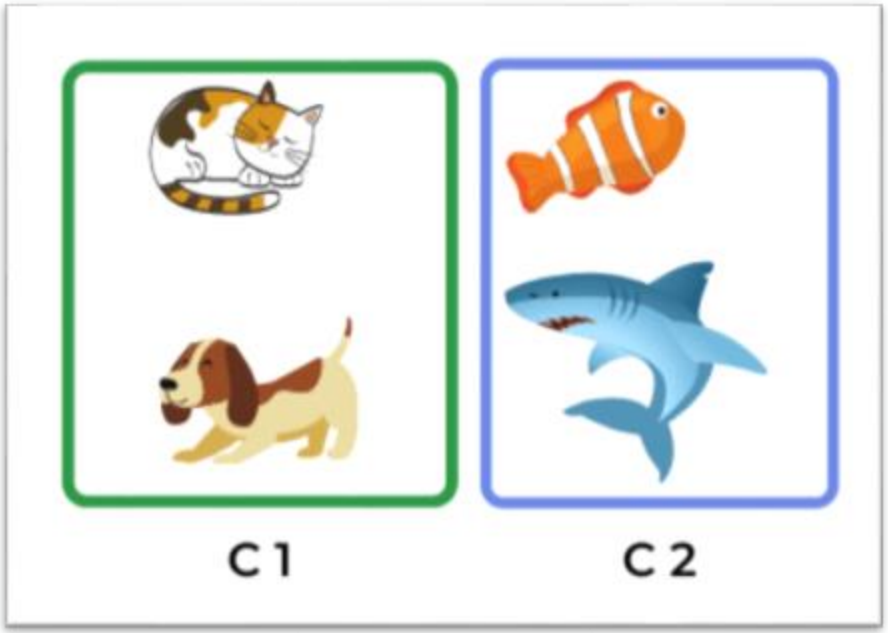
FUTURE INNOVATIONS

CLUSTERING VS CLASSIFICATION

Clustering

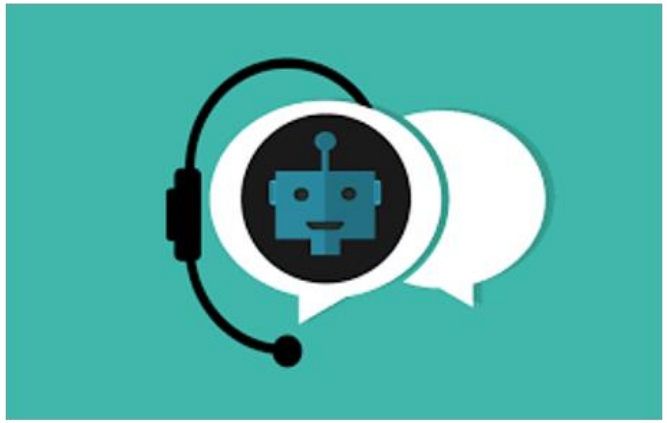


Classification

CLASSIFICATION PROBLEM

Recommendation System

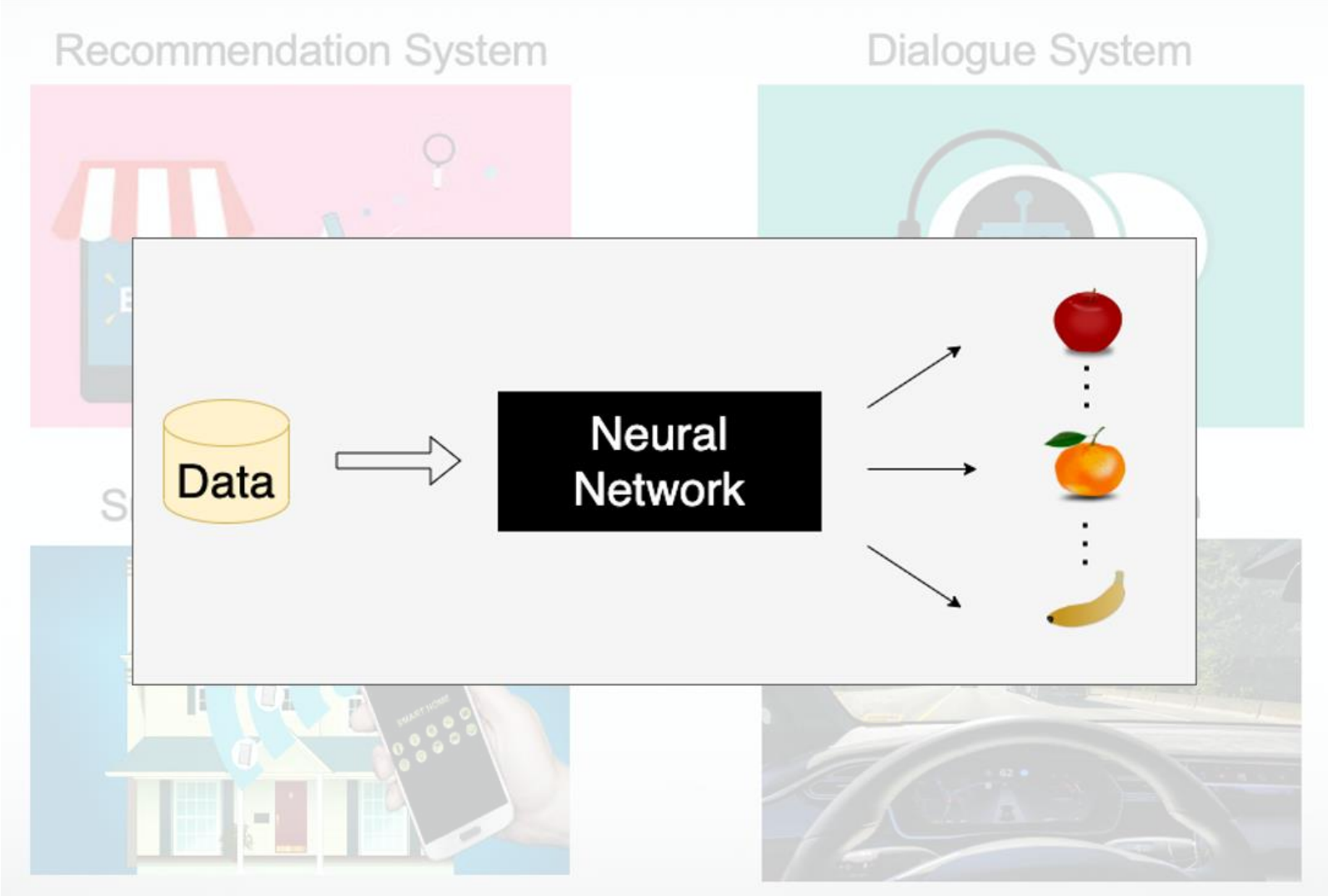
Dialogue System



Smart-Home System

Autopilot System

CLASSIFICATION PROBLEM



DEEP NEURAL NETWORK

