DataMD

Annotation Tool for Biomedical Images

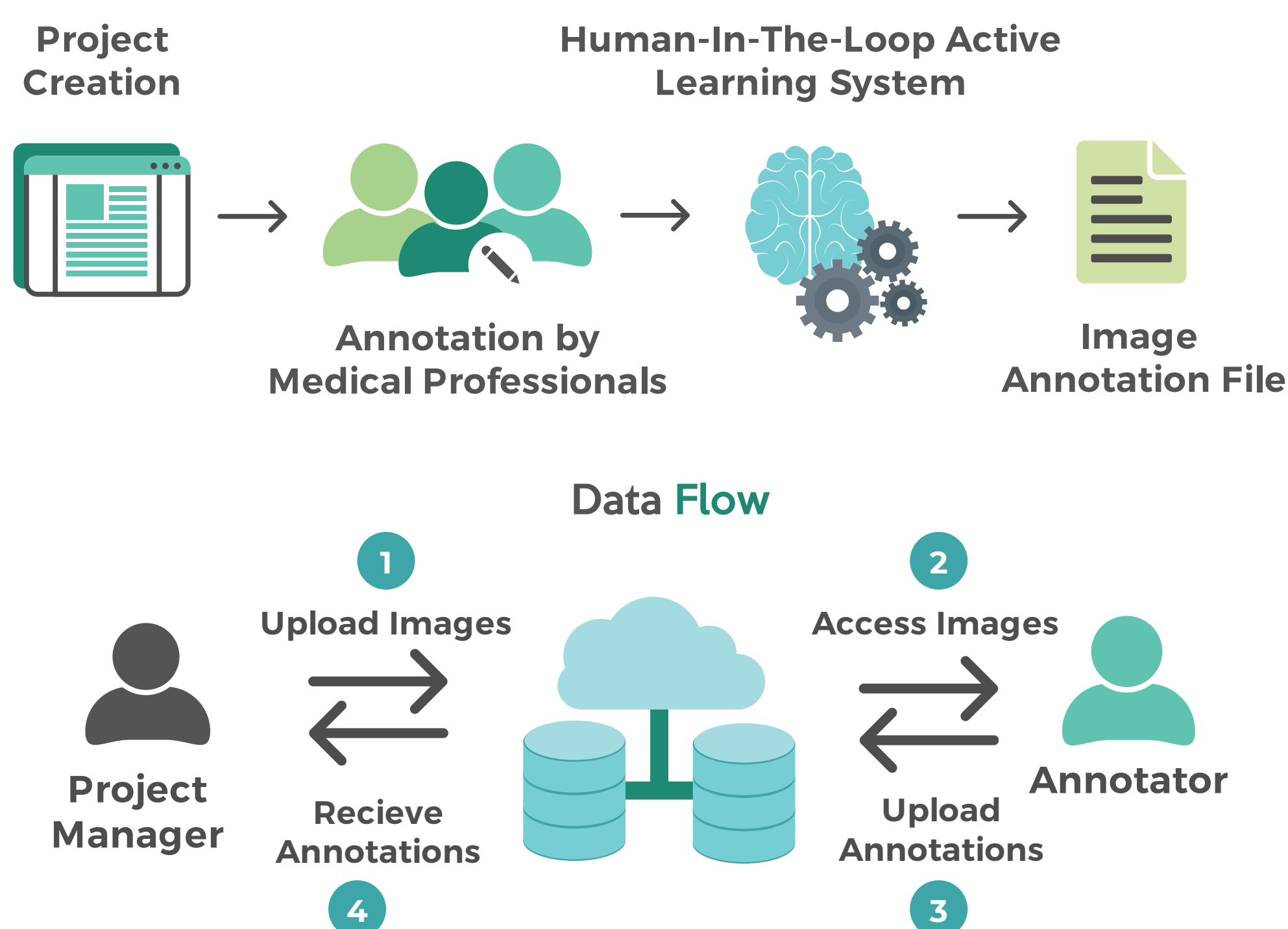NATIONAL UNIVERSITY OF SCIENCES & TECHNOLOGY PAKISTAN

Problem Statement

Medical institutions generate large volumes of biomedical image data that can be used to train supervised models for valuable AI-assisted diagnosis in healthcare. However, annotating biomedical images is a laborious process that also needs input from professionals for accuracy.

