HARSHIT TIMMANAGOUDAR
PES UNIVERSITY
BENGALURU

Dear Harshit Timmanagoudar,

Subject: Letter of Recommendation

It is a pleasure to certify that you have successfully completed the module on '**Data Analytics using Deep Learning**' by Hewlett Packard Enterprise, Education Services as part of the Global Academic Internship Programme (GAIP), from 11th July 2022 to 21st July 2022.

The module consisted of the following topics:

Machine Learning vs Deep Learning
- Sample demos - When is machine learning right?
- Sample demos - When is deep learning right?
- Identifying a problem and building solution

Optimization and Tuning
- Learning rate
  - Adam Optimizer
  - Custom Optimization Functions
- Momentum
  - Speed up convergence of 1st order optimizations (Gradient Descent)
- Parameter initialization strategy
- Data normalization
- Batch normalization
- Hyperparameter tuning strategy
- GPU and Hardware acceleration
- Setting up Hardware acceleration, effect on the network and best practices

Deep Learning Project Management
- Data Engineering Fundamentals and Pipelines
- Data pre-processing techniques
- Data labelling – Manual and Automatic Process
- Benchmarking Baseline and Comparing models
- Data augmentation – Noise, Interpolation, Extrapolation, ImageDataGenerator
- Transfer learning
  - Types of Transfer Learning
  - Preparing model for Transfer Learning
  - Transfer learning in Action – ResNet, VGGNet

Performance Measurement
- Data Optimization Strategies, Missing Data, Subsampling and Oversampling
- Performance Management Strategies- Algorithms and Hyperparameters revisited
- Early Stopping Strategies with Back-propagation and Generalization
- Ensemble methods
    - o Generating Sub-models and Aggregating into One Model
    - o Bagging Models
    - o Stacking
    - o Step by Step Strategy for Measuring and Understanding Network Performance

AI in Law and Ethics
- The Laws and Regulations

Designing an AI solution for Scale
- With and Without Cloud
- Project Specific Pipelines

Capstone Project
- Applying deep learning to real-life use case

Your performance in GAIP is found to be **VERY GOOD.** We wish you the very best in your career ahead.

Sincerely,

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Mr. Clarence Lai
Country Manager
Singapore Education Services
HPE PointNext
Hewlett Packard Enterprise

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Mr. Rajesh Panda
Managing Director
Corporate Gurukul Pte. Ltd.
Singapore