Intelligence slicing: A synthesized framework to integrate artificial intelligence into 5G networks

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Abstract

For best-performing networks from 5G and above, it must support a wide range of needs. It is understood that more transmission, resource assistance and communication systems will be required. Achieving these tasks can be challenging as network infrastructure becomes more complex and massive. A good solution is to incorporate more robust AI technology that has been tested to provide answers ranging from channel prediction to autonomous network management, as well as network security. Today, however, the latest technology to integrate AI into wireless networks is limited to using a unique AI algorithm to solve a specific problem. A comprehensive framework that can fully utilize the power of AI in solving various network problems remains an open problem. Therefore, this paper introduces the idea of the spy pieces on which the AI unit is installed and delivers on one condition. Intelligence units are used to flexibly control the intelligence of AI algorithms with two comprehension strategies to perform different intellectual tasks: 1) Neural network-based channel predictions and 2) Industrial network-based security acquisition, to illustrate this framework.

Keywords: Artificial intelligence, intelligence slicing, neural network, Anamoly detection.

1.Introduction

5G Networks are powered by common business in parts of the system with sufficient assets using Network Function Virtualization (NFV) and Defined Network Technology (SDN). Network Slider Critical and limited by programming or network software. Ongoing developments in top-down practice provide new insights into the most effective way to handle this problem. They are used in deep vision [1], computer vision [2], common language [3], independent composites [4] and many different fields. Impressive results guarantee great execution. Inspired by this, the basic sieve problem can be seen as a variation of the partition and is a well-known application for top-down learning. Frankly, the Deep Neural Network uses a multi-layer cycle with non-linear setup modules to capture and modify the highlights of the codec and audio engineering field. Contrary to standard data inspection arrangements, the NND decoding unit rates each pass. You have a single constructed nervous system, which is referred to as an individual test. It introduces reduce usage delays. Similarly, the advantage can be effectively obtained at higher rates by using the current internal and external learning steps, for example, TensorFlow [5]. As a rule, it supports a single computer and misuses popular devices, for example, design processing units (GPUs).

Fifth generation (5G) remote frameworks are compatible with many new frameworks and components, for example, IoT, Haptic Internet [1], programmed, rational and surprising leadership, electronic luxury and intelligent

processing factory. To take into an account their diverse needs, the 5G system and its approaching architecture should support high data rates, high quality, low execution, robust security, security assurance, great integration and unreliable network. Payment signal transmission, property usage, radio, computer auxiliary use, physical coordination and system implementation, autonomous system, authorities, systematic information and customer behavior should all be improved. Achieving these missions is an endeavor as the basis of the system becomes more confusing, diverse, gross and intelligent and accelerates the development of new applications.

The main setting that can be used is artificial intelligence (AI), which provides information-based technologies that can be considered to solve complex and pre-existing problems. In March 2016, Google launched a search for computational thinking in all areas of science and innovation, [3] when opposition exploited human competition for Alfago [2]. Truth be told, the remote search network began to use AI strategies to take care of connection issues a long time ago. A variety of specialized arrangements have been attempted, for example, the multiple input channel (MIMO) expected by the internal nervous system (RNN) [4], asset-based recruitment [5], security surveillance control [6] and the highlight of the practice. Touch radio [7]] and smart grid management [8]. However, the latest innovations in the use of computerized thinking in remote systems are mainly limited to the use of artificial intelligence accounts dedicated to taking care of obvious problems, for example [4] - [8]. Although the Self net project [9] suggests a more complex structure for the explicit programming framework, it focuses specifically on the use of non-permanent AI to manage executives. The system that influences AI innovation to look at system issues in a standard way remains an open issue.

Join AI to expand and monitor smart commitments to all areas of the system, from broadcast to signature applications, from asset allocation to zoning frameworks and a wide range of internal management. In line with AI implementation units, the idea of front-line knowledge along with the ability to verify,

normalize, measure, reconstruct and trigger has been identified. The efficiency of insight can make the problem look pleasant by selecting the best accounts to clarify the content in the questionable work of the system.