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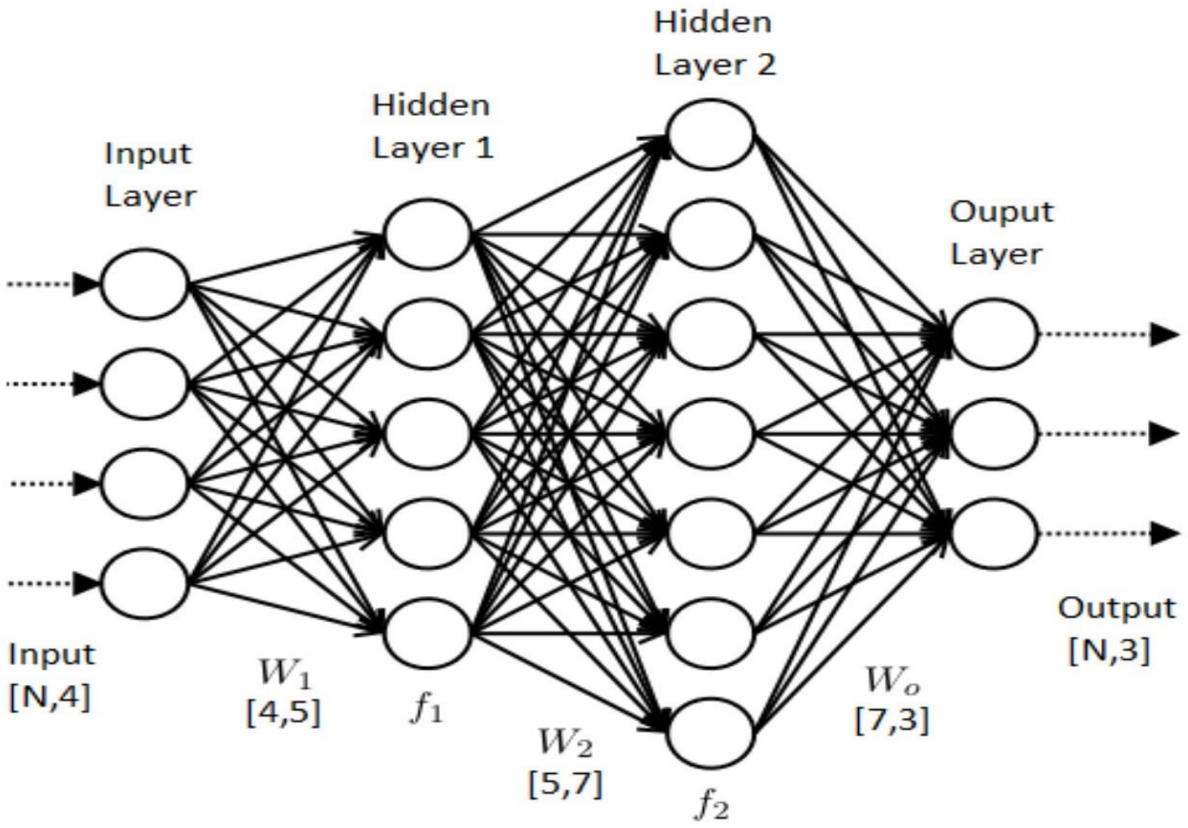
Input: Employee's Features

Output: Employee's Title

- Skill
- Year of Experience
- Education
- Certificate



- Machine Learning Engineer
- System Administrator
- Software Developer

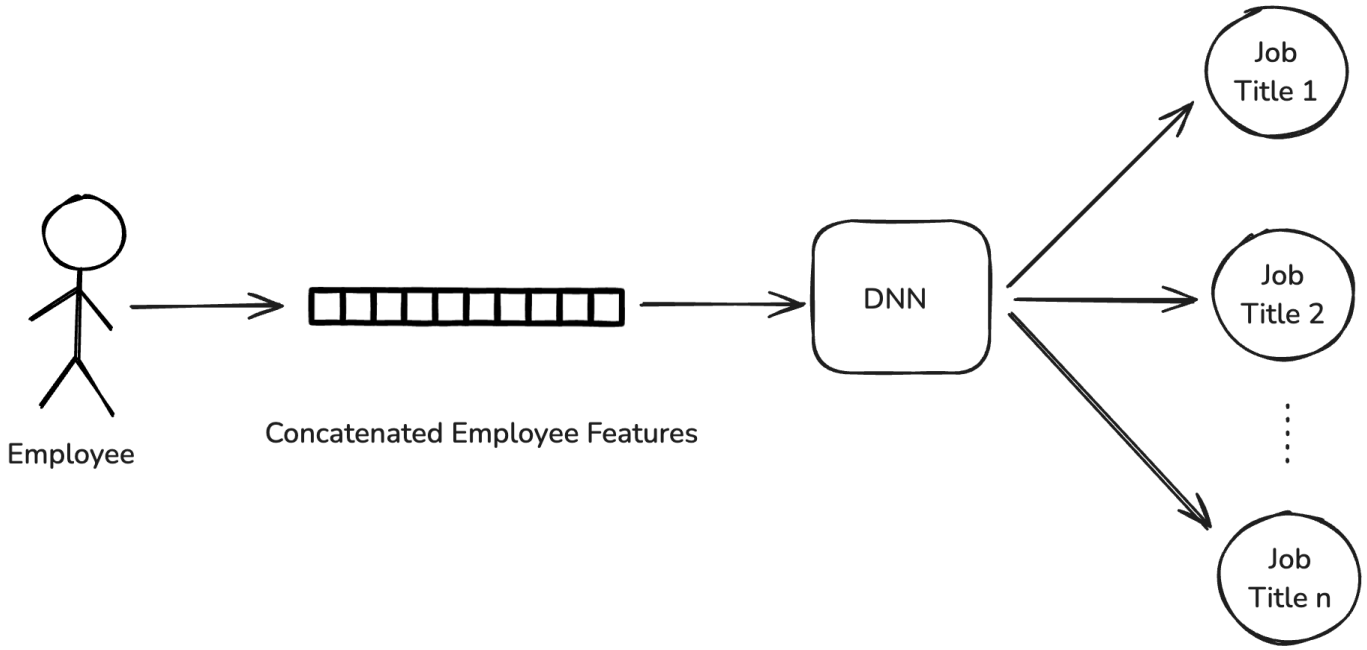
DEEP NEURAL NETWORK

Did we miss anything?

