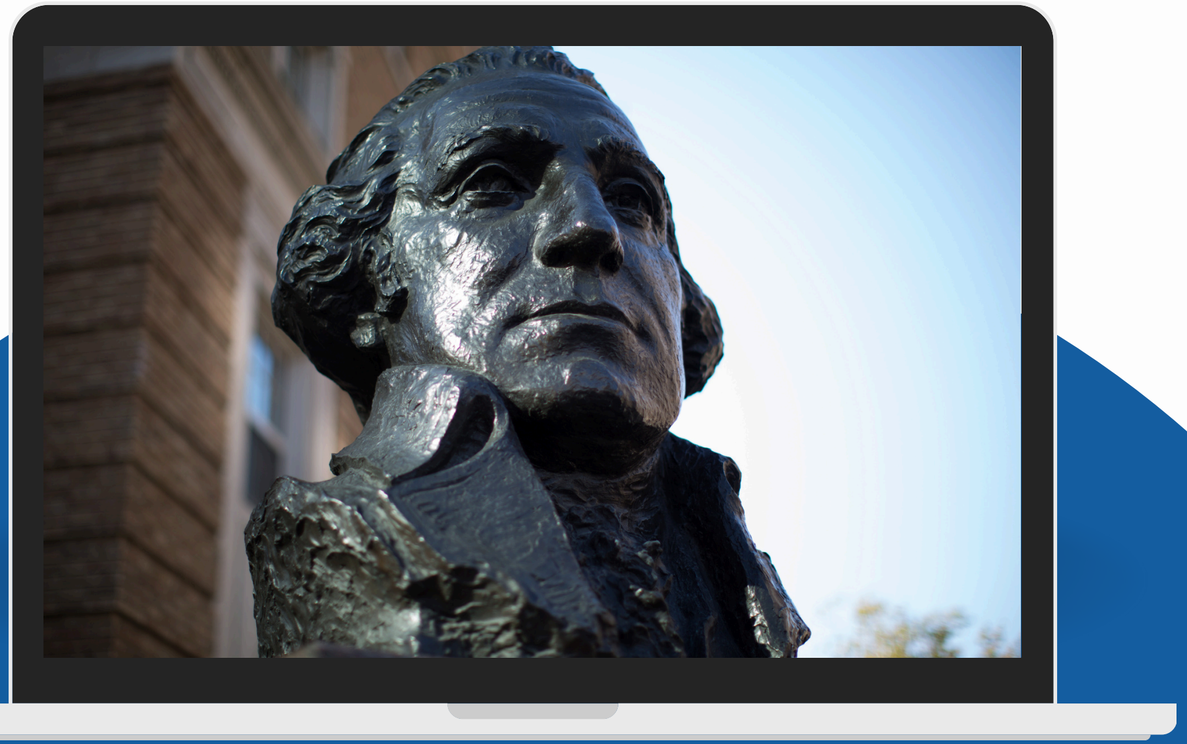
2025 Convergence: Using AI for Skills

LAiSER
Leveraging AI for Skills Extraction & Research

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THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

Where to Start: Defining Skills

Skills are the operationalization of knowledge to perform tasks.



Knowledge

- Information learned from experience or transmission
- Discrete units with overlapping interpretations
- Can be assessed through existing methods
- Not unique to a single skill



Skills

- Synthesis of learning to functional knowledge
- Individual, not discrete
- Always evolving
- Measured on a spectrum, no existing effective tests

