Model Driven Engineering, Artificial Intelligence, and DevOps Body of Knowledge

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1 Model Driven Engineering Body of Knowledge

Category	Subcategory	Keywords
Model Foundations	Syntax	Abstract syntax, Concrete syntax
	Semantics	Structural, Behavioral
	Purpose/Intent	Modeling principles, Exemplar purposes
Model Quality		Completeness, Consistency, Correctness, Comprehensibility, Confinement, Changeability
Analysis	Structural Model Analysis	Invariant checking, Instance generation, Metrics calculation, Smells detection
	Behavioral Model Analysis	Pre-postcondition checking, Simulation, Reachability analysis, Temporal model checking, Performance
	Model Transformation Analysis	Mt correctness, Mt completeness, Mt functional behavior, Mt performance
Modeling Languages	Language Definition	Metamodels, Grammars, Semantics
	Types of Modeling Languages	General purpose (gpl), Domain-specific (dsl)
	Multiview Modeling	Model viewpoints and views, Correspondences among views, Viewpoint consistency, Viewpoint integration
Model Representation		Concrete syntax, Physics of notations, Layout, Textual vs visual, Animation
Model Maintenance and Evolution		Model operations, Model versioning, Model migration
Model Execution		Model simulation, Execution strategies, Model debugging, Model testing
Model Transformations	Model Transformation Languages	Syntax, Semantics
	Model Transformation Types	
	Text2Model, Model2Model, Model2Text	Exogenous vs. endogenous, In-place vs. out-place, Horizontal vs. vertical, Uni- vs. bidirectional, Syntactical vs. semantical, Mt paradigm
	Model Transformation Applications	Model translation, Model merge, Model differencing, Model weaving, Model synchronization, Model interpretation
Further Topics	Application Domains	Automotive, Cyber physical systems, Industry 4.0, Banking systems
	Advanced Topics	Streaming transformations, Incremental transformations, Uncertainty in modeling
	Application Scenarios	Model-based testing, Model-based modernization
	Best Practices	For information systems, For physical systems

Table 1: Data Extraction Categories for MDE (RQ1)

2 Artificial Intelligence Body of Knowledge

Category	Subcategory	Keywords
Reasoning	Knowledge representation, Automated reasoning, Common sense reasoning	Case-based reasoning, Inductive programming, Causal inference, Information theory, Causal models, Knowledge representation
Planning	Planning and Scheduling, Searching, Optimisation	Bayesian optimisation, Hierarchical task network, Constraint satisfaction, Metaheuristic optimisation, Evolutionary algorithm, Planning graph, Genetic algorithm, Stochastic optimisation, Gradient descent
Learning	Machine learning	Active learning, Feature extraction, Adaptive learning, Generative adversarial network, Adversarial machine learning, Generative model, Adversarial network, Multi-task learning, Anomaly detection, Neural network, Artificial neural network, Pattern recognition, Automated machine learning, Probabilistic learning, Automatic classification, Probabilistic model, Automatic recognition, Recommender system, Bagging, Recurrent neural network, Bayesian modelling, Recursive neural network, Boosting, Reinforcement learning, Classification, Semi-supervised learning, Clustering, Statistical learning, Collaborative filtering, Statistical relational learning, Content-based filtering, Supervised learning, Convolutional neural network, Support vector machine, Data mining, Transfer learning, Deep learning, Unstructured data, Deep neural network, Unsupervised learning, Ensemble method
Communication	Natural language processing	Chatbot, Natural language generation, Computational linguistics, Machine translation, Conversation model, Question answering, Coreference resolution, Sentiment analysis, Information extraction, Text classification, Information retrieval, Text mining, Natural language understanding
Perception	Computer vision	Action recognition, Object recognition, Face recognition, Recognition technology, Gesture recognition, Sensor network, Image processing, Visual search, Image retrieval
	Audio processing	Computational auditory scene, Sound synthesis, Music information retrieval, Speaker identification, Sound description, Speech processing, Sound event recognition, Speech recognition, Sound source separation, Speech synthesis
Integration and Interaction	Multi-agent systems	Agent-based modelling, Negotiation algorithm, Agreement technologies, Network intelligence, Computational economics, Q-learning, Game theory, Swarm intelligence, Intelligent agent
	Robotics and Automation	Cognitive system, Robot system, Control theory, Service robot, Human-AI interaction, Social robot, Industrial robot
	Connected and Automated vehicles	Autonomous driving, Self-driving car, Autonomous system, Unmanned vehicle, Autonomous vehicle
Services	AI Services	AI application, Intelligence software, AI benchmark, Intelligent control, AI competition, Intelligent control system, AI software toolkit, Intelligent hardware development, Analytics platform, Intelligent software development, Big data, Intelligent user interface, Internet of Things, Central processing unit, Machine learning framework, Computational creativity, Machine learning library, Computational neuroscience, Machine learning platform, Data analytics, Personal assistant, Decision analytics, Platform as a service, Decision support, Tensor processing unit, Distributed computing, Graphics processing unit, Virtual environment, Virtual reality
AI Ethics and Philosophy	AI Ethics	Accountability, Safety, Explainability, Security, Fairness, Transparency, Privacy
	Philosophy of AI	Artificial general intelligence, Weak artificial intelligence, Strong artificial intelligence, Narrow artificial intelligence

Table 2: Data Extraction Categories for AI (RQ1)

3 DevOps Body of Knowledge

Category	Subcategory	Keywords
Software Engineering Management	Software Project Planning	Continuous planning, Feedback loop between developers and operators
	Software Project Enactment	Continuous monitoring, Automated performance monitoring during test and continuous integration, Automated feedback for performance models and performance predictions, Application monitoring, Automated dashboards
Software Construction	Practical Considerations	Continuous integration
	Software Construction Fundamentals	Prototyping application
Software Configuration Management	Software Release Management and Delivery	Integrated deployment planning, Continuous deployment, Automated deployment, Continuous delivery, Cooperative application configurations, Monitoring application and next development
	Management of the SCM Process	Staging application, Integrated configuration management
	Software Configuration Control	Integrated change management, Change management
Software Testing	Test Techniques	Continuous testing, Automated testing
Software Process	Process Definition	Process standardisation, Product support
Software Quality	Practical Considerations	Use of data to guide QA
Software Engineering Tools and Methods	Software Engineering Methods	Infrastructure as code, Modeling and simulation, Measure performance metrics, Continuous application performance
	Software Tools	DevOps maturity evaluation model, Elasticity practice
Software Requirements	Software Requirements Fundamentals	Defining requirements
	Requirements Process	Stakeholder participation
Software Design	Software Structure and Architecture	Designing architecture

Table 3: Data Extraction Categories for DevOps (RQ1)