論文 / 著書情報
Article / Book Information

題目(和文)	
Title(English)	Reinforcement Learning-based Optimization of Radio Resource Management and Trajectory Planning for Smart UAV Wireless Networks
著者(和文)	AMRALLAHAmr
Author(English)	Amr Amrallah
出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第12370号, 授与年月日:2023年3月26日, 学位の種別:課程博士, 審査員:TRAN GIA KHANH,阪口 啓,髙田 潤一,青柳 貴洋,西尾 理志,安達 宏一
Citation(English)	Degree:Doctor (Engineering), Conferring organization: Tokyo Institute of Technology, Report number:甲第12370号, Conferred date:2023/3/26, Degree Type:Course doctor, Examiner:,,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

博士課程）
Doctoral Program

論 文 要 旨
THESIS SUMMARY

系・コース： Department of, Graduate major in	Electrical and Electronic Engineering	申請学位（専攻分野）： Academic Degree Requested	博士 Doctor of (Engineering)
学生氏名： Student's Name	Amr Ahmed Hasan Amrallah	指導教員（主）： Academic Supervisor(main)	TRAN Gia Khanh
		指導教員（副）： Academic Supervisor(sub)	SAKAGUCHI Kei

要旨（英文 800 語程度）
Thesis Summary (approx.800 English Words)

The thesis can be summarized as follows:

Chapter 1 titled "Introduction" and it gives and overview of the UAV including its history and different deployment scenarios to support wireless communications applications.

Chapter 2 titled "Reinforcement learning Applications for Smart UAV Wireless Networks" and it provides a survey for different machine learning techniques and highlight reinforcement learning algorithms. Then, it introduces general problems that face implementing UAV wireless communications networks. Finally, it shows related works that included reinforcement learning algorithms to tackle different optimization problems related to wireless communication networks.

Chapter 3 titled "Reinforcement Learning-based Dynamic Spectrum Access System in Smart UAV Wireless Networks" and it studies the implementation of UAV emergency wireless communication network as a cognitive radio network. This idea is introduced as an unconventional solution for the spectrum scarcity problem. Then, two MAB-based algorithms are implemented to study how to select the most suitable power to signal transmission. On the other hand, it should keep an eye on the interference threshold to the primary network. Simulation scenarios shows the outstanding performance of proposed algorithms over the data transmission method using a random power value selection. Furthermore, the proposed algorithms showed a moderate convergence rate. The obtained results showed the capability of different MAB algorithms to deal with such problems with a high degree of randomness.

Chapter 4 titled "Reinforcement Learning-based Trajectory Optimization in Smart UAV Wireless Networks" and it Studies the trajectory optimization for the UAV that supports emergency wireless communication networks in a post-disaster area. Then, it implements a MAB trajectory optimization algorithm to maximize the offloaded data from trapped victims in the post-disaster area via maximizing the number of the served users. The whole optimization problem is constrained by the limited available energy for both the UAV and the victims. The proposed algorithm could solve the trajectory optimization problem with respect to this dynamic power consumption over time. Simulation results showed that our proposed algorithm outperforms benchmark methods in terms of long-term uplink throughput and energy efficiency. Furthermore, it could increase the energy consumption of the UEs during the data offloading process which reflects the success of maximizing the served UEs in a post-disaster area and accomplishing the task of information collection in the post-disaster area.

Chapter 5 titled "Final Remarks and Future Work" and it concludes the thesis and shows the future directions to extend the presented work.

備考 ： 論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。
Note : Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).

注意：論文要旨は、東工大リサーチリポジトリ(T2R2)にてインターネット公表されますので、公表可能な範囲の内容で作成してください。
Attention: Thesis Summary will be published on Tokyo Tech Research Repository Website (T2R2).