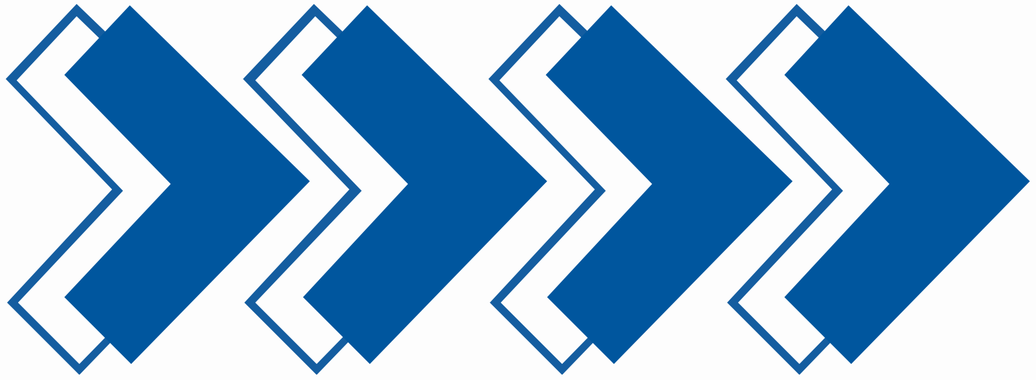


Task Abilities

- Smallest unit of work involved in an economic process
- Discrete units with overlapping interpretations
- Can be assessed through existing methods
- Not unique to a skill

Building Skills Definitions

- A skill is defined by two lists
  - Knowledge
  - Task Abilities
- Each skill is a unique combination
- Skills can share SOME elements
- Elements need not be discrete



Data Analytics

Knowledge

- Statistics
- Python Coding
- Data Structures
- Data Visuals
- Policy Analysis
- Finance
- Regression
- Time Series
- R Coding

Task Ability

- EDA
- Data Visualization
- Outlier Analysis
- Data Cleaning
- Report Writing
- Data Analytics

Labeling KStAs

- Issues:
  - Skills are not directly observable
  - Three concepts are used interchangeably
  - Terminology varies across contexts
  - Source data are generally incomplete
  - Taxonomies for Knowledge and Task Abilities are rare
- Advantages:
  - Education focuses on Knowledge
  - Workforce focuses on Task Abilities
  - Skills taxonomies are common

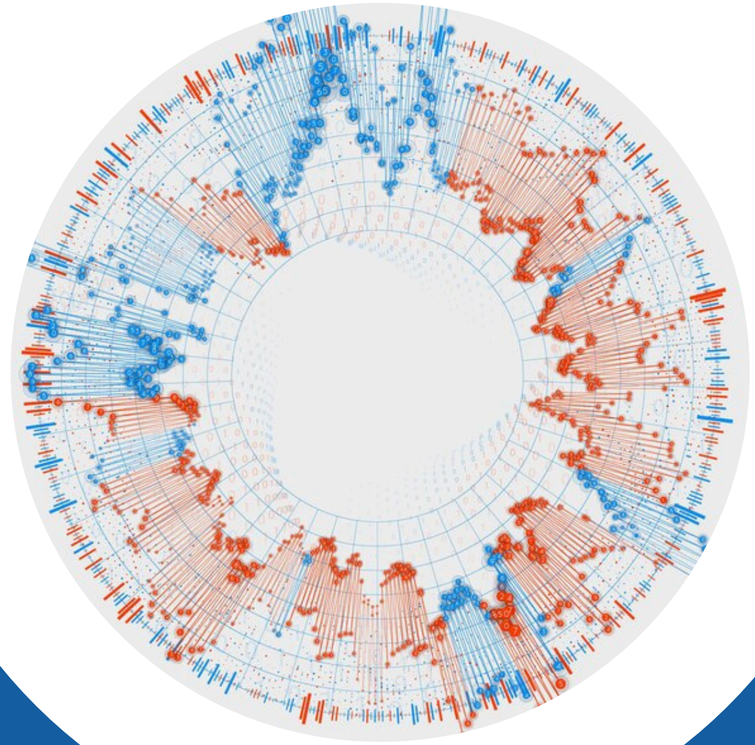


Overcoming Data Limitations

Solution

1. Classify unstructured data into Knowledge, Skills, or Task Abilities
    - Create a general definition of KStAs
    - Align the KStAs to taxonomy(s) to apply a “best” label
2. Infer missing data
    - Use repeated observations to fill gaps in sources
3. Make it easy to use and repeat
    - Data memory reduces cost
    - AI helps inference
    - Answers need not be over detailed

Skills as a Universal Language of Education and Work



KStA Signal from Noise

- Use well defined training to take advantage of AI
- Add labels to data from education and workforce
  - Job Descriptions
  - Syllabi
  - Industry documents
  - Textbooks/Publications
- Link data to enhance KStA clustering
- Build map of common associations (ontology)
- Repeat and update



What is LAiSER?