This paper provides good use for all aspects of the system, providing a robust and compatible AI system to handle smart tasks from transmitting to dealing with science and managing management to departmental controls. Compatibility with Vanguard's thinking, security, development and appreciation.
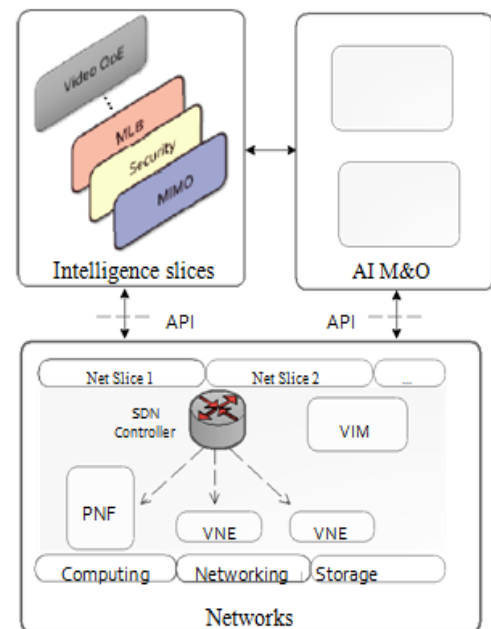

Fig.1. Unified AI framework based on the Anatomy of Intelligence through software-defined 5G virtual infrastructure.

Reconfigure and transfer AI functional units on demand. The intelligence chip can be mounted on an arbitrary network entity to solve the problem by selecting the best algorithm specifically optimized for the problem. Software Defined Networking (SDN) and Network Function Virtualization (NFV) were originally developed as an independent network by the Open Network Networks Foundation (ONF) and the European Telecommunications Standards Institute (ETSI). But they have demonstrated strong synergies and can be of considerable value by combining them with a single network architecture. For example, the SDN controller can be implemented in a program that broadcasts on computers as a virtual network function (VNF). Network control and management

applications (such as SDN applications) such as security, mobile load balancing (MLB) and providing a quality experience (QoE) for ultra-high definition video delivery are also perceived as VNFs. Computing, storage and virtual network resources controlled by the Virtual Infrastructure Manager (VIM) can be leveraged through the SDN to facilitate flexibility in programming backbone networks. By leveraging SDN and NFV, it is possible to create a network segmentation [12] that allows multiple virtual networks to provide dedicated service or client-specific functions, as shown in Figure 1 where physical network functions are used. (PNFs) to refer to legacy (non-NFV or non-SDN) components. Two slides of examples, namely RNN-based MIMO channel assessment to determine transmission antenna selection accuracy and security anomaly in industrial networks are described to demonstrate this framework.

2.Proposed Method

Since the launch of the 5G setup worldwide, the full capabilities and guarantees of 5G will not be recognized for long. In this sense, the race on the 5G side is more like a long-distance race than a race, as the primary benefits of the 5G have changed in a phased manner over the years. While 5G is here and eventually worldwide, Systems Life of the system is designed to extend the benefits of various 5G usage cases and applications and take the necessary work in developing computerized change. Meanwhile, one thing is for sure: the Pre-5G trim can be used today.

This paper demonstrates the construction of a modular and multi-utility system together to integrate AI to perform intelligent tasks for all parts of the system, from radio channels to science handling, from property allocation to segregation coordination and from proximate control to startup. The idea of life knowledge structures is introduced, the ability to create, transfer, scale, reconstruct and transfer useful AI modules on demand. The knowledge section can be submitted in the personal system to challenge the best care by clearly selecting the best advanced accounts for this issue. Two categories of models are represented, for example, RNN-based MIMO channel projections to demonstrate

this structure, to improve the accuracy of transmitting receiving wire selection and to identify security differences in modern systems.
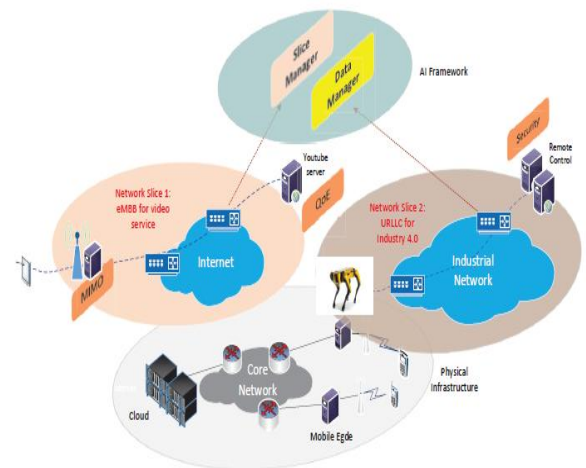

Fig.2: Representation of the organization of the expansion of the focus divisions in the joint management of AI architecture.

