Smart Resource Allocation for Mobile Edge Computing: A Deep Reinforcement Learning Approach

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Agenda

- Introduction
- Problem Definition
- Mobile Edge Computing (MEC) architecture
- Software Defined Network (SDN) enabled MEC architecture
- Deep Reinforcement Learning based Resource Allocation (DRLRA) Algorithm
- Performance Evaluation
- Conclusion
- Reference

Introduction

- Huge amount of data generated by communication devices cause congestion at cloud for data processing and cause delay in service time.

- Solution - Mobile Edge Computing (MEC) architecture with Deep Reinforcement Learning (DRL).

Problem Definition

Average service time minimization

- Edge network routing delay.
- Data processing delay.

Resource allocation balancing

- Variance of network resource allocation.
- Variance of computing resource allocation.

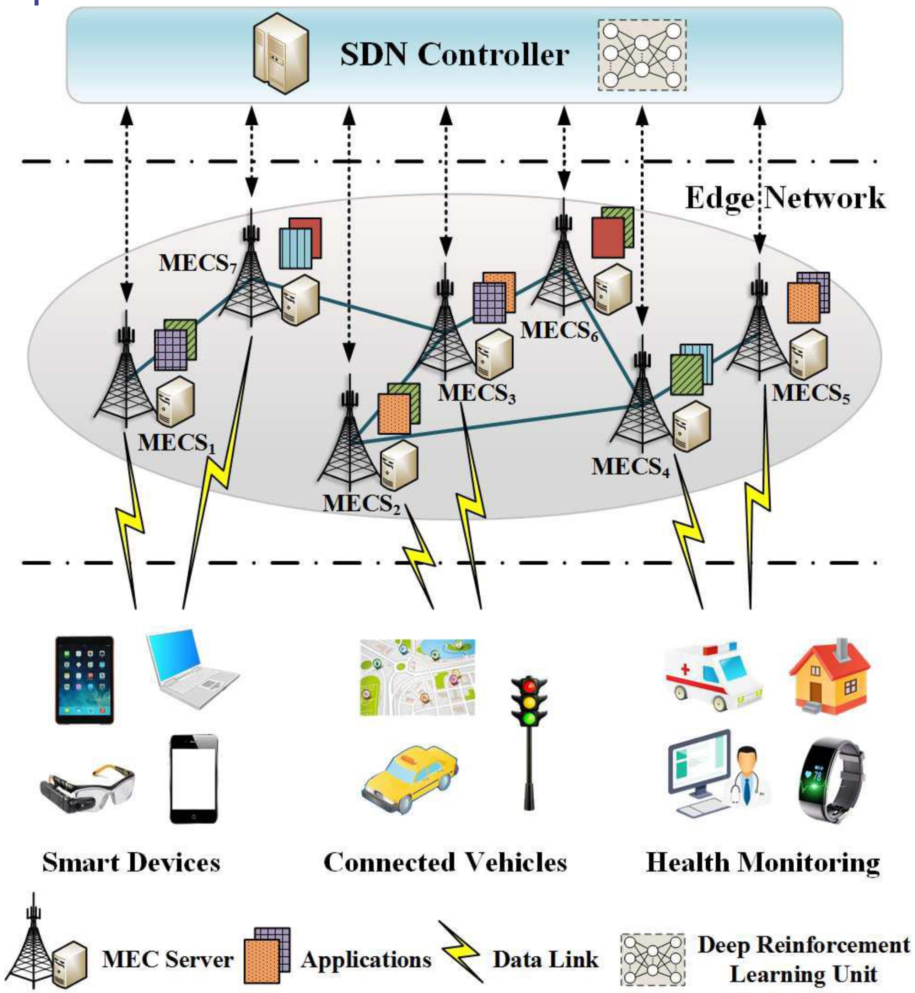
Mobile Edge Computing (MEC) architecture

- MEC architecture reduces response delay by moving computing and storage resources near to mobile devices.

- Limitations of MEC
  - Deployment and maintenance is expensive.
  - Limited number of applications deployed.
  - MEC server goes down with burst requests.

- DRLRA algorithm to allocate resources adaptively under varying MEC environment.