Proposed Solution

An online collaborative tool specialised for use by teams of medical professionals as annotators of biomedical images. Users can smoothly complete annotations with an optimised user interface, and an active learning architecture built upon a pre-trained machine learning model will reduce the labour.
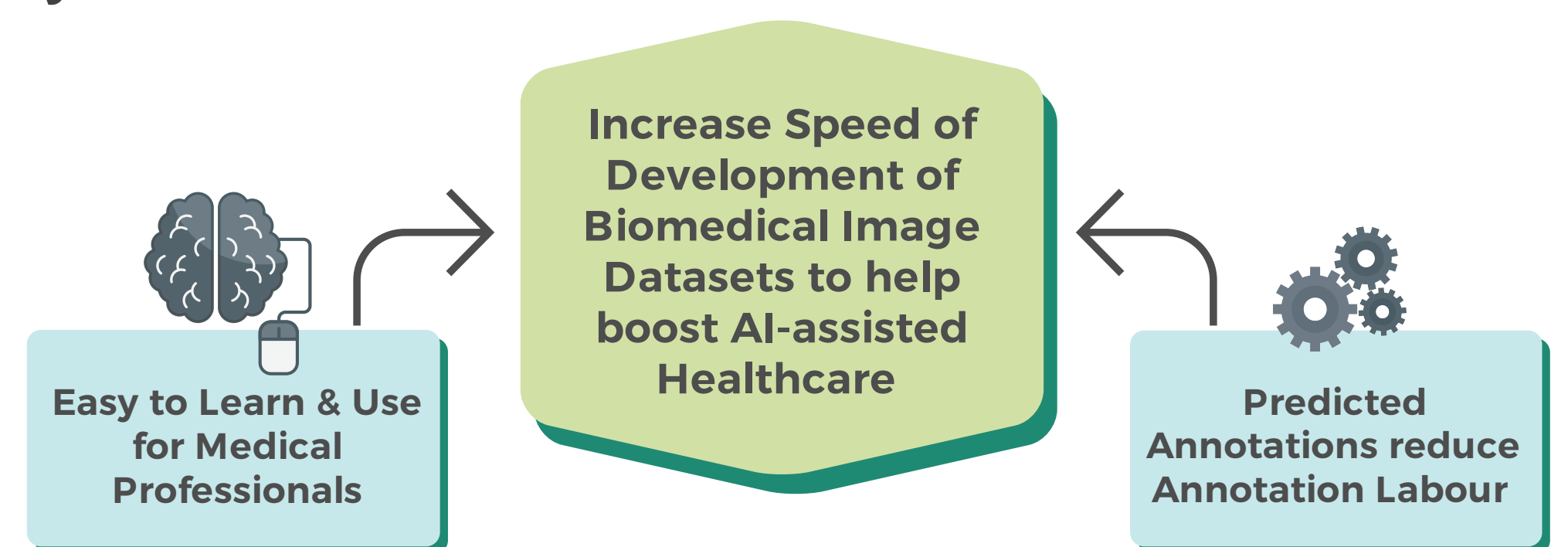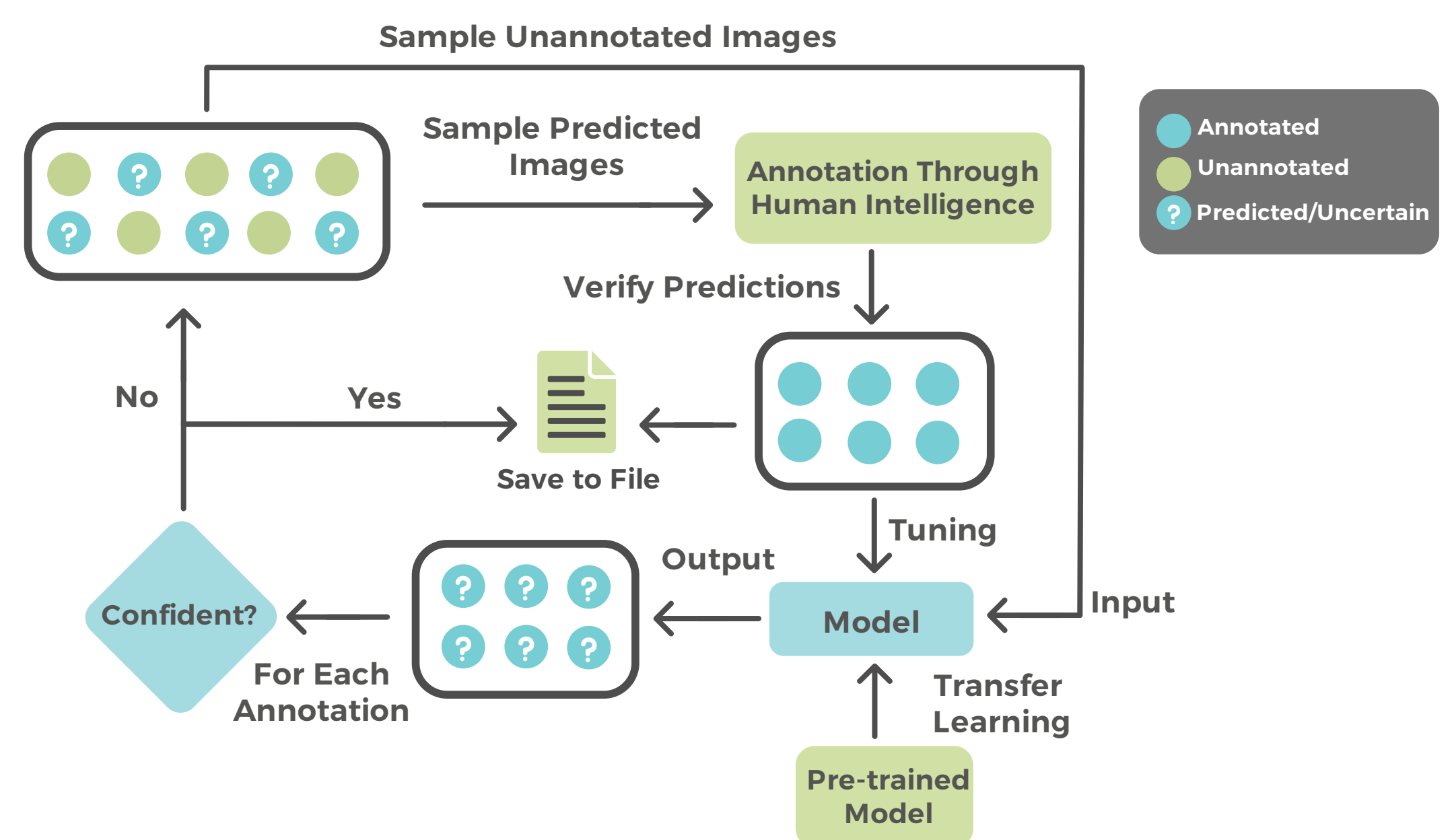
Objectives

