
Postgraduate Certificate in AI and Cognitive Psychology

Artificial Intelligence Foundations

Abstract Concept refers to a general idea or notion that is not tangible, and is often used in Artificial Intelligence to represent complex relationships between objects or entities. Related terms include Concept Learning, Abstract Thinking, and High-Level Reasoning. In the context of AI and Cognitive Psychology, abstract concepts are used to develop intelligent systems that can understand and represent complex knowledge.

Action Selection is the process of choosing the most appropriate action from a set of possible actions, given a particular situation or goal. Related terms include Decision Making, Problem Solving, and Goal-Oriented Behavior. In AI, action selection is used to develop autonomous agents that can make decisions and take actions in a dynamic environment.

Active Learning is a machine learning approach where the system actively selects the most informative data to learn from, rather than passively receiving data. Related terms include Supervised Learning, Unsupervised Learning, and Reinforcement Learning. In AI, active learning is used to develop systems that can learn from limited data and improve their performance over time.

Adversarial Attack refers to a type of attack where an adversary attempts to mislead or deceive a machine learning system into making incorrect predictions or decisions. Related terms include Security, Robustness, and Adversarial Training. In AI, adversarial attacks are used to test the security and robustness of machine learning systems.

Affective Computing refers to the study of emotions and affective states in humans, and the development of systems that can recognize and respond to emotions. Related terms include Affect Recognition, Emotion Analysis, and Sentiment Analysis. In AI, affective computing is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Agent-Based Modeling is a methodology for modeling complex systems using autonomous agents that interact with each other and their environment. Related terms include Multi-Agent Systems, Simulation, and Modeling. In AI, agent-based modeling is used to develop systems that can simulate and analyze complex phenomena and systems.

Artificial General Intelligence refers to a hypothetical AI system that possesses human-like intelligence and can perform any intellectual task that a human can. Related terms include Narrow AI, Superintelligence, and Strong AI. In AI, artificial general intelligence is considered the holy grail of AI research.

Artificial Neural Network is a type of machine learning model inspired by the structure and function of the human brain. Related terms include Deep Learning, Neural Network, and Connectionism. In AI, artificial

neural networks are used to develop systems that can learn and represent complex patterns and relationships.

Association Rule Learning is a type of unsupervised learning that discovers patterns and relationships between variables in large datasets. Related terms include Data Mining, Pattern Discovery, and Knowledge Discovery. In AI, association rule learning is used to develop systems that can discover insights and patterns in large datasets.

Attention Mechanism is a component of neural networks that allows the system to focus on specific parts of the input data when making predictions or decisions. Related terms include Focus of Attention, Attentional Modulation, and Saliency Detection. In AI, attention mechanisms are used to develop systems that can selectively focus on relevant information and ignore irrelevant information.

Autoencoder is a type of neural network that learns to compress and reconstruct data, often used for dimensionality reduction and feature learning. Related terms include Encoder, Decoder, and Bottleneck Layer. In AI, autoencoders are used to develop systems that can learn compact and informative representations of data.

Autonomous System is a type of system that can operate independently without human intervention, often used in robotics and control systems. Related terms include Self-Organizing System, Autonomy, and Decentralized System. In AI, autonomous systems are used to develop systems that can operate independently and make decisions without human intervention.

Backpropagation is a method for training neural networks by propagating error gradients backwards through the network to update the weights and biases. Related terms include Gradient Descent, Optimization, and Weight Update. In AI, backpropagation is used to develop systems that can learn from data and improve their performance over time.

Bayesian Network is a type of probabilistic model that represents relationships between variables using a directed graph. Related terms include Conditional Probability, Joint Probability, and Inference Algorithm. In AI, Bayesian networks are used to develop systems that can reason about uncertainty and make decisions under uncertainty.

Bias-Variance Tradeoff refers to the tradeoff between the bias and variance of a model, where a model with high bias has low variance but may not capture the underlying patterns in the data. Related terms include Overfitting, Underfitting, and Regularization. In AI, the bias-variance tradeoff is used to develop systems that can balance the need for accuracy and simplicity.

Big Data refers to the large amounts of structured and unstructured data that are generated by various sources, often used in data analytics and machine learning. Related terms include Data Mining, Business Intelligence, and Analytics. In AI, big data is used to develop systems that can analyze and extract insights from large datasets.

Brain-Computer Interface is a system that allows humans to interact with computers using only their brain signals, often used in neuroscience and assistive technology. Related terms include Neural Interface, Brain Signal, and Control System. In AI, brain-computer interfaces are used to develop systems that can read and write brain signals.

