**Advanced Deep Learning Variants Combined with Logistic Regression for Cervical Cancer Cell Image Classification**

Cervical cancer is one of the most common types of cancer and a leading cause of death among women globally, especially in developing countries. Early detection and accurate diagnosis of cervical cancer cells play a crucial role in improving treatment outcomes, reducing complications, and increasing patient survival rates. Traditional diagnostic methods rely heavily on manual analysis of cell samples under a microscope by medical professionals, which is time-consuming, requires expert knowledge, and is prone to human error.

With the rapid advancement of artificial intelligence (AI) and machine learning (ML), particularly deep learning, numerous studies have focused on developing automated medical image processing algorithms to support faster and more accurate diagnoses. Among these, deep learning models based on Convolutional Neural Networks (CNNs) and Transformers have shown outstanding performance in image recognition and classification tasks, thanks to their ability to automatically extract complex features from image data.

This study, titled *“Advanced Deep Learning Variants Combined with Logistic Regression for Cervical Cancer Cell Image Classification,”* aims to develop an automatic classification model for cervical cancer cells using the SipakMed dataset – a well-known and diverse dataset consisting of five major cervical cell types: Dyskeratotic, Koilocytotic, Metaplastic, Parabasal, and Superficial-Intermediate.

In this research, several state-of-the-art deep learning variants are employed, including CMT (Convolutional Neural Networks Meet Vision Transformers), CvT (Convolutional vision Transformer), CoAtNet (Convolutional Attention Network), and BoTNet (Bottleneck Transformer Network). To further enhance classification performance, outputs from these deep models are integrated with Logistic Regression – a simple yet effective ML algorithm known for its generalization capability and binary/multiclass classification performance.

The combination of advanced deep learning variants with Logistic Regression not only improves classification accuracy but also highlights the potential of deep learning in medical image analysis – a research direction with promising applications.

The expected outcome is to develop an accurate and efficient cervical cancer cell classification model to assist healthcare professionals in early detection and diagnosis, minimize errors and costs, and contribute to the advancement of automated diagnostic systems for better public healthcare.