Transfer Learning and Fine-tuning Pre-trained Models Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today's fast-paced AI and machine learning landscape, Transfer Learning and fine-tuning of pre-trained models are game-changing strategies for accelerating model development, reducing training time, and improving performance on specialized tasks. By leveraging large, generalized pre-trained models like BERT, GPT, ResNet, or Vision Transformers, organizations can tap into vast knowledge encoded from massive datasets and repurpose it for their specific domains—be it healthcare, finance, retail, NLP, or computer vision.

Transfer Learning and Fine-tuning Pre-trained Models Training Course provides a deep dive into the core principles, frameworks, and applications of transfer learning, from zero-shot learning to domain adaptation, and enables participants to gain hands-on experience with TensorFlow, PyTorch, Hugging Face Transformers, and more. Through real-world case studies, practical assignments, and collaborative learning, participants will acquire the essential skills to build efficient, scalable, and intelligent AI models with minimal labeled data and maximum impact.

Programme Curriculum

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Course Objectives

1. Understand the fundamentals of transfer learning and domain adaptation
2. Explore various types of pre-trained models across NLP and CV
3. Implement fine-tuning strategies for custom datasets
4. Apply zero-shot and few-shot learning techniques
5. Gain proficiency with TensorFlow Hub, PyTorch Hub, and Hugging Face
6. Learn to handle overfitting and catastrophic forgetting
7. Integrate transfer learning with real-time AI pipelines
8. Evaluate performance using cross-domain metrics
9. Optimize models for low-resource environments
10. Understand multi-task and continual learning paradigms
11. Build scalable solutions with MLOps and AutoML tools
12. Explore ethical considerations and model bias in transfer learning
13. Work through industry-relevant case studies and hands-on labs

Target Audience

1. Data Scientists
2. Machine Learning Engineers
3. AI Researchers
4. Software Developers
5. NLP Practitioners
6. Computer Vision Engineers
7. Academic Researchers
8. Tech Startups and Innovators

Course Duration: 5 days

Course Modules

Module 1: Foundations of Transfer Learning

- Definition and evolution of transfer learning
- Core principles: feature reuse, knowledge distillation
- Categories: inductive, transductive, unsupervised
- Comparison with traditional ML
- Industry use cases: NLP, CV, speech
- **Case Study**: Transfer learning for pneumonia detection using chest X-rays

Module 2: Pre-trained Models in NLP and Vision

- Overview of models: BERT, GPT, T5, ResNet, VGG, ViT
- Tokenization and embeddings
- Transferability and task generalization
- Choosing the right model
- Model architecture dissection
- **Case Study**: Fine-tuning BERT for legal document classification

Module 3: Fine-tuning Techniques and Strategies

- Layer freezing and unfreezing
- Discriminative learning rates
- Gradual unfreezing and slanted triangular learning
- Domain-specific fine-tuning
- Monitoring model drift
- **Case Study**: Custom object detection using YOLOv5

Module 4: Frameworks and Tools for Implementation

- TensorFlow Hub & PyTorch Hub
- Hugging Face Transformers library
- Training scripts and model APIs
- Using Google Colab and Kaggle notebooks
- Model optimization and saving checkpoints
- **Case Study**: Sentiment analysis using Hugging Face pipeline

Module 5: Advanced Topics in Transfer Learning

- Few-shot and zero-shot learning
- Meta-learning and multi-task learning
- Continual learning and knowledge transfer
- Dealing with domain shift
- Cross-lingual and multi-modal models
- **Case Study**: GPT-3 for multilingual summarization

Module 6: Evaluation and Performance Tuning

- Domain-specific metrics: BLEU, F1, mAP
- Handling imbalanced datasets
- Avoiding overfitting and bias
- Explainability in transferred models
- Visualization with Grad-CAM and SHAP
- **Case Study**: Model evaluation in a multi-domain e-commerce dataset

Module 7: Deployment and Real-time Inference

- Converting models for ONNX and TFLite
- Serverless deployment with AWS Lambda or Google Cloud Functions
- Using Docker and FastAPI
- Latency and throughput optimization
- Integration with mobile/edge devices
- **Case Study**: Real-time object tracking with fine-tuned MobileNet

Module 8: Ethics, Security, and Sustainability

- Ethical AI and bias in pre-trained models
- Secure deployment and adversarial threats
- Privacy-preserving fine-tuning techniques
- Carbon footprint of large-scale models
- Governance and compliance issues
- **Case Study**: Auditing GPT fine-tuning for hate speech detection

Training Methodology

- Interactive instructor-led sessions

- Real-world case studies with code walkthroughs
- Hands-on labs and assignments using cloud-based tools
- Peer collaboration via discussion forums and group projects
- Capstone project and certificate of completion

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com