- Open Source Tools
  - Extraction
    - Knowledge, Skills, Task Ability
  - Mapping
  - Inference (AI)
- API/EXE implementations
- Skills ontology
- Public literature
  - Technical documentation
  - Validation research

Demo

- AWS server running LAiSER V0.2.2
- Uses Gemini 2.5 AI model for extraction
- LAiSER V 0.3 available now!
- Local software install (.exe) to launch in Q4!

Long Term Vision: Skills Will Change the World

Skills-Centered

A world where skills, not credentials, are the currency of the labor market – because credentials are recognized for the skills they contain

Interoperable Data

Seamless data interoperability is the norm because AI LLMs can effectively handle unstructured data

Empowered Learners

A world where individuals are empowered by transparency about what they are learning and the full range of opportunities that are unlocked by that learning.

THANK YOU

Questions?

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Visit our website for more info

Github Repository for LAiSER

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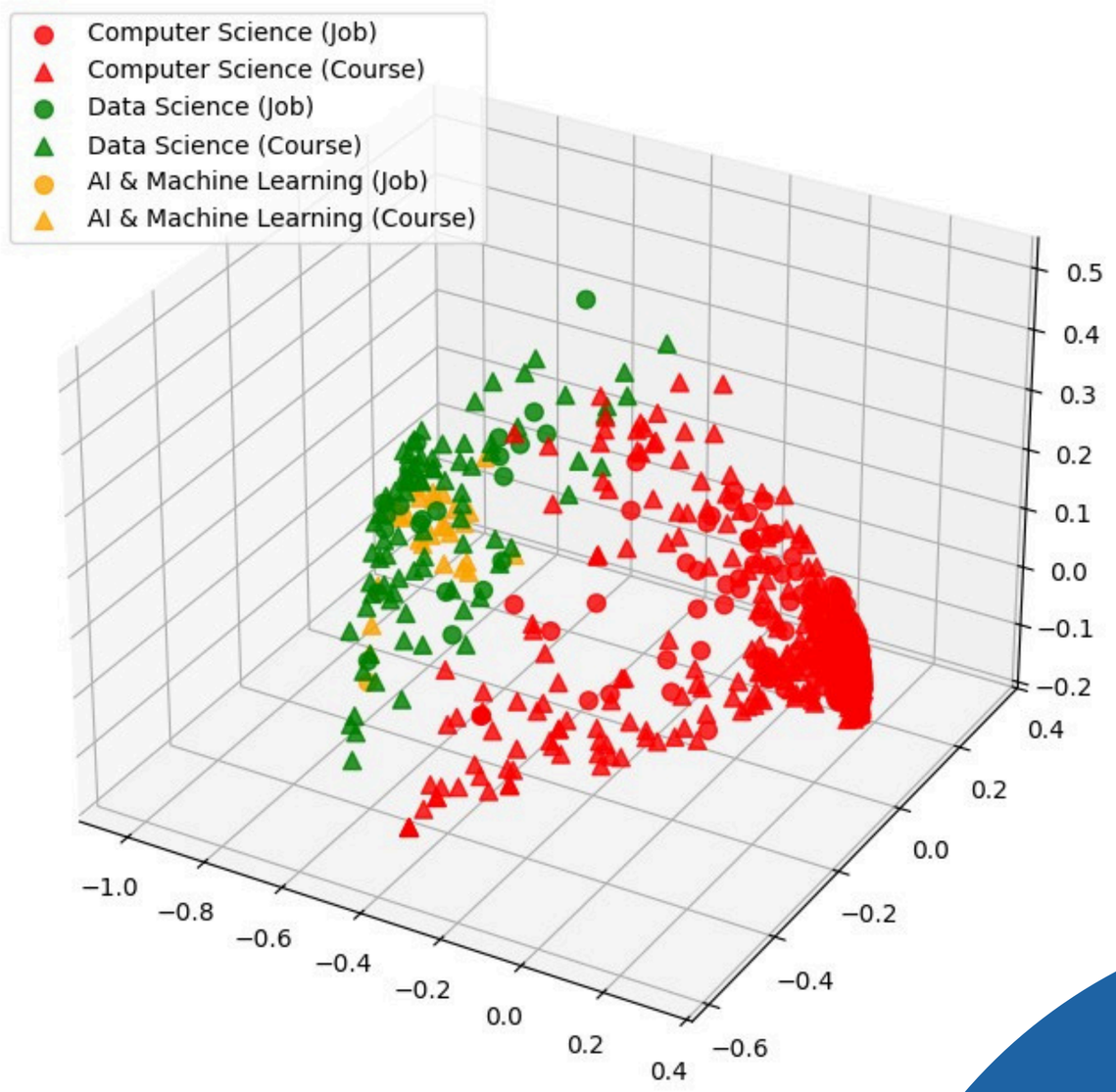
Example: Certificates

