

# NFVdeep: Adaptive Online Service Function Chain Deployment with Deep Reinforcement Learning

Asmaa Elhadad

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## Abstract

The development of network function virtualization (NFV) has introduced a new method, which is assuming that network services are service function chains (SFCs) that are consisted of multiple virtual network functions (VNFs) (Software instead of hardware). this system is called NFVdeep. However many problems face the system, the most important is that the system receives many requests with different quality of service (QoS) requirements. we can solve that by using adaptive online SFC deployment with the help of MDP model and PG policy

## 1 Introduction

NOW, service requests are represented service function chains (SFCs) that are consisted of multiple virtual network functions (VNFs). using the VNFs can increase the flexibility and efficiency of the system. The system continuously receives requests of different Quality of service requirement and trac conditions, which causes a real time network variations. we can solve this problem by using Marcov decision process model to capture dynamic network state transition, in other words capturing the state of the network which continuously changes between SFCs and each sfc contains number of vnfs and so on.

in order to solve the real time network state variations we agreed on using adaptive online SFC deployment

in figure 1 we explain two different ways of SFC deployment.

## 2 Architecture of NFVdeep

figure 2 explains how the system is connected and how it work  
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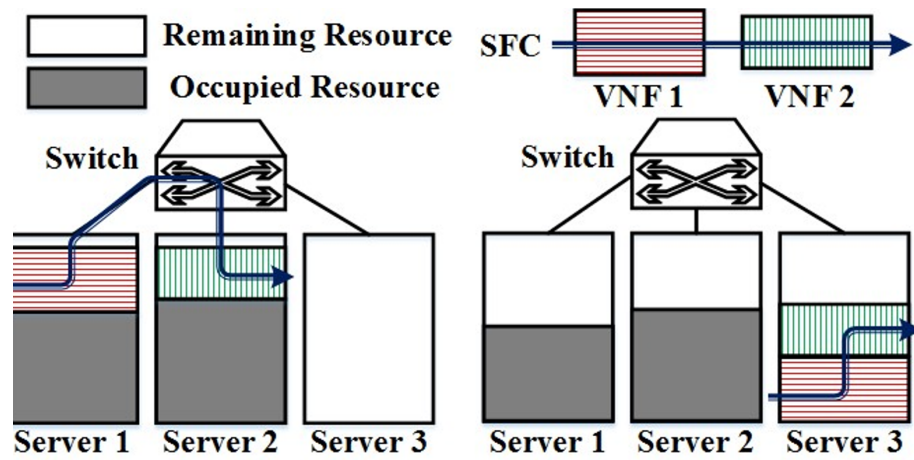


