

# Research Challenges in Coupling Artificial Intelligence and Network Management

## draft-francois-nmrg-ai-challenges-01

Jérôme François,, Alexander Clemm , Dimitri Papadimitriou , Stenio Fernandes , Stefan Schneider

[NMRG@IETF](mailto:NMRG@IETF) 115



# Summary

1. Introduction . . . . .	3	7. Network data as input for ML algorithms . . . . .	
2. Conventions and Definitions . . . . .	5	7.1. Data for AI-based NM solutions . . . . .	
3. Acronyms . . . . .	5	7.2. Data collection . . . . .	
4. Difficult problems in network management . . . . .	5	7.3. Usable data . . . . .	
5. High-level challenges in adopting AI in NM . . . . .	8	8. Acceptability of AI . . . . .	
6. AI techniques for network management . . . . .	10	8.1. Explainability of Network-AI products . . . . .	
6.1. Problem type and mapping . . . . .	10	8.2. AI-based products and algorithms in production systems . . . . .	
6.1.1. Sub-challenge: Suitable Approach for Given Input . .	10	8.3. AI with humans in the loop . . . . .	
6.1.2. Sub-challenge: Suitable Approach for Desired Output . . . . .	11	9. Security Considerations . . . . .	
6.1.3. Sub-challenge: Tailoring the AI Approach to the Given Problem . . . . .	12	10. IANA Considerations . . . . .	
6.2. Performance of produced models . . . . .	13	11. References . . . . .	
6.3. Lightweight AI . . . . .	15	11.1. Normative References . . . . .	
6.4. AI for planning of actions . . . . .	16	11.2. Informative References . . . . .	

# Changes between v0 and v1

- From comments received after IETF 114 presentation
  - Reference to the data-mesh concept
    - In section 7.2

*Also, the data-mesh concept proposes to classify data into three categories: source-aligned, aggregate and consumer-aligned. Source-aligned data are those related to the same operational domain and it is important to correlate or aggregate them with higher planes: management-, control-and forwarding plane. An issue is the difference, not only in the nature of data, but in their volumes and their variety. Some may change rapidly over time (for example network traffic) while other may be quite stable (device state).*

...

*One difficult problem resides also in the availability of data as real-time data from different sources to be aggregated may not arrive at the same time requiring so some buffering techniques.*

# Next steps

- Request feedback from the group + call for adoption
- Identified possible additions
  - Integrate lightweight AI within distributed AI
  - Regarding *data challenges*: highlight the impact of labelled vs unlabelled data in regards to supervised/unsupervised/semi-supervised problems we have in NM
  - Adding legal / regulatory aspects of using AI (admissibility)
  - **But cannot be exhaustive anyway**
- In-depth investigation of some challenges (in other documents)
  - Considerations of deploying AI services in a distributed approach (draft-hong-nmrg-ai-deploy-02)