**Sample Objectives**

|  |  |
| --- | --- |
| **Problem Statement 1** | **Problem Statement 2** |
| Despite the significant advances in deep learning, the deployment of deep neural networks on resource-constrained edge devices remains a challenging task. The computational and memory requirements of deep models often exceed the capabilities of edge devices, leading to latency issues and increased energy consumption. This research aims to address the pressing need for efficient deep learning algorithms and model architectures that can enable the deployment of powerful AI applications on edge devices with limited computational resources, thereby expanding the scope of edge computing in various domains, including IoT, autonomous systems, and real-time analytics. | The rapid growth of unstructured data, such as text, images, and videos, has created a pressing need for more advanced deep learning models that can effectively extract meaningful information and insights from these diverse data sources. However, existing deep learning architectures often struggle to generalize across different domains, languages, or modalities, hindering their widespread applicability. This research aims to develop novel deep learning frameworks and techniques that can enable the creation of more versatile and robust models capable of handling a wide range of unstructured data types, with a focus on improving cross-domain and cross-modal generalization while maintaining high performance and efficiency. |

**OBJECTIVES**

**Develop Efficient Deep Learning Architectures:** To design and develop novel deep learning model architectures that are optimized for resource-constrained edge devices, with a specific focus on minimizing computational and memory requirements while preserving model performance.

**Enhance Cross-Domain and Cross-Modal Generalization:** To investigate and implement techniques that improve the generalization capabilities of deep neural networks across different domains, languages, and modalities of unstructured data, ensuring versatility and adaptability in real-world applications.

**Enable Deployment on Edge Devices:** To create practical solutions for deploying deep learning models on edge devices, addressing issues related to latency and energy consumption, and ensuring seamless integration with edge computing ecosystems.

**Evaluate and Benchmark Performance:** To rigorously evaluate the proposed deep learning frameworks, algorithms, and models through comprehensive performance benchmarks, comparing them to existing solutions and establishing their effectiveness in enabling efficient and versatile deep learning on edge devices.

**Facilitate Real-World Applications:** To demonstrate the practical utility of the developed deep learning techniques and models by applying them to real-world use cases in domains such as IoT, autonomous systems, and real-time analytics, showcasing their potential impact on these applications.