Figure 1: Using SFC

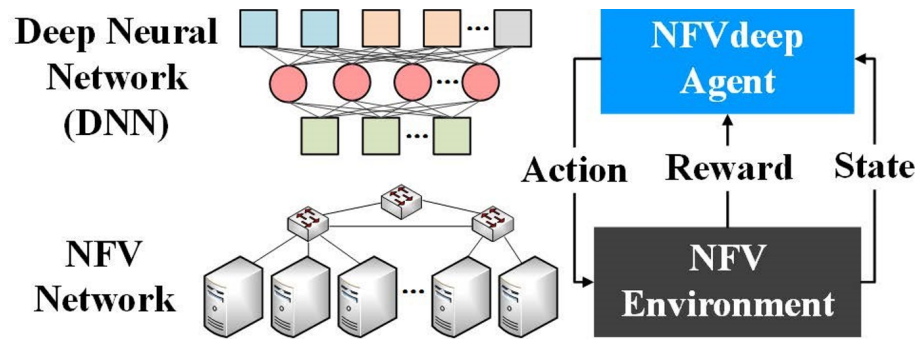


Figure 2: Architecture of NFVdeep

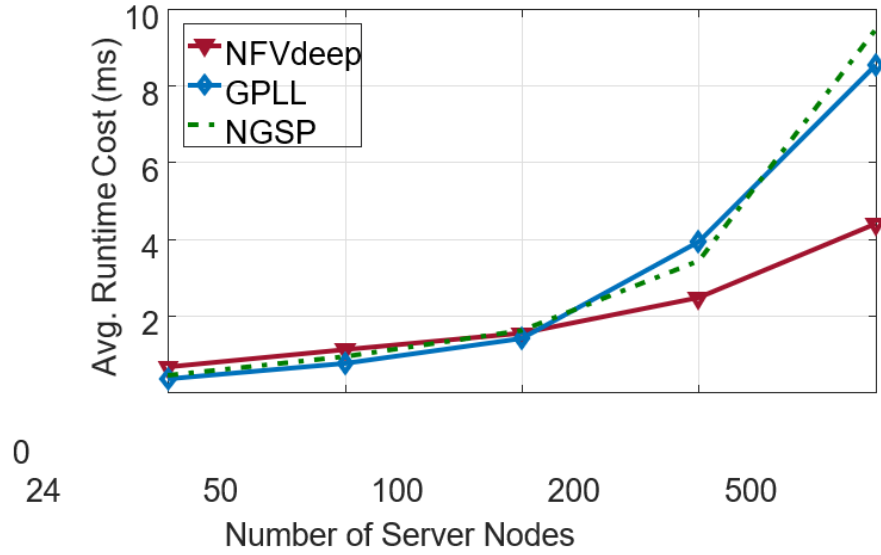


Figure 3:

### 3 principals

in order to understand the principal of adaptive online SFC deployment we have to understand some concepts first.

#### 3.1 Markov decision process Model

#### 3.2 types of policies

we use policy Gradient not value

### 4 Adaptive, Online Approach for SFC Deployment

-how to deal with NFVdeep system -SFC deployment

### 5 Comparison with other systems

in this section we show some graphs to compare between NFVdeep and other systems in terms of performance , cost and the number of servers used

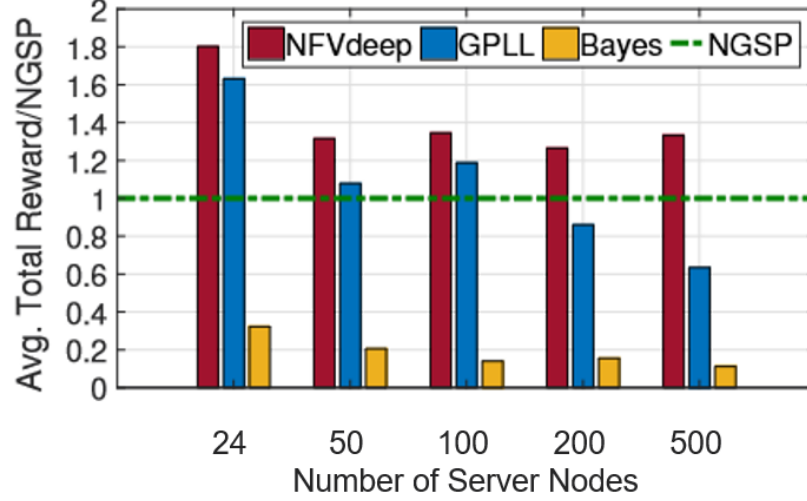


Figure 4:

## 6 Conclusion

involving VNFs in the NFV has improved the network functions in terms of efficiency , operational costs and convergence which then improves the performance. the main idea of NFVdeep is representing the requests as SFC.each SFC consists of number of VNFs. the NFVdeep is connected to an agent which is a deep neural network (DNN).when NFVdeep receives a request the DNN calculats the new reward after taking the decision of accepting the request or rejecting it in case of timed out requests and depending on the time slot avoiding the network state transition problem.

## 7 References

@article1.NFVdeep: Adaptive Online Service Function Chain Deployment with Deep Reinforcement Learning”, IWQoS 2019