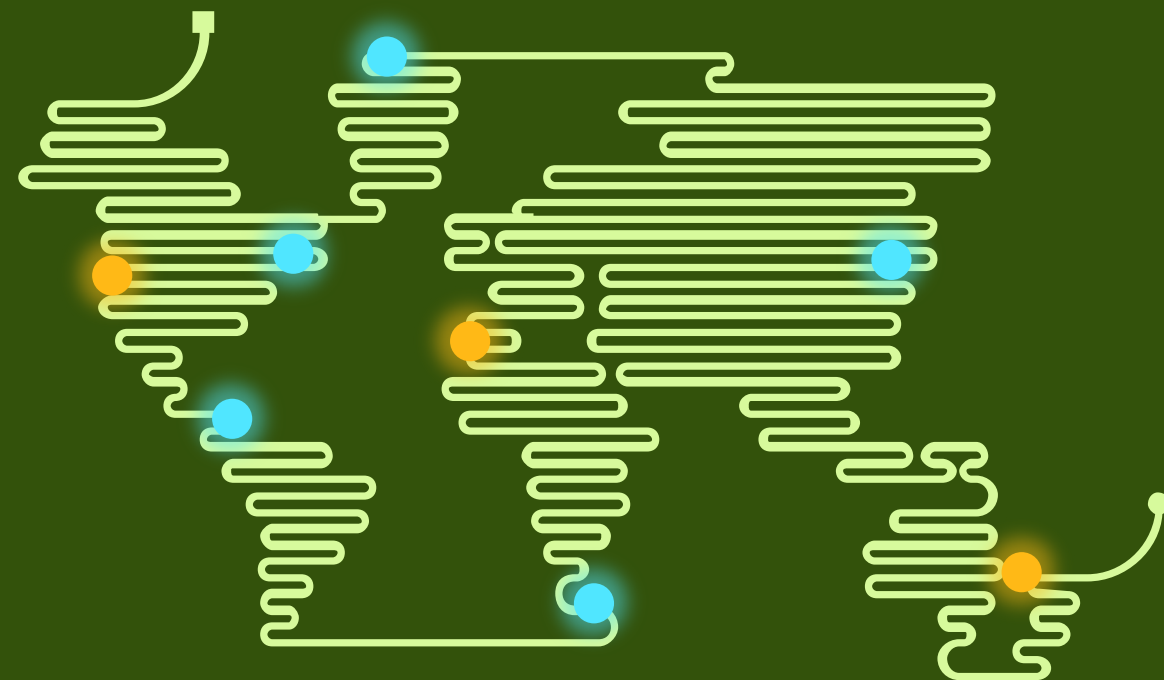


# Kalbe Digital Lab

Inspire The Future of Digital Biology with AI

Kalbe Corporate Digital Technology



# Digital Core Competencies

Kalbe Digital University (KDU) is Setup in 2023 to Improve Digital Technology Competency Development

## Software Engineer (SWE)

- **Fundamental**
  - Operating System
  - Data Structures and Algorithms
  - Programming Languages (TypeScript\*, Python, Rust, Go)
- **Conceptual**
  - Object Oriented Design Patterns
  - SOLID Design Principles
  - Microservice Architecture and Patterns
- **Practical**
  - Development Tools (IDE, Frameworks, Libraries)
  - CI/CD - Git and JIRA
  - Web Development Frameworks (ReactJS, NextJS)
  - Mobile Development Frameworks (Flutter)

## Data Engineer (DE)

- **Fundamental**
  - Operating System
  - Data Structures and Algorithms in Python
  - Python Programming Language
- **Conceptual**
  - Data Platform Architecture
  - Data Platform Toolset (eq. Airflow, PySpark)
  - Data Mining Techniques
- **Practical**
  - Data Visualization (Tableau)
  - Data Engineering Cloud Ops (AWS, GCP, Azure)
  - Data Engineering Life Cycle

## Data Scientist (DS)

- **Fundamental**
  - Basic Mathematics - Probability, Statistic, Optimization
  - Classical Machine Learning Models
  - Neural Network Models
  - Python Programming Language
- **Conceptual**
  - Discriminative Machine Learning Models
  - Machine Learning Toolset (eq. Scikit Learn)
  - Data Mining Techniques
- **Practical**
  - Data Visualization
  - Machine Learning Ops and Engineering Toolset

