학위논문신청 제출서류 예시

학위논문신청서

학위청구논문제출신청서

■ 과 정 : 석사과정 ( )

■ 학 과 : 컴퓨터·소프트웨어학과 ( )

■ 성 명 : [redacted] ([redacted])

■ 연구윤리서약 : 서약완료

■ 논 문 제 목 : (한글) Cognitive Radio Network에서 개선 된 BAS 알고리즘을 이용한 스펙트럼 할당

(영어) Spectrum Allocation with improved BAS algorithm in Cognitive Radio Network

■외국어논문작성 : 영어

위 학위청구논문에 대한 심사위원을 다음과 같이 추천합니다.

다 음

구분	내/외부	성명	학과/전공	학위	근무처(TEL)
지도교수	내부	조인휘	컴퓨터소프트웨어학부	박사	[02-2220-1088]
심사위원	내부	이병호	컴퓨터소프트웨어학부	박사	
심사위원	내부	이춘희	컴퓨터소프트웨어학부	박사	[02-2220-1268]

※ 심사위원은 지도교수(공동지도교수)를 포함하여 석사과정은 3인 박사과정은 5인 추천하시기 바랍니다.

2019년05월15일

제 출 자 : 유자선 (인) 유자선

지 도 교 수 : 조인휘 (인)

학 과 / 전 공 주 임 교 수 : (인)

대 학 장 : (인)

* 제출장소 : 소속 대학원 혹은 단과대학 RC 행정팀

한 양 대 학 교 대 학 원 장 귀 하

논문실적 심사양식(박사만)

논문실적 심사 양식

- 학 과 : 컴퓨터·소프트웨어학과 박사과정 - 학 번 : [redacted]
- 성 명 : [redacted] 연락처 : [redacted]

◎ 연구실적(게재 된 논문과 실적 % 기재)

순번	Journal 명	논 문 제 목	저자명(모두기입)	SCI(E)여부
1	IEICE TRANSACTIONS ON COMMUNICATIONS	Harvest-Then-Transceive: Throughput Maximization in Full-Duplex Wireless-Powered Communication Networks	Kyungrak Lee Sungryung Cho Jaewon Lee Inwhee Joe	SCI 50%
2	EURASIP Journal on Wireless Communications and Networking	A hybrid MAC protocol for optimal channel allocation in large-scale wireless powered communication networks	Sungryung Cho Kyungrak Lee BooJoong Kang Inwhee Joe	SCIE Q2 100%
3	IEEE ACCESS	Weighted Harvest-Then-Transmit: UAV-Enabled Wireless Powered Communication Networks	Sungryung Cho Kyungrak Lee Boojoong Kang Kwangmin Koo Inwhee Joe	SCIE Q1 200%
4	Advanced Science Letters	An Software Defined Networking Architecture Design Based on Topic Learning-Enabled Data Distribution Service Middleware	Sungryung Cho Sungmoon Chung Wooyeob Lee Inwhee Joe Jeman Park Soohyung Lee Wontae Kim	n/a
계			350 (%)	

◎ 적용 학과내규(예 : SCI 1편 포함)
- SCI, SCIE가 적용되는 학과는 SCI,SCIE를 증빙할 서류를 반드시 제출하시기 바랍니다.
- SCI(E) 여부란에 표기바랍니다.

◎ 논문실적은 200%까지만 제출바랍니다.

◎ 제출서류 : 논문 별쇄본(논문게재를 증명할 수 있는 서류)

위 학생의 논문 실적은 공과대학과 학과내규에 따라 박사 학위청구논문 제출자격이 있음을 확인합니다.

2019년 05월 08일

지 도 교 수 조 인 휘 (인)

전공주임교수 박 용 수 (인)

한 양 대 학 교 공 과 대 학

게재된 논문 혹은 발표자료

Spectrum Allocation with the Improved BAS Algorithm for Cognitive Radio Networks

[redacted] Jiao Yan, Joe Inwhee*
Hanyang Univ., Dong Seoul Univ., *Hanyang Univ.

yuzixian@hanyang.ac.kr, kubohao007@gmil.com, * iwjoe@hanyang.ac.kr

Abstract

In the cognitive radio network, Look for a spectrum allocation optimization scheme through the Graph Coloring Theory model. Based on the BAS algorithm, an improved BAS algorithm is proposed. The optimized algorithm expands the single search direction when a single individual finds the optimal solution, and effectively improves the search accuracy. Global searchability is improved by multiple bodies and by introducing the Metropolis-Hastings algorithm. Through the simulation based on the graph coloring spectrum allocation model, the optimized BAS algorithm has obvious effects in terms of solution accuracy and total network efficiencies.

