Research Challenges in AI for NM document

NMRG@IETF 109, Online

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Update on *challenges*

- https://docs.google.com/document/d/1dQOzZustI2mkYr_omtiqu3FqUvoqLgaCp7nbRj4ZJyw/edit?usp=sharing
- Slight modifications on existing challenges
- New proposed challenge: Scalable real-time monitoring
    - *"… While efficient mechanisms that extract raw measurement data at line rate have been recently developed, the processing of collected data is still a costly operation. This involves evaluating and aggregating a vast amount of state information as a response to a diverse set of monitoring queries,…"*
    - some comments
        - From a general point of view: how to handle the data we need to collect (volume, heterogeneity, velocity…)
        - What makes this challenge different in NM?
        - Why is this problem more difficult in the context of NM? (why existing solutions for real-time AI/big data cannot be applied?)

Scope & objectives of the document 1/2

- Focus on two dedicated virtual meetings in November
- Identify the boundaries of the document
  - From NM perspective:
    - No particular application domain or problems
    - High impact problem for motivation
    - + illustrating use cases (once challenges set)
  - AI is very large: only ML? or ML+ …?
    - Need clear definition of what we means by AI in this document
    - A document jointly developed by AI and NM experts: precise terms AI taxonomy as support
    - How intelligence mechanisms provided in NM maps to AI terminology
- Why do we want/need to use AI for NM?
  - Properties of NM problems that require the use of AI create specific AI problems and so new AI algorithms?
  - Are there new problems we can solve with AI?

Scope & objectives of the document 2/2

- (Discussed) Value of the document:
  - Avoid test & try method to resolve a problem
    - →identify the fundamental issues we have in NM where AI can help: generalized issues, no use-case specific
    - →make the bridge between NM problems and AI solutions
  - Different obstacles to adopt AI
    - Finding the right AI technique to use is a single problem/challenge
    - Need for interfaces, specific resources to run AI, access to data, explainability, education of human users…(some already described in the docs)
  - Not a set of use cases
  - Not a survey or mapping between NM problems and AI solutions (endless discussion)

Tentative scope description

[…] To identify the right set of challenges, the document must define a method based on the evolution and nature of NM problems […] So, the method aims at evaluating the gap between NM problems and AI solutions. Challenges are derived accordingly assuming solving these challenges will help to reduce the gap between NM and AI. This method will identify different kinds of challenges: technical, organizational, educational…

The challenges will be categorized according to the types of problems they relate to and an in-depth description will be provided. This description must clearly emphasize the different locks that we need to alleviate to solve the challenges. […], the objective of the document is to provide the reader with a justified set of challenges to address and so can serve as a basis for orienting research works in both NM and AI areas.

This document is NOT intended to:

- be a survey of the use of AI techniques in NM;
- define a mapping between NM problems and AI solutions;
- provide in-depth application use cases for each challenge. However, a few illustrating use cases can be integrated as separate sections but must been always described in regards to the challenges we have identified;
- provide solutions to all introduced challenges

Next steps

- Define a Refine scope of the document
  - Feedback now and on ML agree on a the scope in 2/3 weeks
- Method to identify the right set of challenges (ensure a good coverage in the document)
  - Definition of AI in the context of the document
  - Short history/evolution of NM and AI
  - List properties of NM problems that make them hard + list properties of AI solutions → define a "translation" between the NM and AI properties (not necesarily a 1-to-1)
- Refine challenge description
  - Recompose some of them (redundancy, generalization)
  - Converge to the same level of details and structure
- ID vs google document?