

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 | | | | | | | |

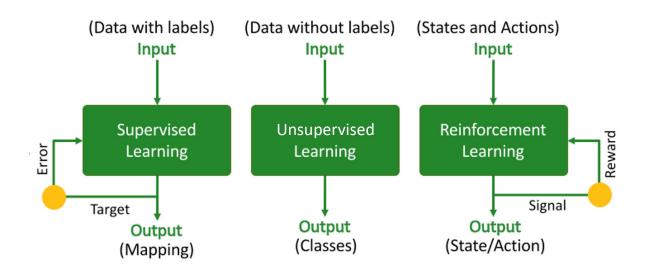


Al for Digital Biology

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