1. Introduction

Wireless spectrum is very precious natural resource. Especially, latest new wireless communication technologies like 5G, IoT, demand for spectrum has increased exponentially. However, most of the licensed spectrum lies idle depending upon location and time [1] because of current static allocation on spectrum. It triggers the searching of new technique for spectrum allocation that requires new regulation, policies. Cognitive Radio (CR) [2] is such technique that provide dynamic spectrum access for utilizing the unused spectrum [2]. The most commonly used methods in spectrum allocations are queuing theory, game theory and graph coloring theory [4] etc.

In this paper, we mainly focus on the graph coloring theory joint BAS algorithm for spectrum allocation in CRN. The rest of this paper is organized as follows. In Section 2, we illustrate proposed Improved BAS algorithm and spectrum allocation method. Simulation results and discussions are presented in Section 3. Finally, we draw conclusion in Section 4.

2. The proposed Spectrum Allocation Method

2.1 Improved BAS algorithm

Beetle Antennae Search-BAS [3] is an algorithm developed in 2017 based on the principle of Beetle foraging. The biological principle is: When the beetle foraging, Beetle does not know where the food is, Instead, look for food by the higher of the concentration. Beetle has two long antennas. If the left horn detects food odor concentration is higher than the right side, then the beetle would turn to the left side, otherwise, it would turn to the right side. According to this simple principle, Beetle can effectively find food. The algorithm is an intelligent optimization algorithm like genetic algorithm, particle swarm algorithm and so on. But the algorithm can achieve efficient optimization without function specific form and gradient information.

In this paper, an improved algorithm (I-BAS) is proposed to improve the following shortcomings.

- Create a new random vector and orthogonalize the new random vector with the original vector to obtain two new directions orthogonal to the original direction. Enhance the direction of optimization.

$$\overrightarrow{b2} = rands(k,1)$$
$$= \overrightarrow{b2} - \frac{\overrightarrow{b2} \cdot \vec{b}}{\vec{b} \cdot \vec{b}} \vec{b} \quad (1)$$

where $\vec{b}$ is a random vector used to indicate direction; $\overrightarrow{b2}$ is a vector orthogonal to $\vec{b}$;

- By increasing the number of individuals, when a beetle fall into a local optimal solution, the algorithm still has the ability to find a global optimal solution.
- The Metropolis-Hastings algorithm was introduced. A probability P is received to accept the deterioration solution as the current solution, and an upper limit T_b of the optimal solution is not updated. The step size and the probability P are adjusted according to the following conditions.

$$P = \begin{cases} 1, \quad f(x_{new}) > f(x_{best}) \\ \min(P * 0.98, 0.2), f(x_{new}) < f(x_{old}) \; and \; \Delta t < T_b \\ \min\left(\frac{P}{0.99}, 0.2\right), f(x_{new}) < f(x_{old}) \; and \; \Delta t > T_b \; and \; t < T * 0.5 \end{cases} \quad (2)$$

where P is initially a constant and is updated with the nu mber of iterations; $f(\,)$ is the solution of the optimization function; $f(x_{new})$ represents a new solution; $f(x_{best})$ represents a current optimal solution; $f(x_{old})$ represents the current solution; Δt indicates the number of times the current optimal solution has not been updated; T_b indicates the upper limit of the curr ent optimal solution not updated; T indicates the num ber of iterations.

1) When the new solution is better than the current optimal solution, accept this new solution and attenuate the step size and decrease the probability P.

2) When the new solution is worse than the current solution and the optimal solution is not updated less than T and the current number of iterations is less than half the total number of iterations, the new solution is accepted with the probability P, and attenuate the step size and decrease the probability P.
3) When the new solution is worse than the current solution and the optimal solution is not updated more than T and the current number of iterations is more than half the total number of iterations, the new solution is accepted with probability P, and the step size and probability P are increased.