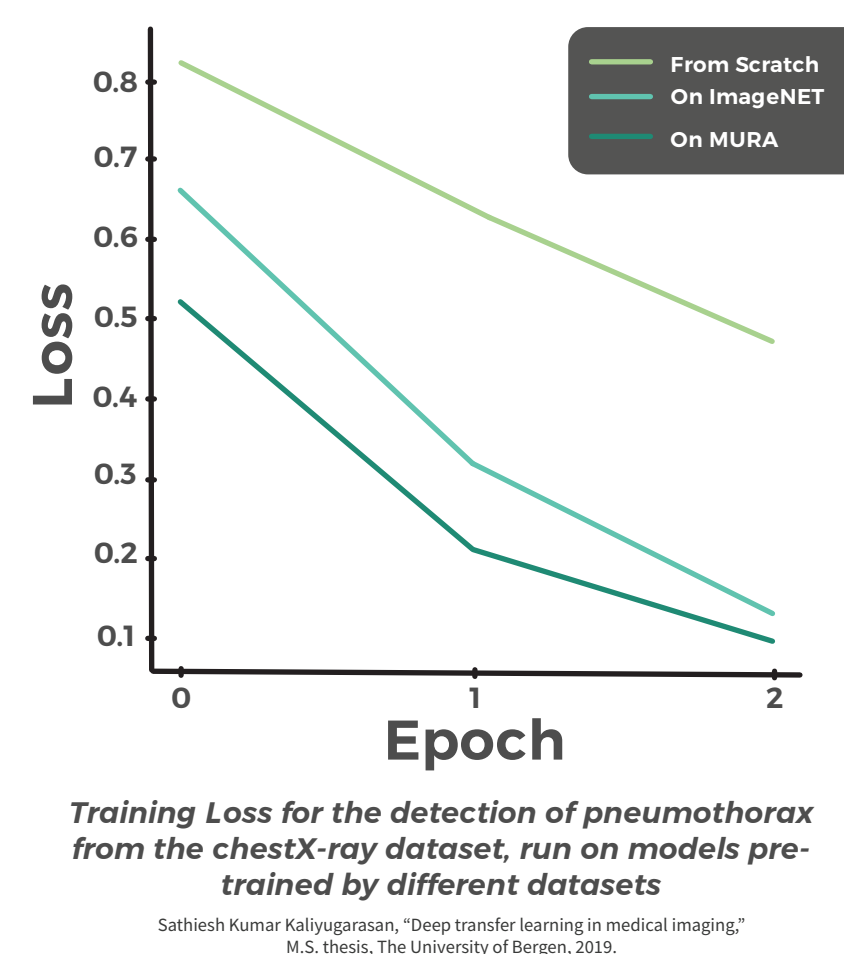Easy to Learn & Use for Medical Professionals → **Increase Speed of Development of Biomedical Image Datasets to help boost AI-assisted Healthcare** ← Predicted Annotations reduce Annotation Labour