## AI Engineer (AIE)

- **Fundamental**
  - Basic Mathematics - Probability, Statistic, Optimization
  - Classical Machine Learning Models
  - Basic Deep Learning Models
- **Conceptual**
  - Generative Models (GAN, Diffusion)
  - Self-Supervised Models
  - Reinforcement Learning
- **Practical**
  - Language: Python
  - ML-Framework: Anaconda Collection
  - DL-Framework: PyTorch and Lightning
  - ML-Ops: HuggingFace, Wandb, Composer

Software

Artificial Intelligence

Internet of Robotic & Things

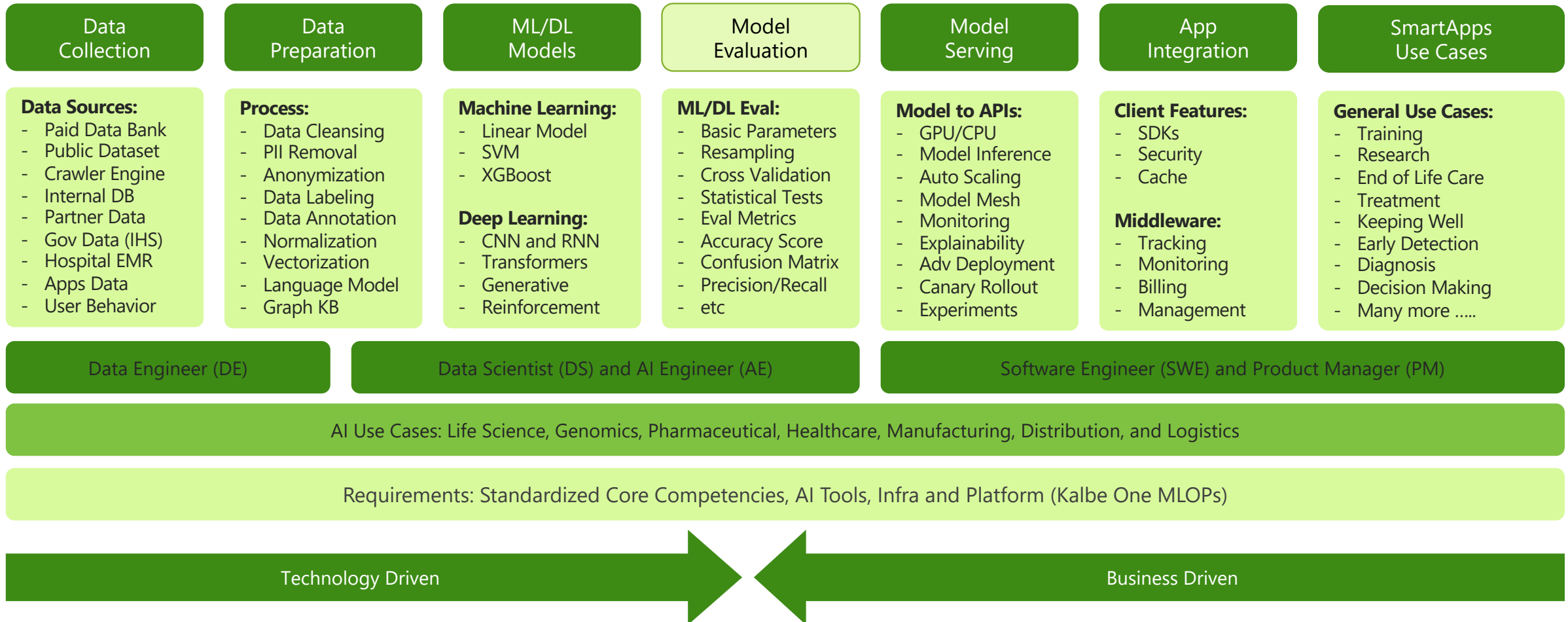
Cloud Native

Data Management

Open Innovation

# Artificial Intelligence R&D Incubation

Kalbe Digital Lab (KDL) is Setup to Develop AI R&D Capabilities in Digital Biology, Supply Chain, Distribution and Logistics