2.1 Neural Network
Dense Neural Network (DNN)

As shown in Fig.2.2, an important part of the DenseNeural system (DNN) is the neuron associated with information minerals and the operating workflow. Regular starting capabilities include tan and rail, and the sky is the limit from there. The information is changed using the system layer and there is no immediate connection between the two non-consecutive layers. System Boundaries, including Momentum, Adam, etc. Course scattering and various GD strategies can be used.
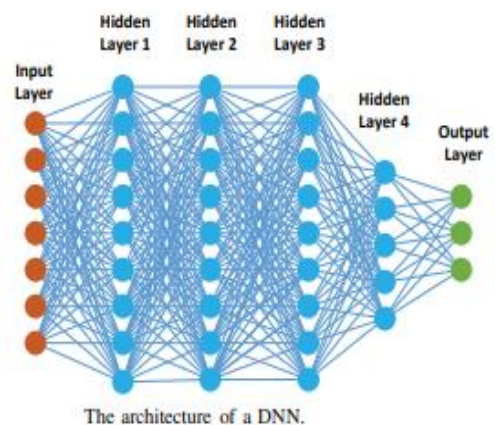

Fig.3.The architecture of a Dense neural network.

2.2 Recurrent neural network(RNN)

The neural network (RNN) is a type of neural network in which the output of the previous phase is transmitted as input to the current teeth. In traditional neural networks, all inputs and outputs are independent of each other, but when the next word in a sentence needs to be followed, the previous words are needed so the previous words need to be remembered.
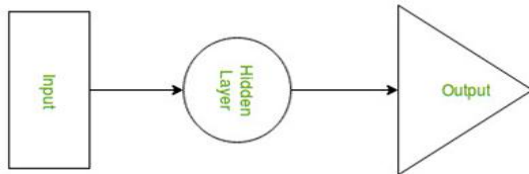

Fig.4. : Hidden layer

Formula for calculating current status
$h_t = f(h_{t-1}, x_t)$ ... (1)
h_t: Current status.
h_{t-1}: previous case.
x_t: Status of the entry.
Formula for applying the activation function (tanh):
$h_t = tanh(W_{hh}h_{t-1} + w_{xh}x_t)$ ..(2)
Whh: Weight in recurrent neurons.
Wxh: Weight at the input neuron.
$y_t = why\ h_t$ ... (3)
y_t: output.
Reason: Weight at the output layer.

3. Software used:

•   Python.
Libraries used in Python:
  ➢ Keras
  ➢ Tensorflow
  ➢ Scipy
  ➢ matplotlib
  ➢ Panda

Python is a written language, which means that unlike languages like C and C ++, it can be displayed without the need for integration. This still makes it easy to develop software with Python. We already have most of the things we need to write a program in Python, data frameworks and functions. This way, as in other languages, you can quickly write presentations and infrastructure to solve the problem without creating the best details. Python is easy. It makes writing programs easier and more enjoyable and makes it easier to understand programs written by others.

As shown in Figure 2, the switched chip for the mobile brand-band (EMBB) that supports high-definition video delivery is identified in the distributed physical infrastructure. With laptop computer resources, the MIMO intelligence sensor is sent to BS, which uses the RNN algorithm to execute channel projections to improve transmission antenna selection (TAS) quality.

Conclusion and Discussion

Conclusion

To take advantage of AI's great potential to solve previously complex and undesirable problems in wireless networks, the AI framework is presented in this paper. Instead of applying a custom AI algorithm to solve a specific network problem individually, the framework can create and implement AI functional units on demand, following a standard approach.

Discussion

By enhancing the concept of anatomy of intelligence, this framework provides the flexibility and scalability to adapt to arbitrary AI algorithms to perform a variety of intelligence tasks on 5G networks and beyond. The results of this paper provided a basic exploration of the use of integrated frameworks to connect AI to wireless networks, which will be further exploited and exploited in the future.

4. Result:

Table for fig.5.

