**Training Plan**

**(Under 90 days Training Program)**

**1. Executive Summary**

I am particularly interested in the application of **machine learning to geophysics and geology.** I am relatively new to machine learning.I did not discuss about the specific topic with metor yet. I am interesting in Lineament extraction and structureal mapping using Lansat and Sentinel-1 SAR data. This topic can be extended for modelling geological CO2 leakage. I am also preparing DC resistivity data with borehole data and soil samples.

**2. Background & Motivation**

I am currently a Lecturer and Head of the Geoscience Division at Mahidol University, Kanchanaburi Campus, Thailand. I teach courses in Geophysics and Computer Programming. During my Master’s degree, I developed a forward modeling and inversion program for Direct Current (DC) Resistivity data by using MATLAB, resulting in a publication (Boonchaisuk et al., 2008). For my Ph.D., I led a survey team to study the crustal structure of Kanchanaburi Province using magnetotelluric and receiver function techniques, leading to Thailand’s first publication in this field (Boonchaisuk et al., 2013). My work involved installing seismic stations, data acquisition, data processing, and inversion, which marked the beginning of my interest in seismology. After graduation, I contributed to the study of Thailand’s crustal properties and thickness using receiver function analysis (Noisagool et al., 2014). Following the largest earthquake in Thai history on May 5, 2014, I was involved in conducting a magnetotelluric survey and proposed a model related to the earthquake’s cause (Boonchaisuk et al., 2017). Currently, our research group plans to apply a variety of geophysical techniques to better understand subsurface structures and active faults. It is my great opportunity to attend the Scientist Invitation Program in Korea 2025 to broaden my khowledge in machine learning and geophysics.

**3. Research Objectives and Methodology**

I have outlined a tentative study plan for the training period:

* **Weeks 1–2:** Foundations
  + Python programming (Jupyter Notebooks, Pandas, NumPy, SQL)
  + Data analysis projects (data cleaning, visualization)
  + Essential mathematics for ML (statistics, probability, linear algebra, calculus)
* **Weeks 3–4:** Machine Learning Basics
  + Core algorithms: Linear Regression, Logistic Regression, Decision Trees, Ensemble Methods, SVMs, Neural Networks
  + Implementation from scratch and with Scikit-learn
* **Weeks 5–6:** Application to Geophysical/Geological Datasets
  + Data preparation, exploratory analysis, feature engineering, and model training
* **Weeks 7–8:** Advanced Machine Learning Techniques
  + Deep Learning fundamentals, random forests, gradient boosting, SVMs
* **Weeks 9–12:** Final Project
  + Define a research problem, gather and process data, train and evaluate models, and present results

Example datasets (Kaggle) I intend to explore include:

* Earthquake datasets (e.g., Kaggle Earthquake dataset)
* Rock classification datasets
* Geochemical data for igneous rocks
* Landsat and Sentinel-1 SAR
* DC resistivity, borehole data and soil property

If there is any fieldwork organized during the training, I would be delighted to participate and contribute. The outcome for short-term is to apply machine learning to one dataset. The long-term outcome is to apply machine learning technique to any real Geophysics and Geology datasets.

**4. Expected Outcomes & Impact (Pay-off, 1/2 page)**

I am interesting in Lineament extraction and structural mapping using Lansat and Sentinel-1 SAR data. This topic can be extended for modelling geological CO2 leakage or tectonics history. For this topic, one publication canbe expected. In the near future, we can apply machine leaning technique to varios fileds especially in Geophysics and Geology datasets.

I plan to expand this into a series of courses in computer simulation and Intro duction to data science, aiming to establish a Data Science major for Geoscience and other divisions students at our campus. Participation in this program would greatly enrich my knowledge and research skills. I am committed to applying the expertise gained to both my research and teaching, which will ultimately benefit my students and my country. Furthermore, this experience would foster future collaborations among institutions across the Asia-Pacific region.