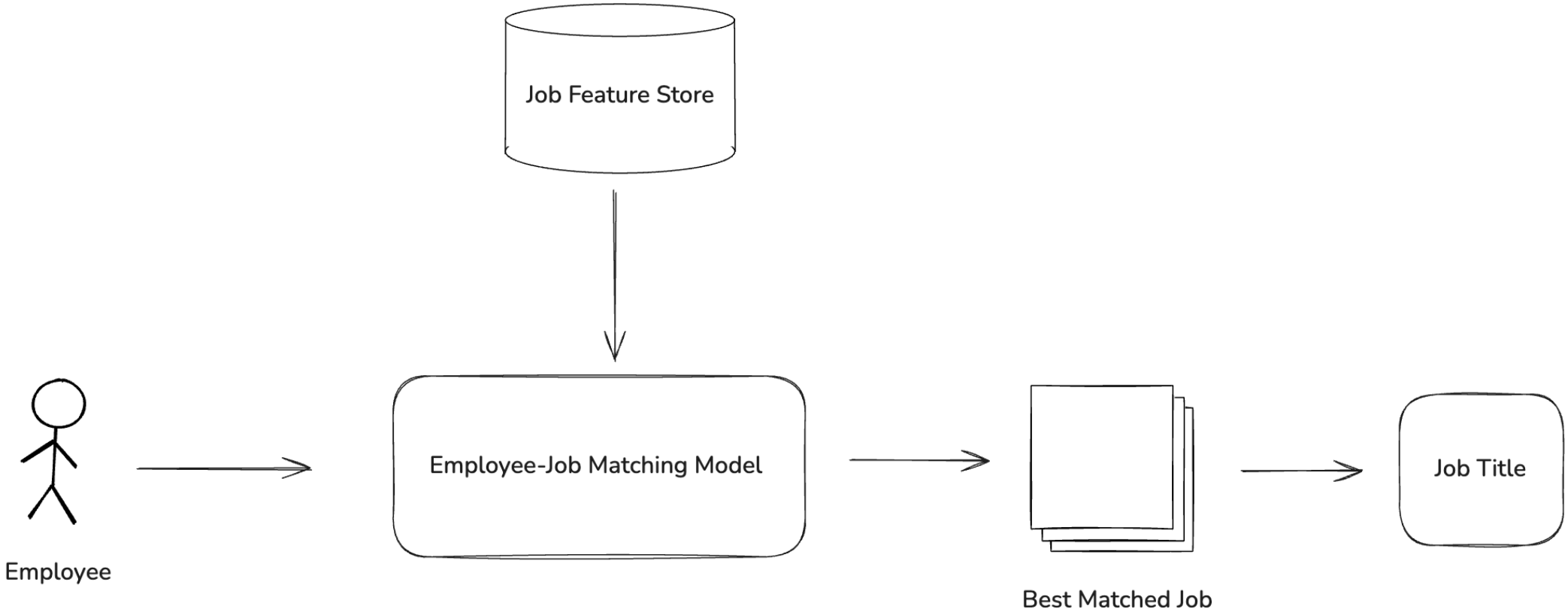
- Job description
- Job duty
- Job requirements

Can we do better?

How to do better?



