ADaSci Certified AI Trainer

Program Curriculum

The ADaSci Certified AI Trainer Program offers a globally recognized certification designed to equip individuals with the skills and knowledge required to effectively teach AI concepts. This program is aimed at professionals, educators, and aspiring trainers who seek to understand and impart the essential concepts of artificial intelligence (AI) across various domains, including machine learning, deep learning, natural language processing (NLP), computer vision, generative AI, agentic AI systems, cloud technologies, and data engineering.

Our curriculum is designed to ensure that AI trainers have a deep understanding of both foundational and advanced topics in AI, empowering them to create impactful and engaging learning experiences for their students.

Upon successful completion of this curriculum and the certification exam, participants will be fully equipped to deliver high-quality AI training to students, professionals, and organizations, with a strong focus on both theoretical understanding and practical application.

Curriculum Breakdown

The ADaSci Certified AI Trainer Program curriculum is divided into 10 key modules, each designed to provide in-depth knowledge and practical exposure to core AI concepts and techniques. Below is a comprehensive breakdown of each module, including the major topics covered and their corresponding weightage in the final certification exam.

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1. **Mathematics for AI**
   Weightage: 8%
   Mathematics is the backbone of artificial intelligence. In this module, participants will learn key mathematical concepts essential for building and understanding AI models, including:
   - **Statistics**: Probability theory, distributions, hypothesis testing, and statistical inference.
   - **Linear Algebra**: Vectors, matrices, eigenvalues, and eigenvectors, essential for machine learning algorithms and deep learning.
   - **Basic Calculus**: Sets, functions, limits, derivatives, integrals, and gradients, particularly relevant for optimization algorithms like gradient descent.

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2. **Programming Frameworks**
   Weightage: 10%

A strong grasp of programming tools and frameworks is essential for AI training. This module introduces the key programming languages and frameworks used in the AI field:

- **Python Data Structures**: Lists, dictionaries, tuples, sets, and understanding the role of Python in AI.
- **TensorFlow**: Key concepts and tools for building and training deep learning models.
- **PyTorch**: A deep learning framework known for flexibility and ease of use in research and deployment.
- **LangChain**: A powerful tool for building AI-powered language models and applications in Python.

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3. **Machine Learning**

Weightage: 12%

Machine learning is at the heart of AI, and this module covers the essential techniques used in supervised and unsupervised learning. Key topics include:

- **Feature Engineering**: Extracting and selecting relevant features to improve model performance.
- **Classification Techniques**: Logistic regression, decision trees, support vector machines, k-nearest neighbors, Naive Bayes.
- **Regression Analysis**: Linear and polynomial regression models for prediction.
- **Clustering**: k-means, hierarchical clustering, DBSCAN for unsupervised learning.
- **Recommender Systems**: Collaborative filtering, content-based methods, and hybrid approaches.
- **Evaluation Metrics**: Accuracy, precision, recall, F1 score, ROC-AUC, and confusion matrix for model evaluation.

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4. **Deep Learning**

Weightage: 12%

Deep learning has revolutionized AI. This module focuses on advanced machine learning techniques, including neural networks and optimization methods:

- **Gradient Descent**: Understanding the gradient descent optimization algorithm.
- **Other Optimizers**: Adam, Adagrad, RMSProp, and their differences in training deep models.
- **Neural Networks**: Introduction to artificial neural networks (ANNs), backpropagation, and network design.
- **RNN and LSTM**: Recurrent neural networks and long short-term memory networks for sequence modeling.
- **Regularizers**: Dropout, L2 regularization, and early stopping for preventing overfitting.
- **Autoencoders**: Understanding unsupervised learning with autoencoders for dimensionality reduction and anomaly detection.

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5. **Natural Language Processing (NLP)**
   Weightage: 12%
   NLP enables machines to understand and generate human language. This module provides in-depth knowledge of NLP techniques and tools:
   - **Text Preprocessing**: Tokenization, stemming, lemmatization, stopword removal.
   - **Tokenization**: Word and subword tokenization techniques.
   - **Embedding Models**: Word2Vec, GloVe, and fastText for text representation.
   - **Word2Vec & GloVe**: The concept of distributed representations of words.
   - **Skip-gram**: Understanding word embeddings and their applications in NLP.
   - **Sentiment Analysis**: Techniques for determining sentiment in text, including supervised and unsupervised approaches.
   - **Named Entity Recognition (NER)**: Identifying and classifying entities in text.
   - **Sequence Modeling**: Working with sequential data using techniques like Hidden Markov Models (HMM) and RNNs.

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6. **Computer Vision**
   Weightage: 11%
   Computer vision enables machines to interpret and understand visual data. In this module, participants will learn core image processing and vision techniques:
   - **Image Processing**: Basic techniques for processing images, including filtering, edge detection, and feature extraction.
   - **Image Segmentation**: Techniques for dividing images into meaningful segments.
   - **Image Classification**: Using convolutional neural networks (CNNs) for classifying images.
   - **Object Detection**: Detecting and classifying objects within images using CNNs and R-CNNs.
   - **CNN and R-CNNs**: Convolutional neural networks and their variants, including region-based CNNs for more advanced detection tasks.

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7. **Generative AI and LLMs**
   Weightage: 13%
   Generative AI and large language models (LLMs) have become a cornerstone of modern AI. This module dives into the cutting-edge techniques in this field:
   - **Attention Mechanism**: Understanding how attention allows models to focus on important parts of the input sequence.
   - **Transformers**: The architecture that powers many recent advancements in NLP.
   - **Large Language Models (LLMs)**: Training and fine-tuning large-scale models like GPT-3 and BERT.
   - **Text Generative Models**: Techniques for generating text, including GPT and other transformer-based models.
   - **Image Generative Models**: Models like GANs and VAEs for generating realistic images.

- **Fine-Tuning**: Adapting pre-trained models to specific tasks.
- **RAG (Retrieval-Augmented Generation)**: Combining retrieval-based methods with generative models to improve performance.

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8. **Agentic AI Systems**
   Weightage: 8%
   Agentic AI systems focus on creating intelligent agents capable of performing tasks autonomously or with minimal human input. Key topics include:
   - **Agent Components and Architecture**: Building intelligent agents with perception, reasoning, and action capabilities.
   - **Single-Agent Systems**: Designing systems with a single agent operating independently.
   - **Multi-Agent Systems**: Enabling communication and collaboration between multiple agents.
   - **Multimodal Agents**: Agents capable of processing multiple forms of input, such as text, speech, and images.

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9. **Cloud Technology Fundamentals**
   Weightage: 7%
   Cloud technologies play a critical role in scaling AI applications. This module covers the major cloud platforms and AI services:
   - **AI Services in AWS**: Overview of AI services in Amazon Web Services, including SageMaker and Rekognition.
   - **AI Services in Azure**: Overview of Microsoft Azure's AI tools like Azure ML and Cognitive Services.
   - **AI Services in Google Cloud**: Exploring Google Cloud's AI offerings, including AutoML and Vision AI.

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10. **Basic Data Engineering**
    Weightage: 7%
    Data engineering is essential for building scalable AI systems. This module covers key data engineering techniques:

- **Data Acquisition**: Methods for gathering data from various sources.
- **Data Transformation**: Techniques for cleaning and transforming raw data into usable formats.
- **ETL (Extract, Transform, Load)**: Best practices for building ETL pipelines.
- **Data Stores**: Understanding databases, data lakes, and other storage solutions for AI systems.