Methodology

Project Creation → **Annotation by Medical Professionals** → **Human-In-The-Loop Active Learning System** → **Image Annotation File**

Data Flow

1. Upload Images
2. Access Images
3. Upload Annotations
4. Recieve Annotations

Project Manager — **Annotator**

Features

- **Saves Time in Annotation**
- **Human-In-The-Loop Machine Learning**
- **Clear & Usable User Interface**
- **Collaborative Teams**

Architecture

Sample Unannotated Images

Sample Predicted Images → **Annotation Through Human Intelligence** → Verify Predictions

Legend:
- Annotated
- Unannotated
- Predicted/Uncertain

No ← Yes → Save to File

Confident? ← For Each Annotation ← Output ← **Model** ← Input

Tuning — Transfer Learning — **Pre-trained Model**

Results

Epoch vs **Loss**

Legend: From Scratch, On ImageNET, On MURA

Training Loss for the detection of pneumothorax from the chestX-ray dataset, run on models pre-trained by different datasets

Sathiesh Kumar Kaliyugarasan, "Deep transfer learning in medical imaging," M.S. thesis, The University of Bergen, 2019.

Conclusion

The project will be evaluated on the following metrics:

- Accuracy of the annotation prediction confidences
- Time-taken to annotate compared to similar software
- Evaluation by Nielsen's 10 Usability Heuristics

Technology

JS, django, TensorFlow, MySQL, Python, Google Cloud

Group Members

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