BETTER SOLUTION

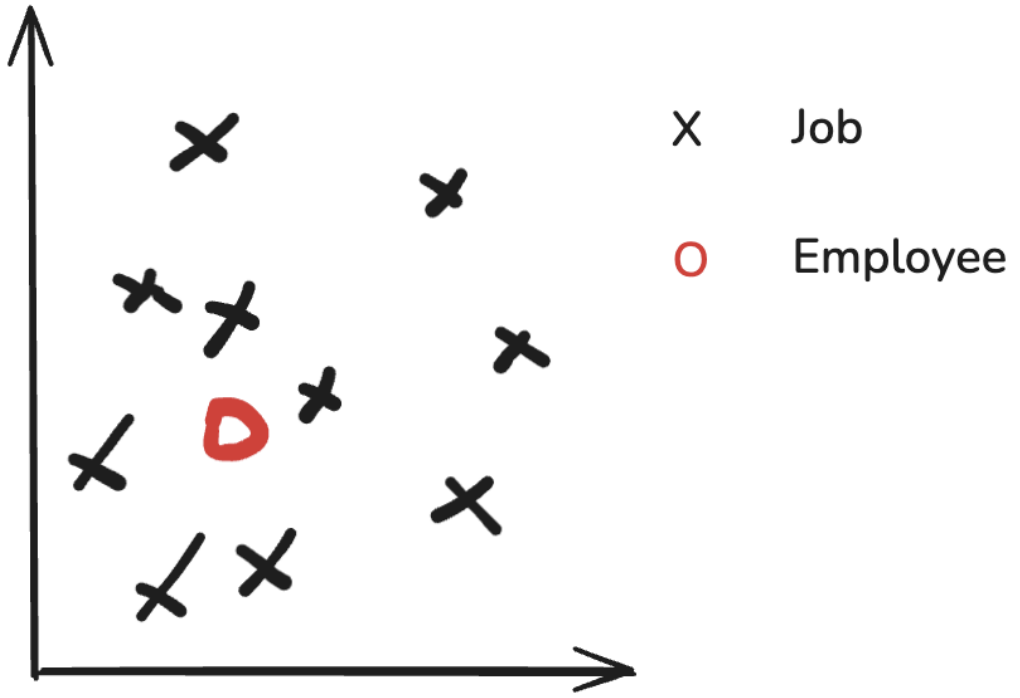


BETTER SOLUTION

Think about search system

Treat employee and job as two different type of data

Find the similarity



BETTER SOLUTION

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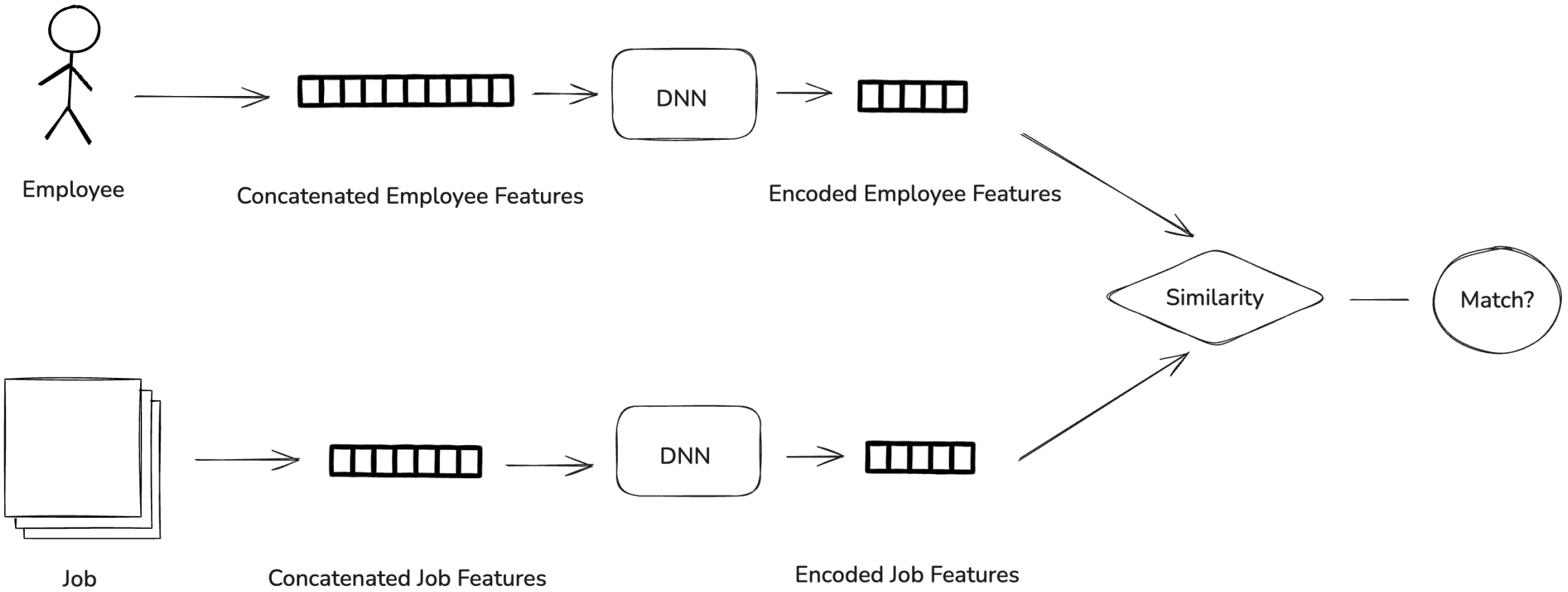
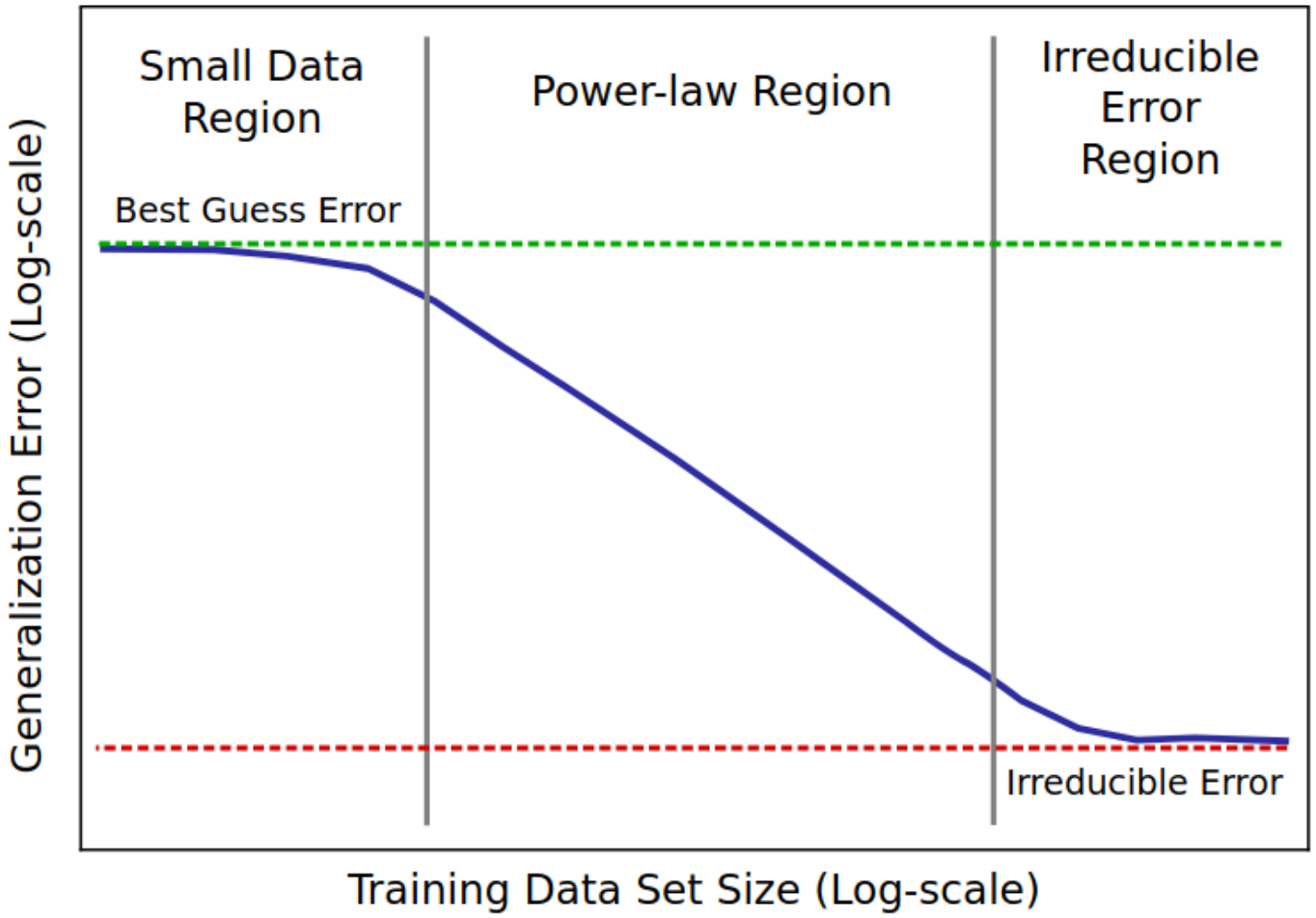


SCALING LAW

- Larger models
- More data
- Greater compute

Better performance, but with diminishing returns.