Classification is a type of machine learning task where the system predicts a label or category for a given input, often used in pattern recognition and decision making. Related terms include Regression, Clustering, and Dimensionality Reduction. In AI, classification is used to develop systems that can predict and classify data into different categories.

Cognitive Architecture is a type of cognitive model that simulates human cognition and provides a framework for integrating multiple cognitive components. Related terms include Cognitive Model, Agent Architecture, and Hybrid Model. In AI, cognitive architectures are used to develop systems that can simulate human cognition and provide a framework for integrating multiple cognitive components.

Cognitive Computing refers to the development of systems that can simulate human cognition and provide intelligent support for human decision making. Related terms include Artificial Intelligence, Cognitive Science, and Human-Computer Interaction. In AI, cognitive computing is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Computer Vision is a field of study that focuses on the development of systems that can interpret and understand visual data from the world, often used in image recognition and object detection. Related terms include Image Processing, Object Recognition, and Scene Understanding. In AI, computer vision is used to develop systems that can see and understand the world around them.

Connectionism refers to a type of neural network that is inspired by the structure and function of the human brain, often used in machine learning and cognitive modeling. Related terms include Neural Network, Artificial Neural Network, and Deep Learning. In AI, connectionism is used to develop systems that can learn and represent complex patterns and relationships.

Control Theory refers to the study of control systems and the development of methods for controlling and optimizing the behavior of complex systems. Related terms include Control System, Optimization, and Feedback Control. In AI, control theory is used to develop systems that can control and optimize the behavior of complex systems.

Conversational AI refers to the development of systems that can engage in natural language conversations with humans, often used in chatbots and virtual assistants. Related terms include Natural Language Processing, Dialogue System, and Speech Recognition. In AI, conversational AI is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Convolutional Neural Network is a type of neural network that is particularly well-suited for image and signal processing tasks, often used in image recognition and object detection. Related terms include Deep

Learning, Convolution, and Pooling. In AI, convolutional neural networks are used to develop systems that can see and understand the world around them.

Data Mining refers to the process of discovering patterns and relationships in large datasets, often used in business intelligence and marketing. Related terms include Knowledge Discovery, Data Analysis, and Pattern Recognition. In AI, data mining is used to develop systems that can discover insights and patterns in large datasets.

Decision Support System is a type of system that provides intelligent support for human decision making, often used in business and finance. Related terms include Expert System, Decision Making, and Recommendation System. In AI, decision support systems are used to develop systems that can provide intelligent support for human decision making.

Deep Learning refers to a type of machine learning that uses deep neural networks to learn complex patterns and relationships in data. Related terms include Neural Network, Artificial Neural Network, and Connectionism. In AI, deep learning is used to develop systems that can learn and represent complex patterns and relationships.

Dimensionality Reduction is a technique for reducing the number of features or dimensions in a dataset, often used in data analysis and machine learning. Related terms include Feature Extraction, Feature Selection, and Principal Component Analysis. In AI, dimensionality reduction is used to develop systems that can simplify complex datasets and improve the performance of machine learning models.

Embodied Cognition refers to the idea that cognition is deeply rooted in the body and its sensorimotor experiences, often used in cognitive science and robotics. Related terms include Embodiment, Sensorimotor Experience, and Cognitive Science. In AI, embodied cognition is used to develop systems that can understand and interact with the world around them in a more natural and intuitive way.

Evolutionary Computation refers to a type of optimization technique that uses principles from evolutionary biology to search for optimal solutions, often used in machine learning and optimization. Related terms include Genetic Algorithm, Evolution Strategy, and Swarm Intelligence. In AI, evolutionary computation is used to develop systems that can search for optimal solutions to complex problems.

Expert System is a type of system that uses knowledge and inference to provide intelligent support for human decision making, often used in business and finance. Related terms include Decision Support System, Knowledge Base, and Inference Engine. In AI, expert systems are used to develop systems that can provide intelligent support for human decision making.

Feature Extraction is a technique for extracting relevant features or patterns from data, often used in machine learning and data analysis. Related terms include Feature Selection, Dimensionality Reduction, and Principal Component Analysis. In AI, feature extraction is used to develop systems that can simplify complex datasets and improve the performance of machine learning models.

Feedback Control refers to a type of control system that uses feedback from the environment to adjust its behavior and achieve a desired goal, often used in control theory and robotics. Related terms include Control System, Optimization, and Regulation. In AI, feedback control is used to develop systems that can adjust their behavior and achieve a desired goal.