A software company is interested in locating a new office in a city serviced by a large community college. To help fortify their entry level staff they want to quickly ramp up a certificate program for training coders on Agentic Agents.

Red — Computer Science Skills

Green — Data Science Skills

Yellow — AI & ML Skills

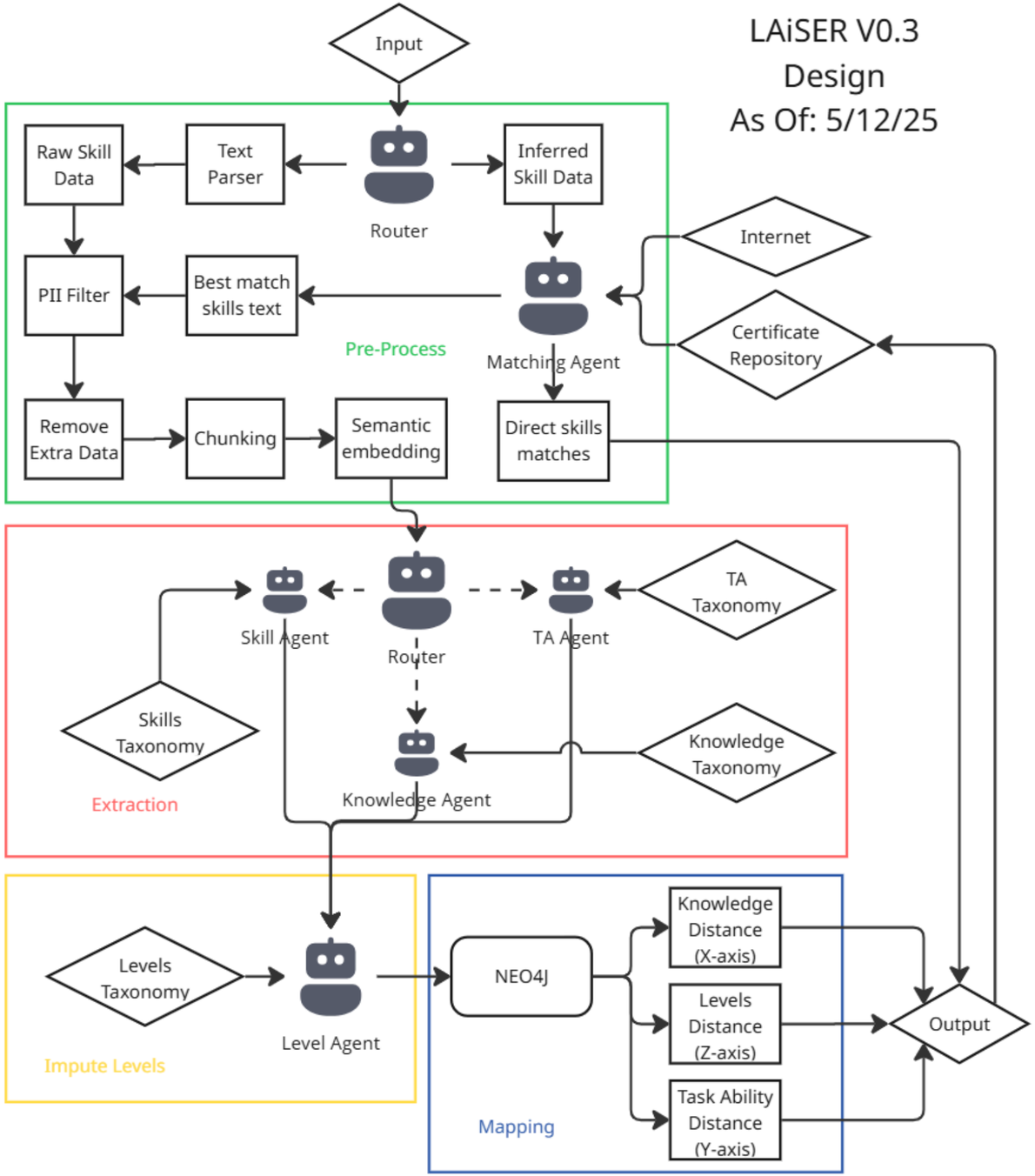


Why Open Source?