DATA SCARCITY AND PRIVACY

Do we have enough high-quality real data?

- Feature
- Label
- Format

Do we concern if some information is used for training?

- Name
- Gender
- Age

SYNTHETIC DATA

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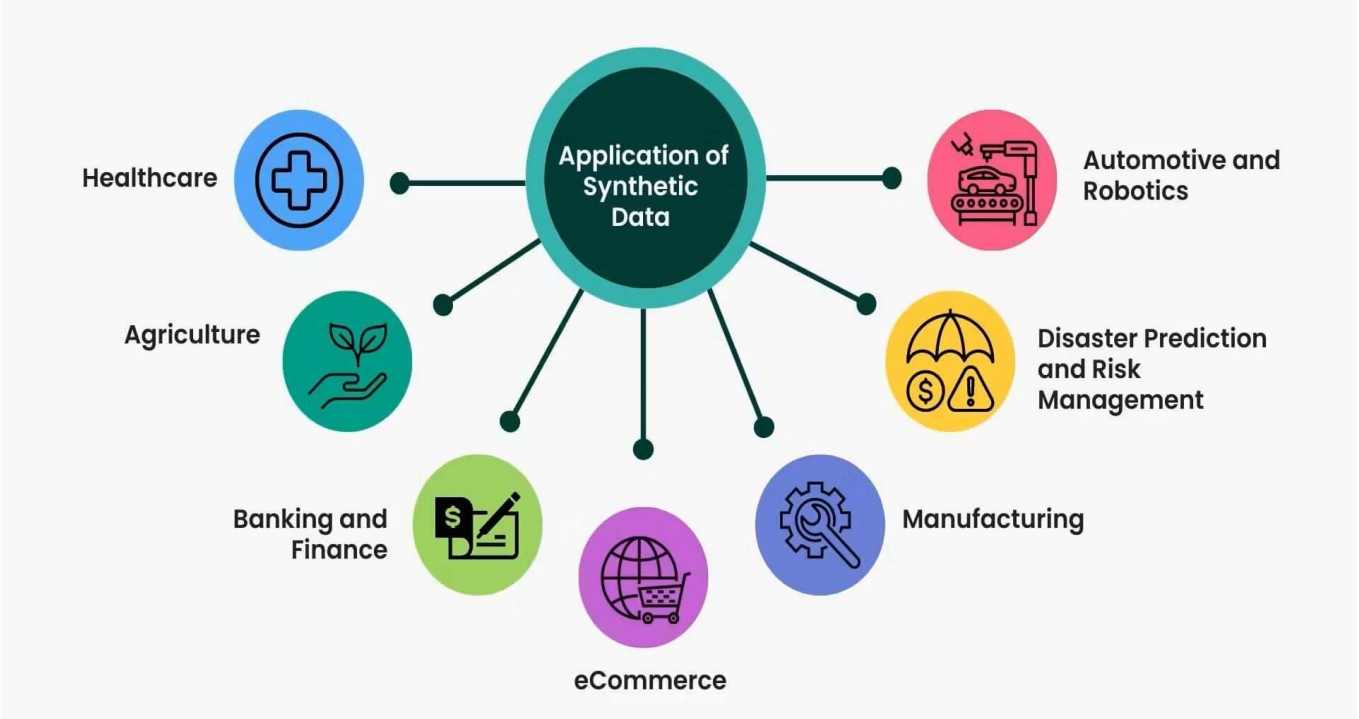
What is Synthetic data?

- Artificially generated data
- Mimics real-world data patterns

Why Use Synthetic Data?

- Data Scarcity
- Privacy Concerns

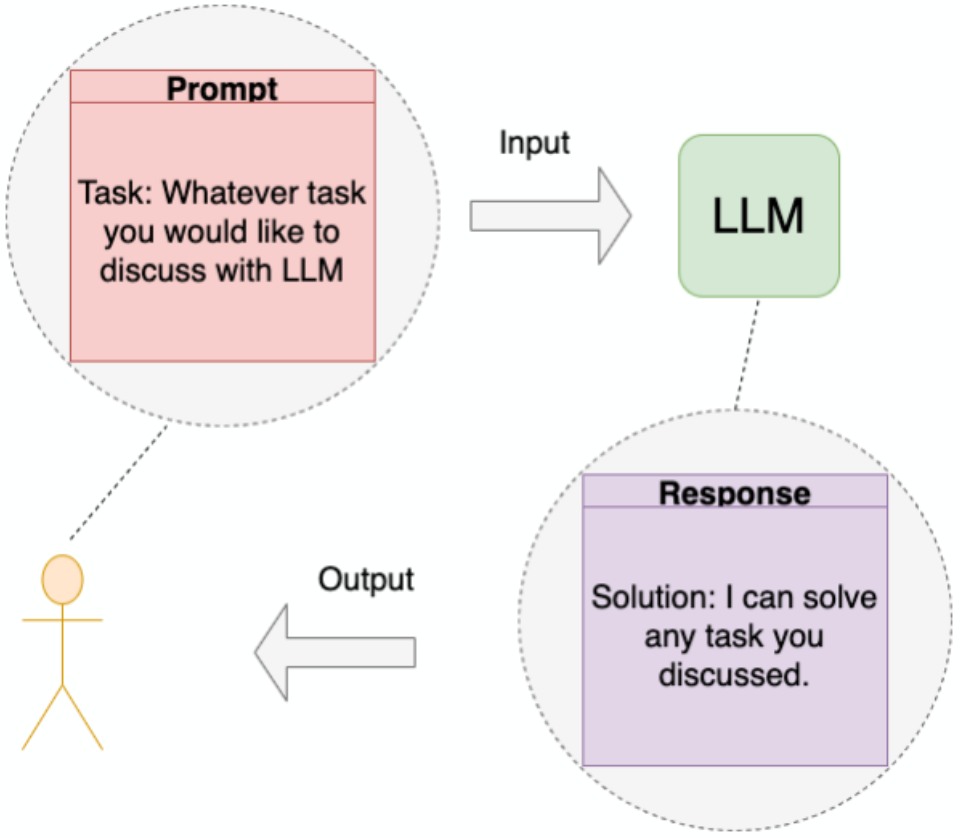


How to Generate Synthetic Data?

