

Artificial and Augmented Intelligence applications in the telecommunications industry

From theory to practice – Network efficiency,
user experience and new services

Joint BEREC-IIC Conference 2019

Competing Continents: The pursuit of excellence in electronic
communication University

Panel 5 - Technology: How to enhance electronic communications with AI, data analytics, blockchain

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1. What is AI ? AI consists of ...

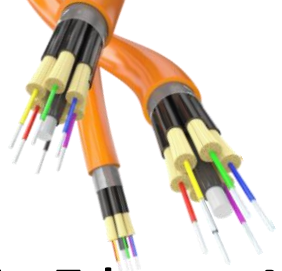
1) Expert Systems (ES): if-then rules

2) Machine Learning (ML): learn by itself with new observations and to create rules on its own

- DAI
- **Augmented intelligence**

2. Research question

- This paper analyzes **the AI applications** already in place, and those expected to be in place in telecoms with the **objective to reduce roll-out and operating costs, to improve performance or to introduce new services.**
- More sophisticated strategic understanding of the type of transformations AI will bring to core processes is precondition for analysis of the **economic impact** of AI or of the future of **sector-specific regulation.**
- The paper also explores AI developments in **other network industries**
- **Methodology:** Literature + Interviews
- **Disclaimer:** AI algorithms tend to be **complex.** We do not provide details on the proposed algorithms



3. Where can AI help? Applications identified in Literature review 1/2

1. Telecoms Network: Architecture and implementation

- **Access network:** minimize the number of optical regenerators (in P2P) and nodes (in PON)
- **Backbone:** AI to optimize the resource allocation in the backbone and for reconfiguration
- **Network Roll-out:** AI controlled robots for the roll-out of optical networks

2. Telecoms Network operation

- **Optimization of technical parameters of transmission:** laser amplitude, phase noise, ...
- **Failure detection and predictive maintenance:** swiftly identify network problems and to predict maintenance needs. Some authors propose AI techniques for fault diagnosis and maintenance prediction in optical access networks
- **Routing:** Some authors propose AI methods to choose the **optimal network paths** for network connections

3. Strategy, Marketing and general business operations

- Prediction of demand and network traffic, Prediction of churn, Prediction of where network improvements would benefit customers most, Virtual digital assistants, Streamlining inbound data and responses by customer representatives, New NLP services, Fraud detection, Cybersecurity



3. Where can AI help? Applications identified in Literature review 2/2

4. Other network industries

- **Quality measurement and prediction:** Water and Gas
- **Smart grid operations:** Electricity demand and traffic management using new meters placed on all levels of the network
- **Forecasting Water levels:** Forecast water resources and optimize water reservoir management
- **Autonomous intelligent agents in Urban Traffic control** that can respond to traffic conditions in real time
- **Failure detection and predictive Maintenance:** E.g. diagnosis and prediction of gas turbines maintenance

4. Where can AI help? Interview results

- **Interviews with key executives from** leading telecommunications operators & equipment providers and utilities
- **Heads of strategy / network / AI**
- **Europe and North America (HQs) / challenges**

Results:

- 1) **Predictive maintenance**
- 2) **Failure detection**
- 3) **Prediction of network traffic and demand**
- 4) **Optimization of network operations**
- 5) **Network architecture**
- 6) **Smart metering / smart grid**
- 7) **Customer care**
- 8) **Cybersecurity and fraud detection**

Some operators further hinted:

- **Lack of data + too strict regulation (among others data protection and net neutrality)**

5. Preliminary conclusions

- **only few transformational AI-ML applications** in operation today
- **But: Lot of enthusiasm and activity**
- Telecoms is at forefront
- **Differences between small and large players**
- **Trust** seems to be a major issue. ML algorithms such as Neural Networks usually cannot be “understood” by humans. Necessarily a long step by step process to the full roll-out of AI. Slow. Trials **alone may take 1-2 years. Maturity is key.**
- Focus of the industry seems to lie on **core network planning and operational** issues such as **failure detection and reparation** in order to **improve performance for customers.**
- This seems to be also the focus of major equipment providers especially in view of 5G. As such it can be expected that **AI will amplify the effects** of the roll-out of new technologies such as 5G and to increase the performance of existing ones.
- **Bottom line:** higher quality, lower Opex and Capex and some new innovative services
- New regulatory debates likely to appear: e.g. 5G traffic management
- **Next step: Use these key AI applications to consider effects on future regulation**