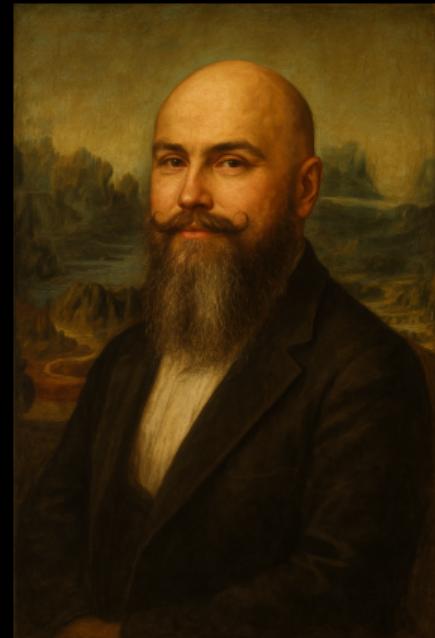


NAF

Teaching “old” LLMs new tricks

Urs Baumann 30.05.2025





- Network Automation since 1503
- MSc Artificial Intelligence

ChatGPT

What is fine-tuning

NAF

- Fine-tuning image generation with art style

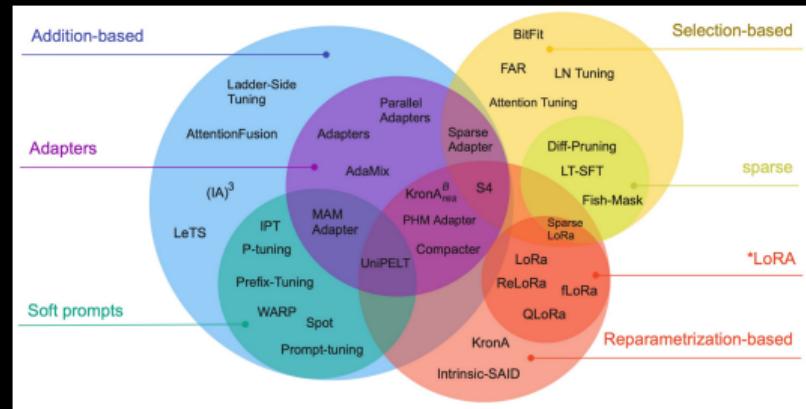


- <https://stabilityai.notion.site/Stable-Diffusion-3-Medium-Fine-tuning-Tutorial-17f90df74bce4c62a295849f0dc8fb7e>

Fine-tuning Methods Taxonomy

NΛF

- arXiv:2303.15647
- Submitted on 28 Mar 2023 (v1), last revised 22 Nov 2024
- Addition-based
- Selection-based
- Reparametrisation-based



<https://arxiv.org/abs/2303.15647>

- **Low-Rank Adaptation of Large Language Models**
- arXiv:2106.09685, 2021, Microsoft
- <https://github.com/microsoft/LoRA>
- Freezes the pretrained model weights
- Adding low-rank matrices into each transformer layer

Why LoRA?

NΛF

- Minimising memory consumption
- Enabling fine-tuning on hardware with limited resources
- Learning task-specific transformations without altering the original model structure

Once upon a time ...

Preparing the stage

NAF

CLI Cowboys ran the network.



ChatGPT

Preparing the stage

NAF

Shooting network configs
from the hips.



ChatGPT

Preparing the stage

NAF

Network engineers working
on the neglected network
dreamed about ...



ChatGPT

Preparing the stage

NAF

...a modern declarative network.



ChatGPT

Preparing the stage

NAF

And take time off.



ChatGPT

Preparing the stage

NAF

However, they needed to extract the intent and resources from the inconsistent network configuration.

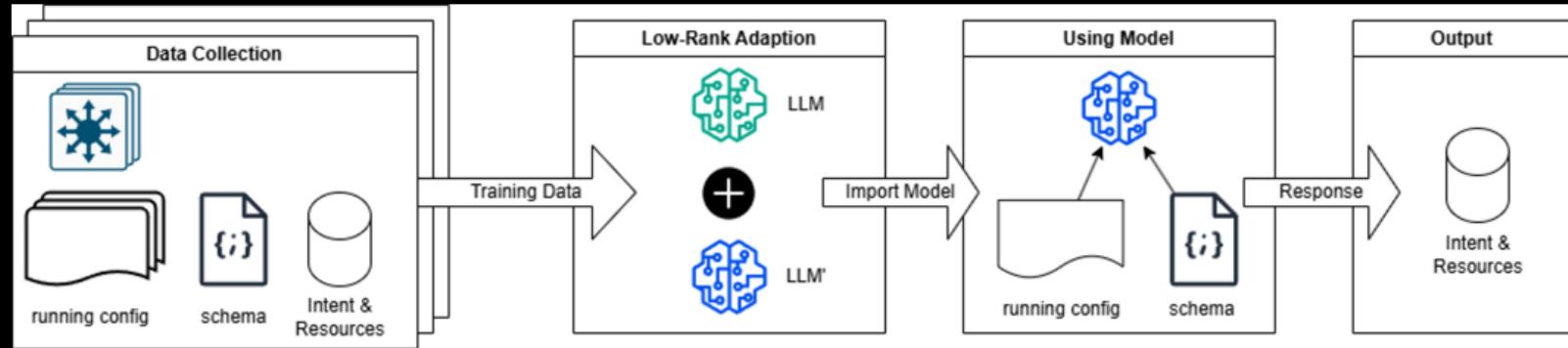


ChatGPT

Intent and Resource Extraction from Network Device Configuration

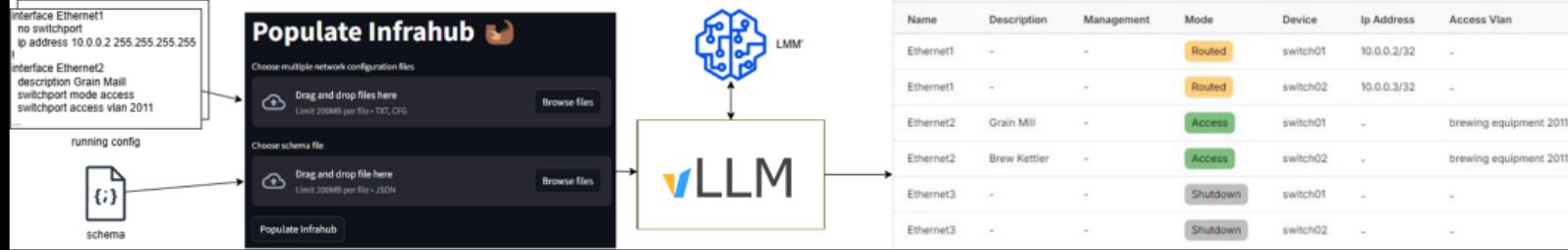
Fine-tuning Pipeline

NAF



Using new model

NAF



Qwen2.5-Coder-32B-Instruct

- Data Extraction Match: 0.86
- JSON Validity: 1.0

OpenAI GPT-4.0

- Data Extraction Match: 0.09
- JSON Validity: 0.98

Challenges

NAF

- Confusion between similar schemas
- IP Address + mask to CIDR
- Dataset quality

- One model for each schema
- Generating parser template
- Validate dataset
- LLM size

Tool Stack Fine-tuning Pipeline

NΛF

- unsloth
- vLLM
- MLflow

Thank you!

What is missing?

NAF

- Training data sets
- Benchmarks
- Real-world showcases

[Runs](#) [Evaluation](#) [Experimental](#) [Traces](#)