- Rule-Based Generation
- Statistical Methods
  - Gaussian Copula
- Generative AI Models
  - Generative Adversarial Networks (GANs)
  - Variational Autoencoders (VAEs)
  - Transformer based GPT Models

LARGE LANGUAGE MODEL

$$Response = f(Prompt)$$



Good Prompt

Write a 500-word blog post explaining the benefits of meditation for stress relief. Include scientific studies, practical tips, and examples of how beginners can start meditating.

Bad Prompt

Tell me about meditation.

REINFORCEMENT PROMPTING[1]

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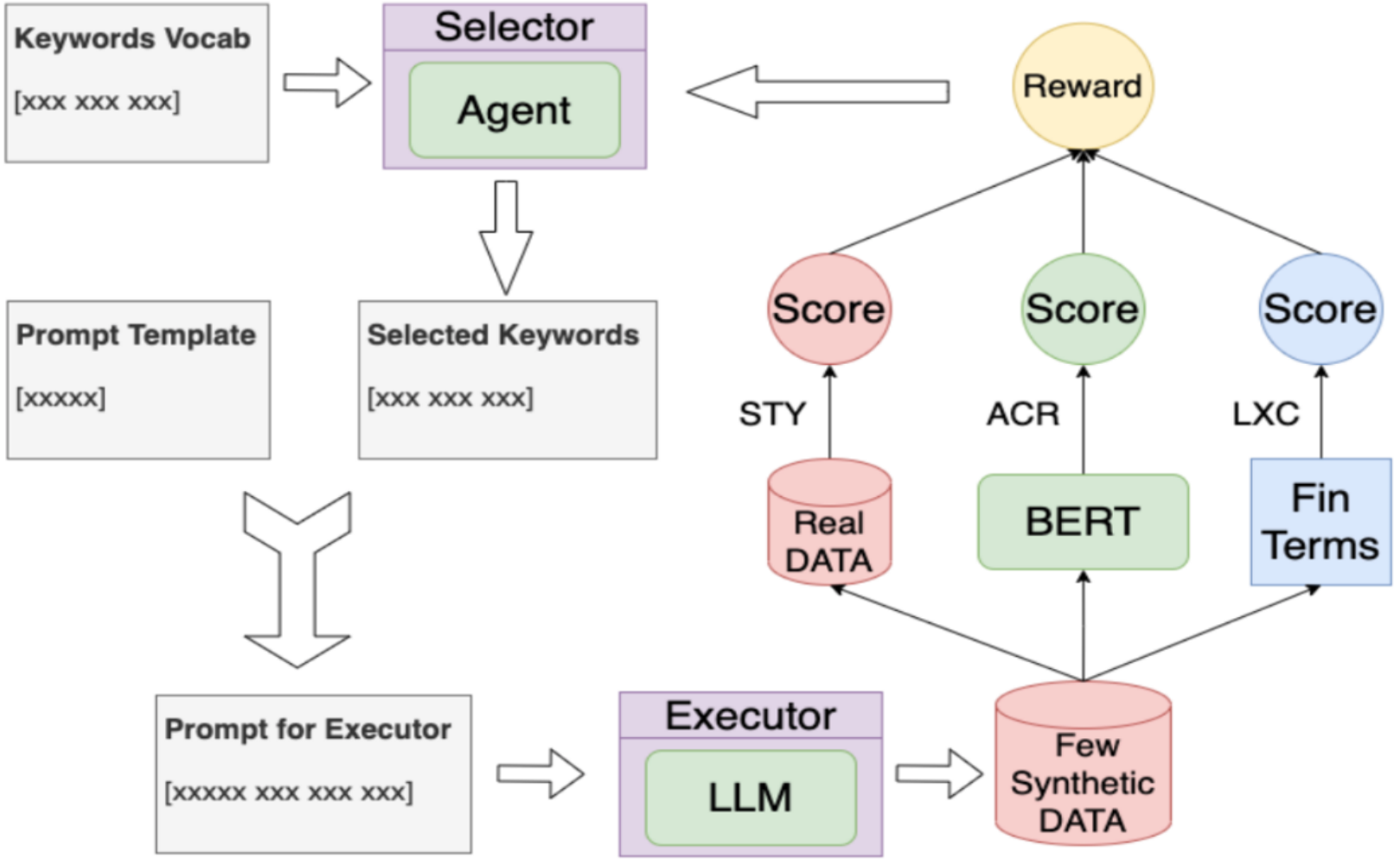

[1] Xiangwu Zuo, Anxiao (Andrew) Jiang and Kaixiong Zhou, Reinforcement Prompting for Financial Synthetic Data Generation, in Journal of Finance and Data Science, vol. 10, 2024.

REINFORCEMENT PROMPTING[1]

