Introduction to Knowledge defined networking - Artificial Intelligence for Networks

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Introduction :

Network technology is a key element in the communication process of today's world. In order to make service systems more effective and highly flexible, network operators are utilizing analytics to gain a deeper understanding of the network. As a result, they are able to make smarter, data-driven decisions about their operations, which will also help them achieve their desired business outcomes.

In the same perspective of improving network technology, D. Clark has defined a new concept for networks called "Knowledge Defined Networks" or KDN in one of his most famous papers. This new concept relies on Machine Learning (ML) in addition to cognitive techniques in order to operate networks.

Knowledge management (KM) is the process of creating, sharing, using and managing the knowledge and information of an organization. It refers to a multidisciplinary approach to achieving organizational objectives by making the best use of knowledge. Historically, KM emerged as a scientific discipline in the early 1990s and was initially supported by individual practitioners,

SDN : Software-defined networking :

Software-defined networking (SDN) technology can be defined as an approach that facilitates the process of network management and enables programmatically efficient network configuration in order to improve network performance and monitoring. SDN is mainly used to fix the problem of static architecture in traditional networks : they are traditionally decentralized and complex while current networks require more flexibility and simplicity. SDN suggests centralizing network intelligence in one network component by disassociating the forwarding process of network packets (data plane) from the routing process (control plane).

In parallel to that one might consider Network analytics, which is, in its simplest definition, a concept involving an analysis process of network statistics and data in order to specify or identify patterns. Once specified/identified, there are operators that make several operations (including network operations) on this data. For instance, if a network operator detects the possibility of a congestion problem in a certain area of the network, traffic can be routed through a different part of the network to meet service performance objectives.

Network telemetry :

Network telemetry offers extensive and useful detection capabilities that help with the process of operating and ensuring availability of a network, it is critical to have visibility and awareness of what is occurring on the network at any given time. This can be coupled with dedicated analysis systems to collect, trend and correlate observed activity.

The KP concept is deployed by combining the use of the SDN paradigm, with network analytics methods that offer a very rich centralized view of the network. In this context, the KP can use various ML approaches, such as Deep Learning techniques (DL), to gather knowledge about the network, and exploit that knowledge to control it using logically centralized control capabilities provided by SDN. We refer to the paradigm resulting from combining SDN, telemetry, Network Analytics, and the Knowledge Plane as Knowledge-Defined Networking (KDN).

Conclusion :

This first attempt was an important phase for our group, guaranteeing us a first contact with the subject. This report was the fruit of teamwork, it contains the result of our very first reading.

We have become aware of the importance of the subject, and we now know that its understanding and assimilating will require a huge investment and regular efforts from us. We are ready to accept this challenge because the subject is rich and has many applications in our 2.0 world.

Regarding our plan, we will start by retrieving and classifying scientific articles, we will also look for interesting applications in order to further understand the issue, then we will start writing our paper which will contain the synthesis of the articles that we will select.

Reference

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