### **Idea proposal – NeuroNest**

**Team members:**

* Juma Rubea
* Meman Salam
* DAMA soumana
* Plensia Lukosi

### **Project Idea:**

This project aims to develop a deep learning model for the **medical image segmentation of cervical cancer lesions**. The objective is to create an accurate segmentation model that can assist medical professionals in identifying cancerous lesions in cervical images, this potentially aiding in early diagnosis and effective treatment.

### **Relevance to Sustainable Development Goals (SDGs):**

This project aligns with **SDG 3: Good Health and Well-being.** By improving the detection of cervical cancer, the project has the potential to reduce mortality rates associated with the disease and enhance early treatment effectiveness. Automated segmentation for early detection is especially valuable in regions with limited healthcare resources, where timely diagnosis can significantly improve patient outcomes.

### **Similar Literature:**

1. **Automated Cervical Cancer Screening Using Deep Learning**: This study from *Frontiers in Oncology* (Mehboob, B., Javed, M., Faheem, A., & Nasir, M., 2022) explores a deep learning approach to automate cervical cancer screening through medical image analysis. It highlights the effectiveness of convolutional neural networks (CNNs) in identifying cervical cancer lesions, making it highly relevant to this project
2. **ColpoNet for Automated Cervical Cancer Screening Using Colposcopy Images**: Saini, S.K., Bansal, V., Kaur, R., & Juneja, M. (2020) introduced *ColpoNet*, a model for automated cervical cancer screening using colposcopy images. Published in *Machine Vision and Applications*, this study addresses challenges similar to those in this project, including image noise from elements like blood, mucus, and light, which can obscure lesion detection.

### **About Dataset:**

The private dataset contains cervical images, not publicly available due to the sensitive nature of the content. The directory includes images and corresponding annotations in JSON format, which can generate segmentation masks. Annotations are labeled with four classes—lesion, blood, mucus, and light—to enable the model to distinguish among them accurately. The colposcopic images vary in size but are generally square; resizing can risk losing critical details, so the model is designed to accept varying image sizes.

### **Deep Learning Approach**

Given the complexity of this segmentation task, deep learning techniques using convolutional neural networks are well-suited. Models such as Mask R-CNN, U-Net++, and DeepLabv3+ are considered due to their strong performance in segmenting detailed image regions. These models will be evaluated to determine the most accurate approach for identifying lesion boundaries. While some literature takes a cellular approach to segmentation, this project focuses on visually segmenting cervix images from colposcopy data, targeting precise lesion detection in practical clinical contexts.