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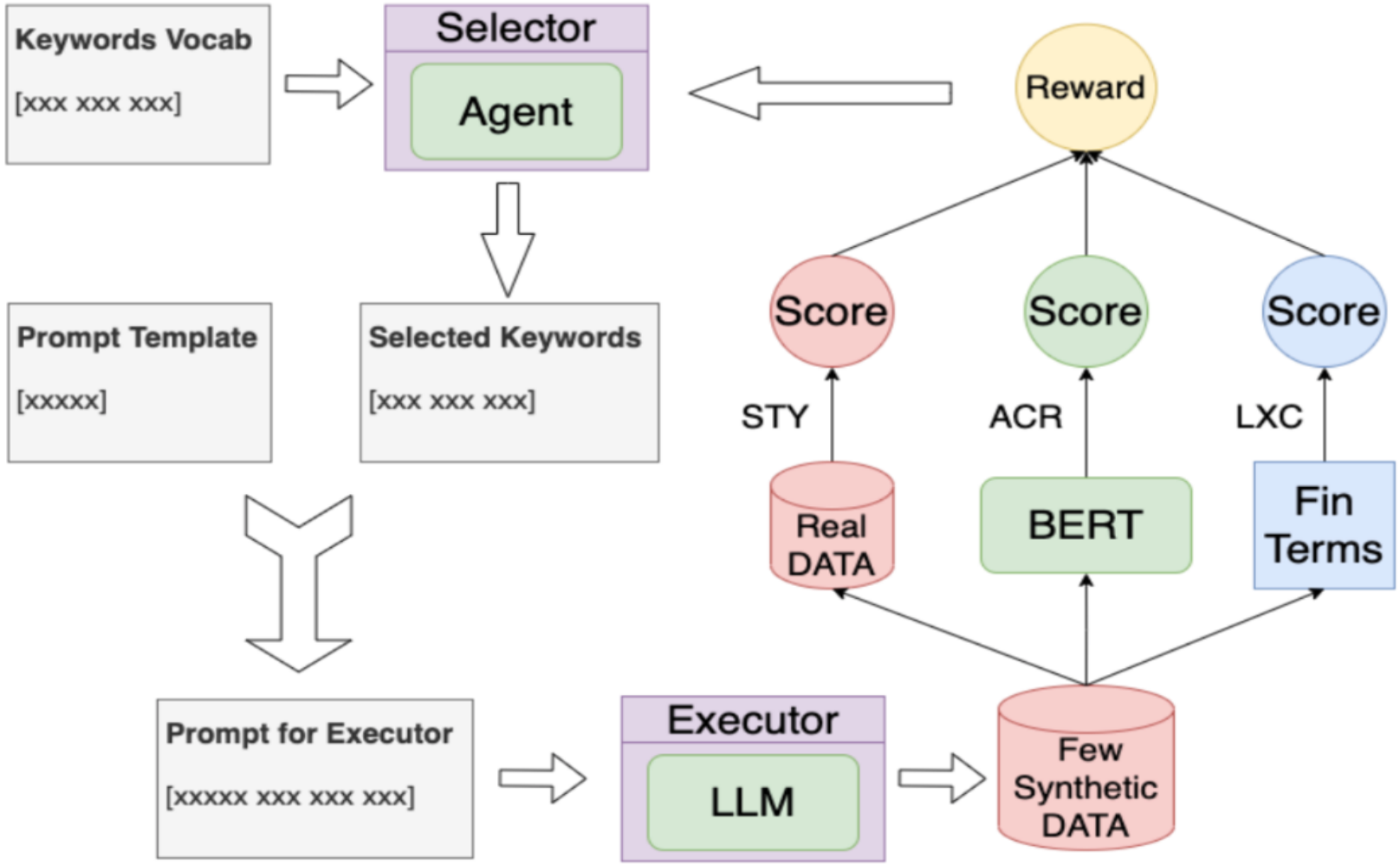
- Inputs
  - Keywords Vocabulary
  - Prompt Template
- Models
  - Selector Agent (Policy Network)
  - Executor LLM



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Keywords Vocabulary[2] and Prompt Template

Sampled Keyword Sets	Prompt Template
Foreign Exchange, Forex, Currency Pair, Exchange Rate, Spot Market, Futures Contract, Option Contract	Generate 100 financial sentences related to companies or persons that fulfill the following strict criteria: 1) Label each sentence as 'positive', 'negative', or 'neutral'. 2) Format the output as '[sentence] | [label]' and exclude any additional text. 3) The sentences should contain topics related to any of the following keyword sets: "@Selected_KeywordSets"
Financial Analysis, Ratio Analysis, Liquidity Ratios, Profitability Ratios, Solvency Ratios, Valuation	
Investment Strategy, Value Investing, Growth Investing, Passive Investing, Active Investing, Contrarian Investing	
Options, Futures, Call Option, Put Option, Strike Price, Expiration Date, Option Premium	
Personal Finance, Budget, Savings, Expenses, Income, Emergency Fund, Credit Card	
Asset Class, Equity, Fixed Income, Commodities, Real Estate, Cash and Cash Equivalents	

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[2] Financial Terminology Glossary: https://www.investopedia.com

REINFORCEMENT PROMPTING[1]

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Sample sentences from Financial PhraseBank Dataset

Sentence	Label
Circulation revenue has increased by 5% in Finland and 4% in Sweden in 2008.	positive
Technopolis plans to develop in stages an area of no less than 100,000 square meters in order to host companies working in computer technologies and telecommunications, the statement said.	neutral
The international electronic industry company Elcoteq has laid off tens of employees from its Tallinn facility; contrary to earlier layoffs the company contracted the ranks of its office workers, the daily Postimees reported.	negative
Both operating profit and turnover for the three-month period increased, respectively from EUR0.9 m and EUR8.3 m, as compared to the corresponding period in 2005.	positive
According to Gran, the company has no plans to move all production to Russia, although that is where the company is growing.	neutral
Operating profit was EUR 11.07 mn, up from EUR 8.65 mn.	positive
Kalmar Espana generated net sales of some 11.3 mln euro $ 14.8 mln in 2005.	neutral
Jan. 6 – Ford is struggling in the face of slowing truck and SUV sales and a surfeit of up-to-date, gotta-have cars.	negative
Rautakesko 's business operations in Norway and Russia, acquired in July 2005, are included in the figures of the comparable period, impacting sales growth starting from August.	neutral

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REINFORCEMENT PROMPTING[1]

