北京邮电大学 本科毕业设计（论文）任务书

Project Specification Form

Part 2 - Student

学院 **School**	International School	专业 **Programme**	**e-Commerce Engineering with Law**		
姓 **Family name**	Ke	名 **First Name**	Jiaming		
BUPT 学号 **BUPT number**	2019213499	**QM 学号** **QM number**	190894179	班级 **Class**	2019215111
论文题目 **Project Title**	Meta Reinforcement Learning for Task Offloading in MEC Networks				
论文概述 **Project outline** **Write about 500-800 words** **Please refer to Project Student Handbook section 3.2**	First, We need to develop a dynamic MEC framework and formulate a Markovian optimization problem.Then, propose a meta reinforcement learning solution to solve the formulated problem and evaluate the performance of proposed algorithms using numerical results.Eventually, fine-tune and debug the algorithms to obtain the numerial results. Mobile applications, have been growing exponentially in wireless networks due to the explosive growth in smart devices, such as smart phones and tablets. The success of heterogeneous services and related applications in wireless networks require unprecedented high access speed and low latency. To address these significant challenges, mobile edge computing (MEC) is proposed to promote abundant computing resources at the edge of networks by integrating MEC servers at wireless access points (APs). Meta-learning, also known as “learning to learn”, intends to design models that can learn new skills or adapt to new environments rapidly with a few training examples. Meta-learning provides promising advances on adaptability for unexpected perturbations or unseen situations (i.e., new environments) like changes of applications, task numbers, or data rates in MEC networks. In this project, the dynamic task offloading problems in MEC networks are investigated. A long-term optimization problem formulated to minimize both transmission latency and energy consumption by optimizing the offloading decisions for each MEC user. We need to transform the formulated problem into a Markovian process. Then, propose a meta reinforcement learning solution to solve the formulated problem. The proposed meta learning solution learns a meta offloading policy for all users and fast obtains the effective policy for each user based on the meta policy and local data. Extensive experiments need to be carried out to validate the performance of the proposed algorithm.				

道德规范 **Ethics** **Please discuss ethical issues with your supervisor using the ethics checklist in Project Handbook Appendix 1.**	Please confirm by checking the box: ☒ I confirm that I have discussed ethical issues with my supervisor.
	Summary of ethical issues: (write "None" if no ethical issues) None
中期目标 **Mid-term target.** **It must be tangible outcomes, E.g. software, hardware or simulation.** **It will be assessed at the mid-term oral.**	1) A thorough literature review on both MEC networks and Deep reinforcement learning 2) Formulate the optimization problem for task offloading in MEV network 3) Initial implementation of the algorithm and the MEC network in Python

Work Plan (Gantt Chart)

Fill in the sub-tasks and insert a letter X in the cells to show the extent of each task

	Nov 1-15	Nov 16-30	Dec 1-15	Dec 16-31	Jan 1-15	Jan 16-31	Feb 1-15	Feb 16-28	Mar 1-15	Mar 16-31	Apr 1-15	Apr 16-30
Task 1 Literature Reviews												
MEC framework	X	X										
Deep reinforcement learning		X	X									
Meta DRL		X	X									
Meta DRL offloading for Edge-Cloud Computing			X	X								
Task 2 Develop a dynamic MEC framework and formulate a Markovian optimization problem												
Develop a MEC network					X							
Formulate the latency and energy cost for task offloading					X	X						
Formulate the optimization objective							X					
Tranform the problem into a Markovian process							X					
Task 3 Propose a meta reinforcement learning solution												
Formulate the meta learning framework							X	X	X	X		
Formulate the DRL algorithm									X	X		
Task 4 Simulation results for demonstrating the effectiveness of the method												
Simulate the MEC network										X		
Implement the meta-DRL algorithm											X	X
Algorithm fine-tune and debug											X	X
Obtain the numerial results											X	X