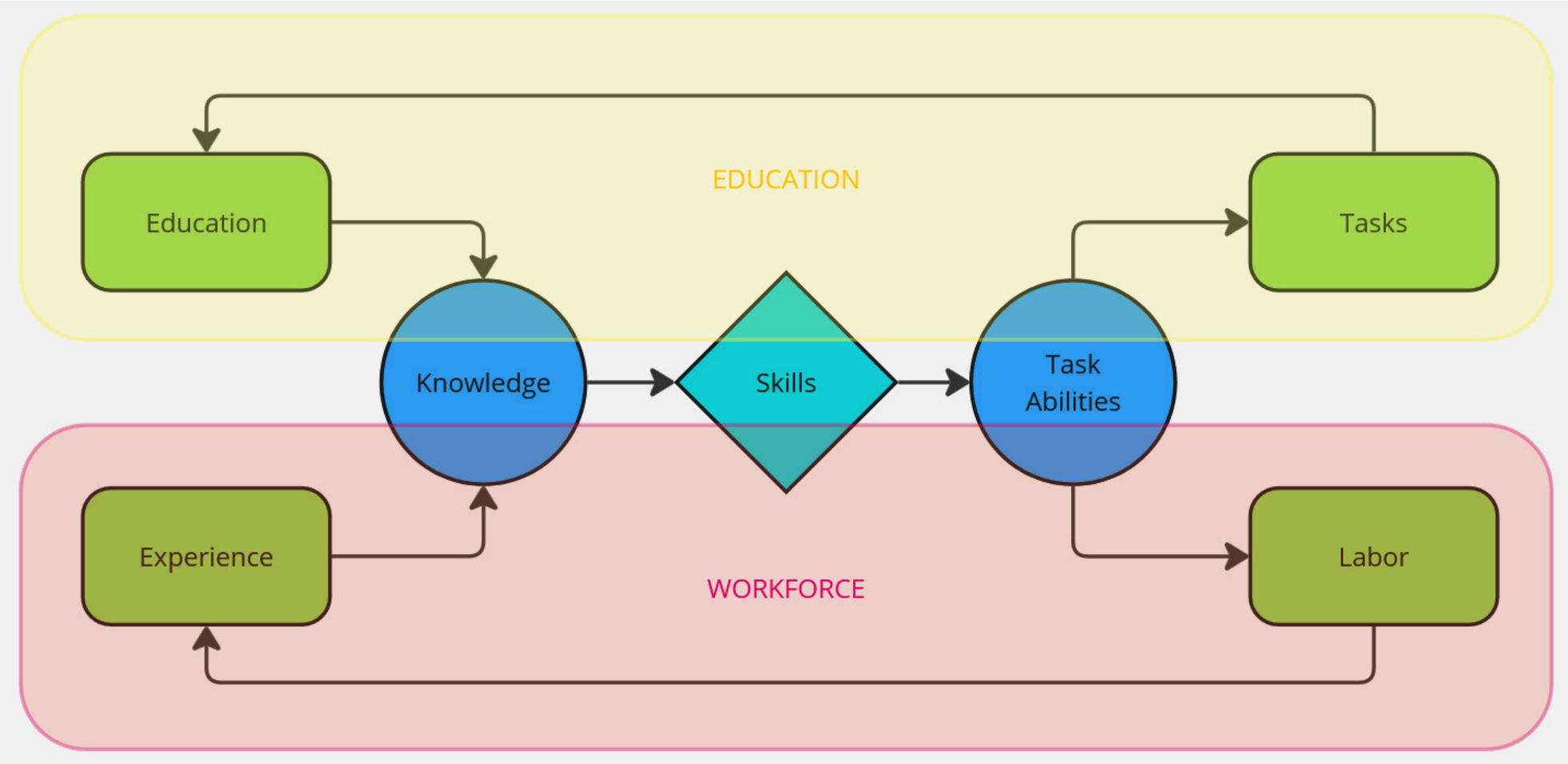


- Allows for organic integration into applications
  - Cost advantage over systems tied to proprietary data
  - Implement locally with their own data
  - Ingest data from many sources
  - Improves as we bring in more training data
- Near future: Locally hosted AI models can reduce the risk of disclosure or security breaches
  -

LAiSER Data Flow Diagram



Theory of Skill Development



Defining Skill Progression

Data Analytics

Develops into

Data Science

Knowledge

Statistics
Python Coding
Data Structures
Data Visuals
Policy Analysis
Finance
Regression
Time Series
R Coding

Task Ability

EDA
Data Visualization
Outlier Analysis
Data Cleaning
Report Writing
Data Analytics

Knowledge

Linear Algebra
Statistics
Python Coding
Data Structures
Data Visuals
Policy Analysis
Finance
R Coding
ML/AI
Regression
Time Series

Task Ability

EDA
Object Oriented Prog
Data Visualization
Outlier Analysis
Inference
Data Cleaning
Report Writing
Data Analytics
Projection

Defining Skill Development

Data Analytics (5.8)

Develops into

Data Science (6.4)

Knowledge

Statistics (4)
Python Coding (5)
Data Structures (6)
Data Visuals (4)
Policy Analysis (3)
Finance (2)
Regression (5)
Time Series (7)
R Coding (5)

Task Ability

EDA (4)
Data Visualization (3)
Outlier Analysis (6)
Data Cleaning (3)
Report Writing (4)
Data Analytics (2)

Knowledge

Linear Algebra (6)
Statistics (4)
Python Coding (5)
Data Structures (6)
Data Visuals (4)
Policy Analysis (3)
Finance (2)
R Coding (5)
ML/AI (7)
Regression (5)
Time Series (7)

Task Ability

EDA (4)
Obj Oriented Prog (5)
Data Visualization (3)
Outlier Analysis (6)
Inference (6)
Data Cleaning (3)
Report Writing (4)
Data Analytics (2)
Projection (4)

Defining Skill Pathways (Ontologies)