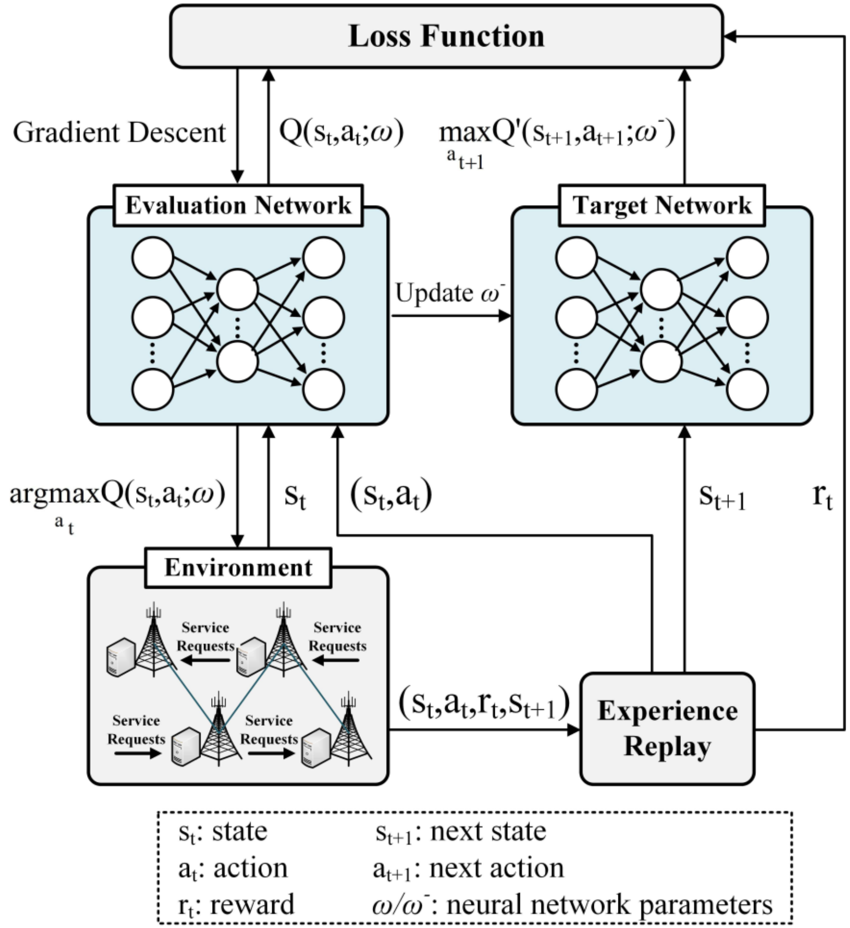
Software Defined Network (SDN) enabled MEC architecture



- Requests are routed to destined MEC server for processing.
- SDN technology maintains network infrastructure.
- DRLRA is deployed in SDN controller plane to offer intelligent routing decisions.

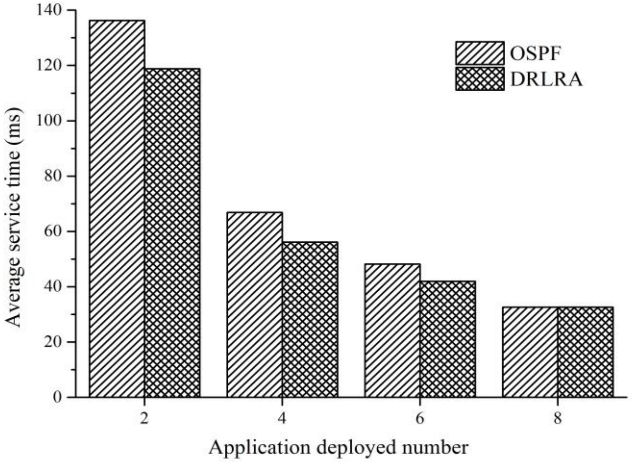
Source [1]

Deep Reinforcement Learning Based Resource Allocation (DRLRA) Algorithm

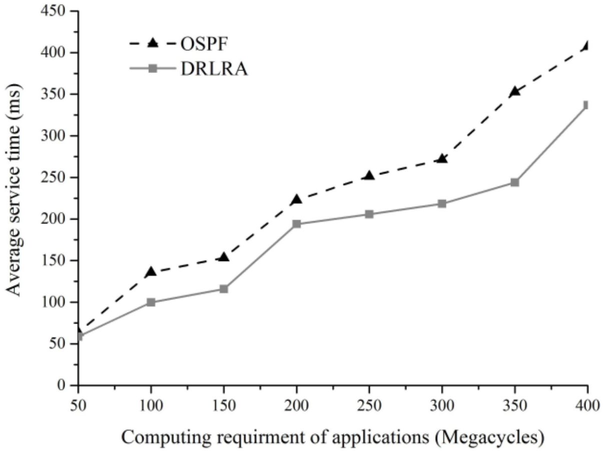


Source [1]