Fuzzy Logic is a type of mathematical logic that allows for fuzzy or imprecise reasoning, often used in control theory and expert systems. Related terms include Fuzzy Set, Fuzzy Rule, and Defuzzification. In AI, fuzzy logic is used to develop systems that can reason about uncertainty and make decisions under uncertainty.

Game Theory is a branch of mathematics that studies the strategic interaction between multiple agents, often used in economics and political science. Related terms include Game Tree, Nash Equilibrium, and Prisoner Dilemma. In AI, game theory is used to develop systems that can reason about the behavior of multiple agents and make strategic decisions.

Generative Model is a type of machine learning model that can generate new data samples that are similar to the training data, often used in image and video generation. Related terms include Discriminative Model, Generative Adversarial Network, and Variational Autoencoder. In AI, generative models are used to develop systems that can generate new data samples and create new content.

Graph Theory is a branch of mathematics that studies the properties and structures of graphs, often used in network analysis and optimization. Related terms include Graph Structure, Node, and Edge. In AI, graph theory is used to develop systems that can analyze and optimize complex networks.

Human-Computer Interaction refers to the study of how humans interact with computers and the development of systems that can interact with humans in a more natural and intuitive way. Related terms include User Interface, Usability, and Accessibility. In AI, human-computer interaction is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Hybrid Approach refers to a type of approach that combines multiple techniques or methods to achieve a desired goal, often used in machine learning and optimization. Related terms include Hybrid Model, Ensemble Method, and Combination Approach. In AI, hybrid approaches are used to develop systems that can combine multiple techniques and methods to achieve a desired goal.

Image Processing refers to the techniques and methods used to analyze and manipulate images, often used in computer vision and image recognition. Related terms include Image Analysis, Object Recognition, and Scene Understanding. In AI, image processing is used to develop systems that can see and understand the world around them.

Information Retrieval refers to the process of retrieving relevant information from a large dataset or database, often used in search engines and information systems. Related terms include Search Engine, Indexing, and Ranking. In AI, information retrieval is used to develop systems that can retrieve relevant

information from large datasets.

Intelligent Agent is a type of system that can perceive its environment and take actions to achieve a desired goal, often used in robotics and autonomous systems. Related terms include Autonomous System, Agent Architecture, and Decision Making. In AI, intelligent agents are used to develop systems that can perceive their environment and take actions to achieve a desired goal.

Intelligent Tutoring System is a type of system that can provide intelligent support for human learning, often used in education and training. Related terms include Tutoring System, Learning Management System, and Adaptive Learning. In AI, intelligent tutoring systems are used to develop systems that can provide intelligent support for human learning.

Knowledge Discovery is the process of discovering patterns and relationships in large datasets, often used in data mining and business intelligence. Related terms include Data Mining, Pattern Recognition, and Knowledge Management. In AI, knowledge discovery is used to develop systems that can discover insights and patterns in large datasets.

Knowledge Graph is a type of knowledge representation that uses a graph structure to represent entities and their relationships, often used in information retrieval and question answering. Related terms include Graph Structure, Entity Recognition, and Relationship Extraction. In AI, knowledge graphs are used to develop systems that can represent and reason about complex knowledge.

Machine Learning is a type of artificial intelligence that involves the development of systems that can learn from data and improve their performance over time. Related terms include Supervised Learning, Unsupervised Learning, and Reinforcement Learning. In AI, machine learning is used to develop systems that can learn from data and improve their performance over time.

Natural Language Processing is a field of study that focuses on the development of systems that can understand and generate human language, often used in chatbots and virtual assistants. Related terms include Natural Language Understanding, Language Generation, and Sentiment Analysis. In AI, natural language processing is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Neural Network is a type of machine learning model that is inspired by the structure and function of the human brain, often used in image recognition and object detection. Related terms include Deep Learning, Artificial Neural Network, and Connectionism. In AI, neural networks are used to develop systems that can learn and represent complex patterns and relationships.

Object Recognition is the process of identifying and classifying objects in images or videos, often used in computer vision and image recognition. Related terms include Image Processing, Object Detection, and Scene Understanding. In AI, object recognition is used to develop systems that can see and understand the world around them.

Optimization refers to the process of finding the best solution to a problem, often used in machine learning and operations research. Related terms include Linear Programming, Nonlinear Programming, and Dynamic Programming. In AI, optimization is used to develop systems that can find the best solution to complex problems.

Pattern Recognition is the process of identifying and classifying patterns in data, often used in machine learning and data analysis. Related terms include Machine Learning, Classification, and Regression. In AI, pattern recognition is used to develop systems that can identify and classify patterns in data.