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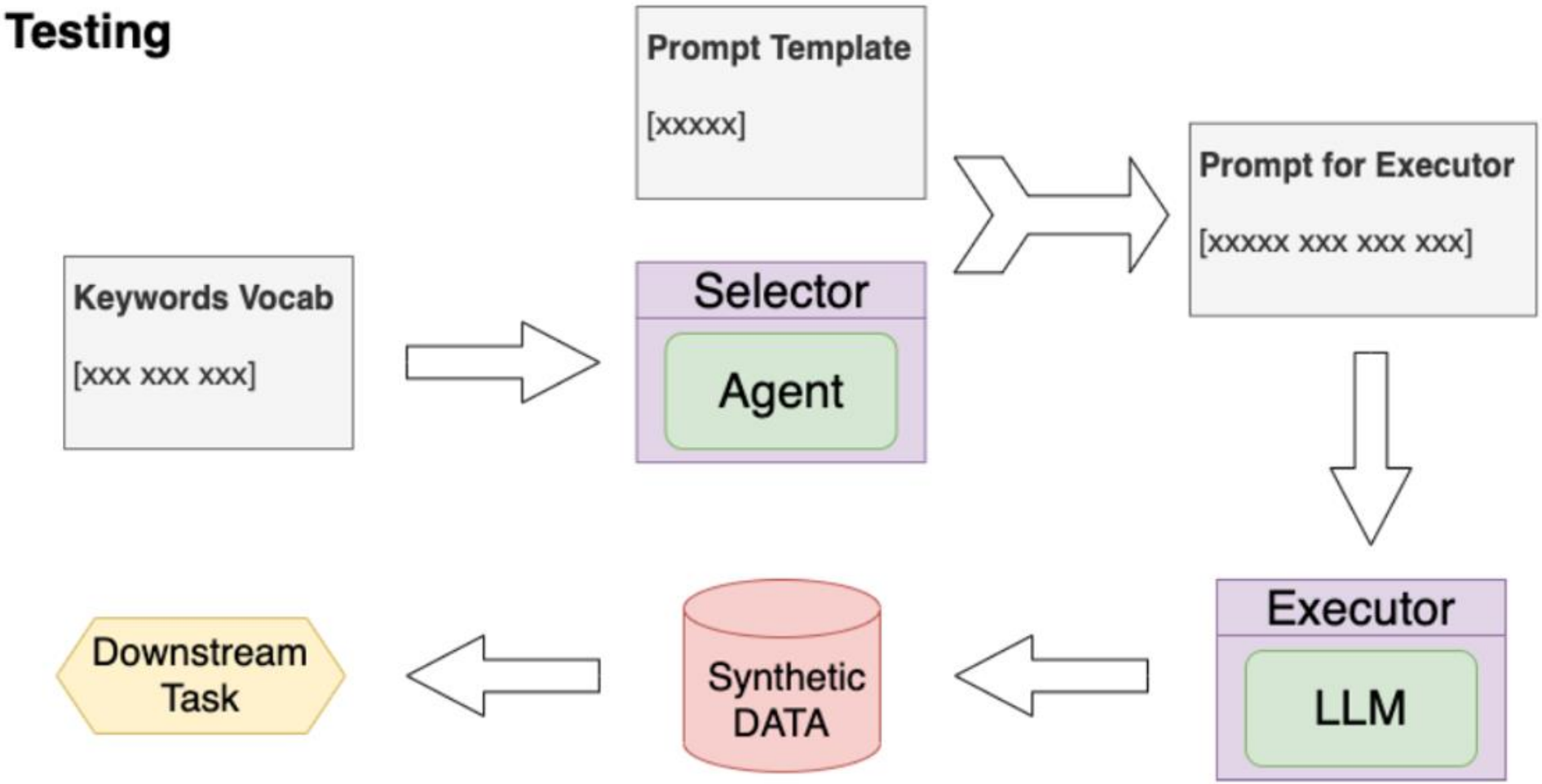

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REINFORCEMENT PROMPTING[1]

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Selected Keywords and Generated Optimal Prompt

Keywords
Business Valuation, Book Value, Market Value, Liquidation Value, Replacement Value
Market Research, Qualitative Research, Quantitative Research, Market Segmentation, Target Market
Financial Derivatives, Options, Futures, Swaps, Forward Contracts, Counterparty Risk
Annuities, Ordinary Annuity, Annuity Due, Perpetuity, Present Value of Annuity
Personal Finance, Budget, Savings, Expenses, Income, Emergency Fund, Credit Card

Optimal Prompt
Generate 100 financial sentences related to companies or persons that fulfill the following strict criteria: 1) Label each sentence as 'positive', 'negative', or 'neutral'. 2) Format the output as '[sentence] | [label]' and exclude any additional text. 3) The sentences should contain topics related to any of the following keyword sets: - Business Valuation, Book Value, Market Value, Liquidation Value, Replacement Value - Market Research, Qualitative Research, Quantitative Research, Market Segmentation, Target Market - Financial Derivatives, Options, Futures, Swaps, Forward Contracts, Counterparty Risk - Annuities, Ordinary Annuity, Annuity Due, Perpetuity, Present Value of Annuity - Personal Finance, Budget, Savings, Expenses, Income, Emergency Fund, Credit Card

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REINFORCEMENT PROMPTING[1]

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Samples of Generated Financial Synthetic Data

Sentence	Label
The Walt Disney Company's acquisition of 21st Century Fox's film and television assets for $71.3 billion was aimed at bolstering its content offerings and competing with streaming services like Netflix.	positive.
Goldman Sachs has been criticized for its involvement in the 1MDB scandal, which involved billions of dollars of fraud and corruption, but the company continues to maintain its reputation as a top investment bank.	negative
The high interest rates associated with credit cards can be a significant financial burden, making it difficult to pay off balances and save money.	negative
The market value of a company's stock reflects the perceived worth of the company by investors and analysts, based on factors such as financial performance and growth potential.	neutral
A recent analysis of the company's product portfolio showed that many were underperforming, indicating a need for greater investment in product development and innovation.	neutral
The CEO announced plans to partner with financial institutions to offer discounted loans and credit to employees who demonstrate strong personal finance habits.	positive
The company's replacement value would be significantly lower than its market value due to substantial investments in research and development that have yet to be reflected in its financial statements.	positive
Morgan Stanley has been accused of engaging in risky trading practices and contributing to the 2008 financial crisis, but the company has also been recognized for its commitment to sustainability and diversity.	neutral
Coca-Cola's introduction of its new flavor Coke Zero Sugar has been successful in attracting younger consumers and bolstering the company's sales.	positive
Intel has faced challenges in diversifying its product offerings and moving beyond its traditional business of manufacturing computer chips, but the company continues to invest in research and development to stay ahead of the competition.	neutral

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Future Solution Workflow

- Tackle it as a classification task
- Train an agent with Reinforcement Prompting
- Generate synthetic data with the agent
- Train DNNs to generate employee and job encoded features
- Serve the model to predict employee job title

CONCLUSION

Organizational Restructuring Task

- Clustering: Quick solution
- Classification: Future solution
- ML Objective: Search similar embeddings (encoded features)
- Data: Synthetic data
- Model: DNN

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ANY QUESTIONS?