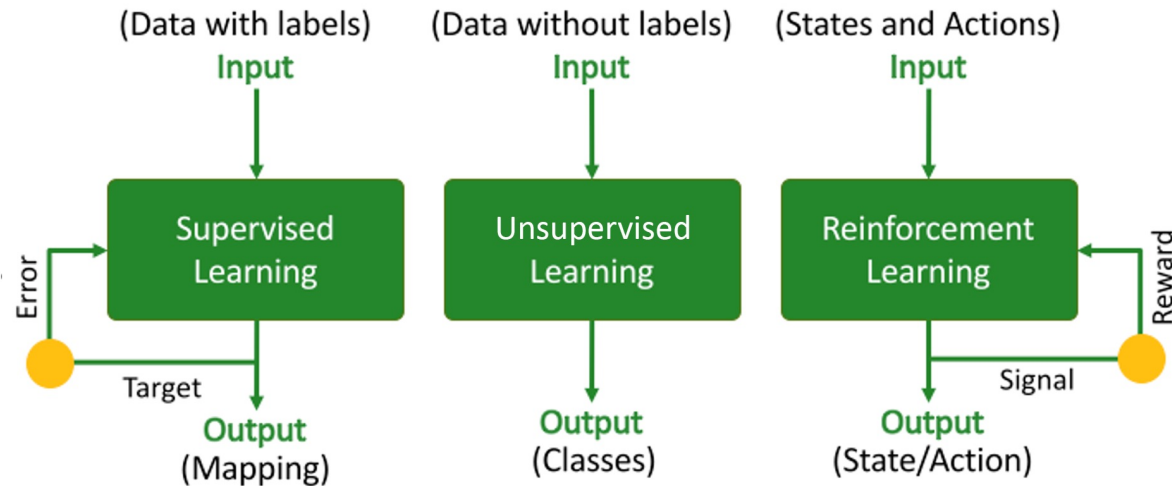


# AI for Digital Biology

## Model Paradigm and Use Cases

### AI Domains Based on Data Types:

- Vision: Image, Time Series (Spatial Patterns)
- NLP: Text, Voice Marker, Video (Sequential Patterns)
- Combined Data: Electronic Health Record, Genomics, etc



Healthcare and Life Science Examples	SL	USL	SSL	RL
Disease Detection with Computer Vision	✓		✓	✓
MRI 3D Image Segmentation	✓	✓	✓	
Medical Imaging for Cancer	✓	✓	✓	✓
Medical Prognosis and Risk Stratification	✓			✓
Disease Progression and Survival Model	✓			✓
Treatment Effect Estimation	✓		✓	✓
NLP: Biomedical Question and Answer	✓	✓	✓	✓
Imaging: Mammography, Pathology and Cardiac	✓	✓	✓	✓
Dynamic Treatment and Causal Inference	✓			✓
DNA Accessibility, Promoters and Enhancers	✓	✓		✓
Gene Regulation, Expression, and Splicing	✓	✓		✓
RNA-Sequencing, Genetics and Variation	✓	✓		✓
Electronic Health Record and Patient Data	✓			✓
Protein Structure and Folding Prediction	✓	✓	✓	✓
AI Powered Drug Discovery	✓	✓	✓	✓

There are many AI use cases in healthcare and life science including genomics. KDL prioritizes Pathology and Nutrigenomics.

# AI for Business

## Healthcare Services



Disease Diagnosis and Imaging



Personalized Medicine



Drug Discovery and Development



Predictive Analytics in Patient Care



AI-powered Virtual Assistants

## Manufacturing and SCM



Predictive Maintenance



Quality Control



Demand Forecasting



Supply Chain Optimization



Workforce Safety and Efficiency:

## Distribution and Logistics



Inventory Management



Route Optimization



Demand Forecasting



Autonomous Vehicles and Drones



Warehouse Automation

# KALBE DIGITAL LAB HUGGINGFACE SPACES

Spaces 6

<https://huggingface.co/KalbeDigitalLab>

Sort: Recently Updated

Running on T4

Pathology Nuclei Segmentation Classification



PathologyNucleiClassification



Breast Density Classification



Runtime error

Lung Cancer Classification



Running on T4

Ipsilateral-view Parametrized Hypercomplex B...



Bilateral-view Parametrized Hypercomplex Bre...