Planning refers to the process of finding a sequence of actions to achieve a desired goal, often used in artificial intelligence and robotics. Related terms include Planning Algorithm, Decision Making, and Problem Solving. In AI, planning is used to develop systems that can find a sequence of actions to achieve a desired goal.

Predictive Modeling is a type of machine learning that involves the development of models that can predict future outcomes or behaviors, often used in business and finance. Related terms include Predictive Analytics, Regression, and Time Series Analysis. In AI, predictive modeling is used to develop systems that can predict future outcomes or behaviors.

Principal Component Analysis is a technique for reducing the dimensionality of a dataset by identifying the most important features or components, often used in data analysis and machine learning. Related terms include Dimensionality Reduction, Feature Extraction, and Feature Selection. In AI, principal component analysis is used to develop systems that can simplify complex datasets and improve the performance of machine learning models.

Recommender System is a type of system that can recommend products or services to users based on their past behavior or preferences, often used in e-commerce and online advertising. Related terms include Personalization, Collaborative Filtering, and Content Based Filtering. In AI, recommender systems are used to develop systems that can recommend products or services to users.

Reinforcement Learning is a type of machine learning that involves the development of systems that can learn from trial and error by interacting with an environment, often used in robotics and game playing. Related terms include Q-Learning, SARSA, and Deep Reinforcement Learning. In AI, reinforcement learning is used to develop systems that can learn from trial and error.

Robotics refers to the study of the design, construction, and operation of robots, often used in manufacturing and healthcare. Related terms include Robot Design, Robot Control, and Human-Robot Interaction. In AI, robotics is used to develop systems that can interact with and understand the physical world.

Scene Understanding refers to the process of interpreting and understanding the content of images or videos, often used in computer vision and image recognition. Related terms include Image Processing,

Object Recognition, and Context Understanding. In AI, scene understanding is used to develop systems that can see and understand the world around them.

Search Engine is a type of system that can retrieve and rank relevant information from a large dataset or database, often used in information retrieval and web search. Related terms include Information Retrieval, Indexing, and Ranking. In AI, search engines are used to develop systems that can retrieve relevant information from large datasets.

Sentiment Analysis is the process of determining the emotional tone or sentiment of text, often used in natural language processing and text analysis. Related terms include Sentiment Classification, Opinion Mining, and Emotion Detection. In AI, sentiment analysis is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Speech Recognition is the process of identifying and transcribing spoken words into text, often used in voice assistants and speech to text systems. Related terms include Speech Processing, Speech Synthesis, and Natural Language Processing. In AI, speech recognition is used to develop systems that can understand and interact with humans in a more natural and intuitive way.

Supervised Learning is a type of machine learning that involves the development of systems that can learn from labeled data, often used in classification and regression tasks. Related terms include Unsupervised Learning, Reinforcement Learning, and Deep Learning. In AI, supervised learning is used to develop systems that can learn from labeled data and improve their performance over time.

Swarm Intelligence refers to the study of the collective behavior of swarms of agents, often used in optimization and robotics. Related terms include Swarm Optimization, Flocking, and Herding. In AI, swarm intelligence is used to develop systems that can optimize and adapt to complex environments.

Time Series Analysis is the process of analyzing and forecasting time series data, often used in finance and economics. Related terms include Time Series Forecasting, ARIMA, and Exponential Smoothing. In AI, time series analysis is used to develop systems that can analyze and forecast time series data.

Unsupervised Learning is a type of machine learning that involves the development of systems that can learn from unlabeled data, often used in clustering and dimensionality reduction tasks. Related terms include Supervised Learning, Reinforcement Learning, and Deep Learning. In AI, unsupervised learning is used to develop systems that can learn from unlabeled data and improve their performance over time.

User Interface refers to the interface between humans and computers, often used in human computer interaction and user experience design. Related terms include User Experience, Usability, and Accessibility. In AI, user interfaces are used to develop systems that can interact with humans in a more natural and intuitive way.

Variational Autoencoder is a type of deep learning model that can learn complex distributions of data, often

used in image and video generation. Related terms include Generative Model, Autoencoder, and Deep Learning. In AI, variational autoencoders are used to develop systems that can generate new data samples and create new content.

Virtual Assistant is a type of system that can assist humans with various tasks, often used in voice assistants and chatbots. Related terms include Chatbot, Voice Assistant, and Personal Assistant. In AI, virtual assistants are used to develop systems that can assist humans with various tasks and provide intelligent support.

Weak AI refers to a type of AI that is designed to perform a specific task, often used in narrow AI and applied AI. Related terms include Strong AI, Artificial General Intelligence, and Narrow AI. In AI, weak AI is used to develop systems that can perform specific tasks and improve their performance over time.