No of epochs	Mean absolute error(MAE) value
0	1.45
2	1.1
4	0.8
6	0.3
8	0.15
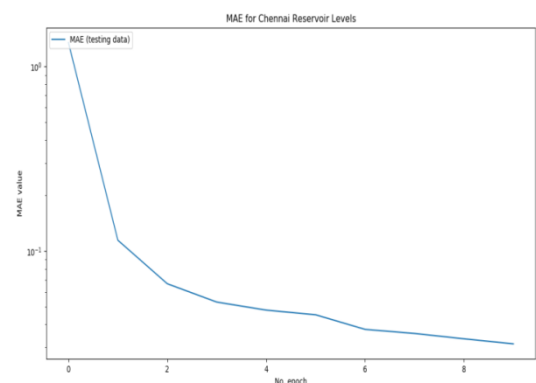
Fig.5: RNN Training with 10 epochs

Table for fig.6.

SNR in dB	Existing work	Simulation using RNN
0	0.8	0.5
5	0.8	0.3
10	0.8	0.15
15	0.8	0.04
20	0.8	0.01
25	0.8	-
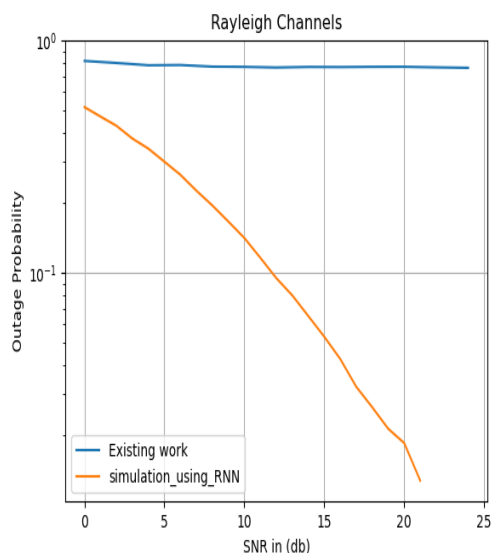
Fig.6: Simulation of Existing and proposed method

Table for fig.7

SNR in dB	Existing work	MIMO-QPSK	RNN simulation
0	0.9	0.4	0.3
5	0.9	0.2	0.15
10	0.9	0.15	0.03
15	0.9	0.05	0.002
20	0.9	0.01	0.00002
25	-	-	0.0000002
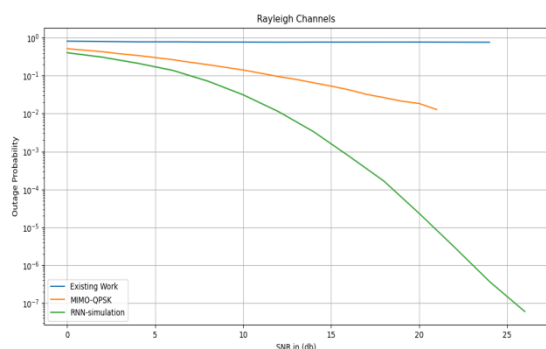
Fig.7: Simulation comparison of multiple methods

References

[1]. TACNET Project 4.0. [Online]. Available: http://www.tacnet40.de

[2]. D. Silver et al., "Knowing the Go game through in-depth neural networks and tree search," Nature, vol. 529, p. 484-489, Jan. 2016.

[3]. W. Jiang, M. Strufe, noH. D. Schotten, "Intelligent network operators of 5G systems: The SELFNET approach," Proc. IEEE European Conf. on the Net. and Commun. (EUCNC), Oulu, Finland, Jun. 2017, pp. 109-113.

[4]. W. Jiang noH. D. Schotten, "a multi-channel prediction channel for decentralization," in Proc. IEEE Vehicular Tech. Conf. (VTC), Chicago, USA, Aug. 2018.

[5]. U. Challita et al., "Effective resource management for LTE in non-literacy: The concept of in-depth learning," vol. 17, no. 7, pp. 4674-4689, Jul. 2018.

[6]. K. Hamedani et al., "Reservoir computing meets smart grids: Discovery acquisition using delayed response networks," IEEE Trans. Ind. Informat., Iv. 14, no. 2, p. 734-743, Feb. 2018.

[7]. A. He et al., "Testing the Intelligence of Intelligent Radiation Implants," IEEE Trans. Vee. Technol., Iv. 59, no. 4, p. 1578–1592, May 2010.

[8]. W. Jiang, M. Strufe, noH. D. Schotten, "Test results of 5G networks based on pride," Proc. IEEE Intl. Symp. in Personal, Indoor and Mobile Radio Commun. (PIMRC), Montreal, QC, Canada, Oct. 2017, pp. 1-6.

[9]. EU H2020 5G-PPP SELFNET project.