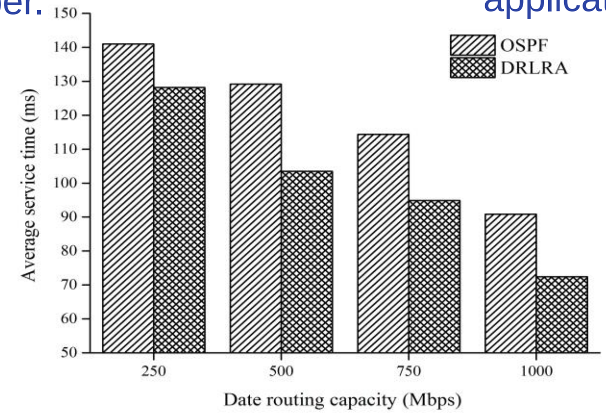
Performance Evaluation



Comparison of performance under different applications deployed number.

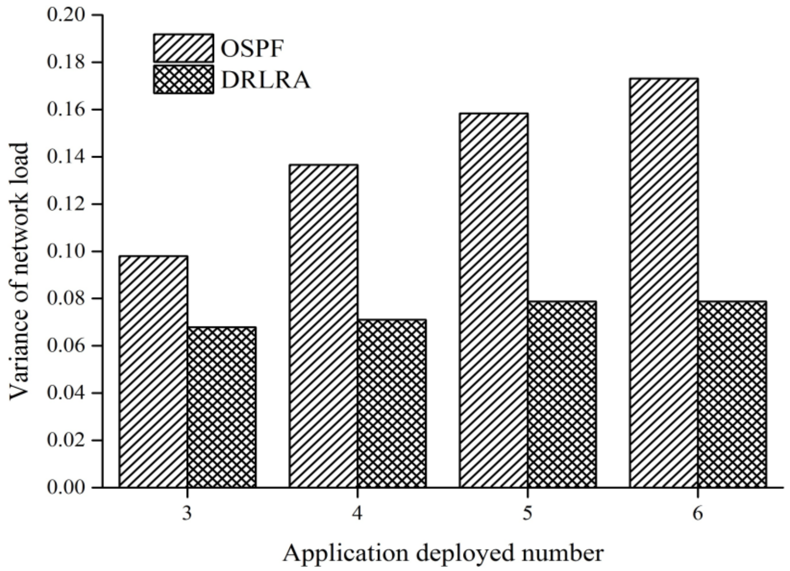


Impact of computing requirement of applications on average service time.

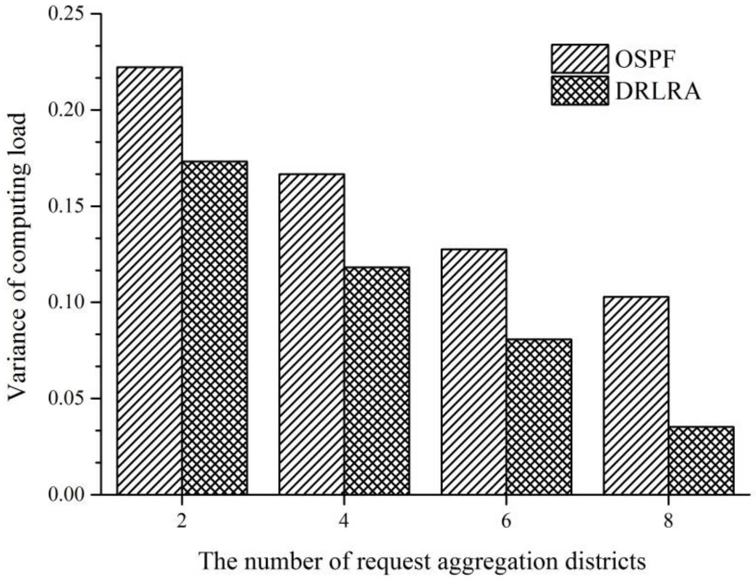


Performance comparison under different data routing capacities.

Performance Evaluation



Comparison of variance of network load under different application deployed number.



Comparison of the variance of computing load under different request aggregation districts.

Conclusion

- The DRL's capacity of being adaptable to varying environment made it suitable for MEC server's burst environment.

- Reduced service time with DRLRA proved efficient than classical Open Shortest Path First (OSPF) algorithm.

References

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Thank You