

Kalbe Digital Lab

Inspire The Future of Digital Biology with AI

Kalbe Corporate Digital Technology

Digital Core Competencies



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

Al 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

Data Collection	Data Preparation	ML/DL Models	Model Evaluation	Model Serving	App Integration	SmartApps Use Cases				
 Data Sources: Paid Data Bank Public Dataset Crawler Engine Internal DB Partner Data Gov Data (IHS) Hospital EMR Apps Data User Behavior 	 Process: Data Cleansing PII Removal Anonymization Data Labeling Data Annotation Normalization Vectorization Language Model Graph KB 	 Machine Learning: Linear Model SVM XGBoost Deep Learning: CNN and RNN Transformers Generative Reinforcement 	 ML/DL Eval: Basic Parameters Resampling Cross Validation Statistical Tests Eval Metrics Accuracy Score Confusion Matrix Precision/Recall etc 	 Model to APIs: GPU/CPU Model Inference Auto Scaling Model Mesh Monitoring Explainability Adv Deployment Canary Rollout Experiments 	Client Features: - SDKs - Security - Cache Middleware: - Tracking - Monitoring - Billing - Management	General Use Cases: Training Research End of Life Care Treatment Keeping Well Early Detection Diagnosis Decision Making Many more 				
Data Engineer (DE) Data Scientist (DS) and AI Engineer (AE) Software Engineer (SWE				Engineer (SWE) and Prod	uct Manager (PM)					
Al Use Cases: Life Science, Genomics, Pharmaceutical, Healthcare, Manufacturing, Distribution, and Logistics										
Requirements: Standardized Core Competencies, AI Tools, Infra and Platform (Kalbe One MLOPs)										
	Technology Driver	า	Business Driven							

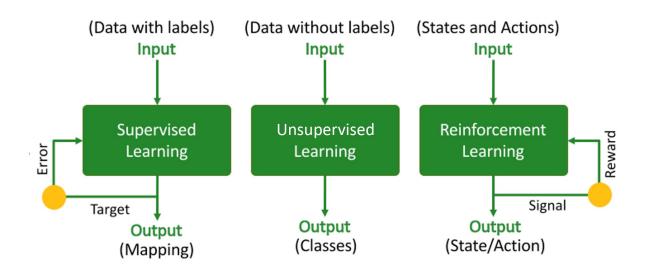


Al for Digital Biology

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	\checkmark		\checkmark	
MRI 3D Image Segmentation	\checkmark		\checkmark	
Medical Imaging for Cancer	\checkmark	\checkmark	\checkmark	
Medical Prognosis and Risk Stratification	\checkmark			
Disease Progression and Survival Model	\checkmark			
Treatment Effect Estimation	\checkmark		\checkmark	
NLP: Biomedical Question and Answer	\checkmark	\checkmark	\checkmark	
Imaging: Mammography, Pathology and Cardiac	\checkmark	\checkmark	\checkmark	
Dynamic Treatment and Causal Inference	\checkmark			
DNA Accessibility, Promoters and Enhancers	\checkmark			
Gene Regulation, Expression, and Splicing	\checkmark			
RNA-Sequencing, Genetics and Variation	\checkmark			
Electronic Health Record and Patient Data	\checkmark			
Protein Structure and Folding Prediction	\checkmark		\checkmark	
Al Powered Drug Discovery	\checkmark	\checkmark	\checkmark	

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



AI for Business

Healthcare Services







Personalized Medicine

Drug Discovery and Development

Predictive Analytics in Patient Care

AI-powered Virtual Assistants

Manufacturing and SCM





Predictive Maintenance

Quality Control

Distribution and Logistics



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Inventory Management





Demand Forecasting

Demand Forecasting



Supply Chain Optimization



Autonomous Vehicles and Drones



Warehouse Automation

timization



Workforce Safety and Efficiency:





KALBE DIGITAL LAB Huggingface spaces

https://huggingface.co/KalbeDigitalLab

↑↓ Sort: Recently Updated

B Spaces 6