2.2 Spectrum Allocation

The graph theory coloring model [4] is a model that abstracts the network topology composed of cognitive users in the spectrum allocation of cognitive radio systems. Each vertex in the graph represents a wireless user, and each edge represents a conflict or interference between a pair of vertices. That is, if two vertices in the graph have one edge connected, the two nodes cannot use the same spectrum at the same time.

The graph coloring model is described by the available spectrum matrix $L = \left\{ l_{n,m} \middle| l_{n,m} \in \{0,1\} \right\}_{N \times M}$, efficiency matrix $B = \{b_{n,m}\}_{N \times M}$, interference matrix $C = \left\{ c_{n,k,m} \middle| c_{n,k,m} \in \{0,1\} \right\}_{N \times N \times M}$, and distribution matrix. Suppose there are N cognitive users (labeled 1-N) in a cognitive network to compete for the right to use M bands (labeled 1-M).

Max Sum Reward formula is expressed as:

$$U_{MSR} = \sum_{n=1}^{N} \sum_{m=1}^{M} a_{n,m} \cdot b_{n,m} \quad (3)$$

In this paper, we use the I-BAS algorithm is used to optimize the U_{MSR} value.

3. Simulation Results

The Improved BAS algorithm is compared with the original BAS algorithm and the PSO algorithm in terms of total network efficiencies. Set the number of individuals of the PSO and Improved BAS algorithms to 10. The number of iterations is 50. And the number of primary users is 5, the number of cognitive users is N=5.

Fig. 1 is the number of spectra is M=10, 400 comparison charts with MSR as the objective function are used. As can be seen from the figure, the Improved BAS algorithm has better search ability than the other two algorithms. Repeated experiments have shown that the Max Sum Reward obtained by the Improved BAS algorithm is more stable and has a higher upper limit.

Fig. 2 is one of the complete iterative processes. It can be seen that a better optimization value can be obtained at the beginning of the iteration. And the Improved algorithm can find the optimal spectrum allocation scheme faster.

4. Conclusion

In this paper, the cognitive radio network is abstracted into graphs, and use the graph coloring model for spectrum allocation. Through the Improved BAS algorithm, we find a spectrum allocation scheme that can obtain the maximum network efficiency. The simulation results show that the algorithm and model can effectively solve the spectrum allocation optimization problem and have better convergence accuracy. Compared with the PSO algorithm, it has higher network efficiencies. The next step is to study other issues in spectrum allocation in the hope of obtaining a better spectrum allocation scheme.

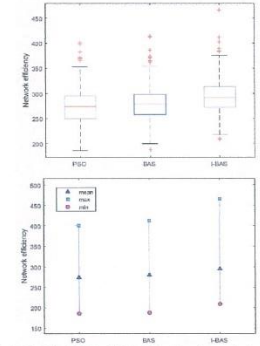

Fig. 1. I-BAS、BAS、PSO's Max Sum Reward (m=10)

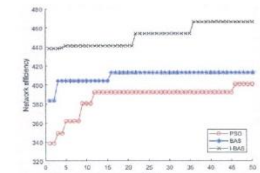

Fig. 2. I-BAS、BAS、PSO's Max Sum Reward (m=10)

Reference

[1] Report of the Spectrum Efficiency Working Group, FCC Spectrum Policy Task Force, Nov. 2002
[2] I. F. Akyidiz, WY. Lee et al., "A Survey on Spectrum Management in Cognitive Radio Networks", IEEE Communication Magazine, pp. 40-48, April 2008
[3] X. Y. Jiang, and S. Li, "BAS: beetle antennae search algorithm for optimization problems," arXiv:1710.10724v1
[4] S. Ramanathan, "A unified framework and algorithm for channel assignment in wireless networks," Wireless Networks, vol.5, no.2, pp.81-94, March 1999.

게재된 논문의 JCR 랭킹 페이지(박사만)

Home > Journal Profile

IEICE TRANSACTIONS ON COMMUNICATIONS

ISSN: 0916-8516

IEICE-INST ELECTRONICS INFORMATION COMMUNICATIONS ENG
KIKAI-SHINKO-KAIKAN BLDG, 3-5-8, SHIBA-KOEN, MINATO-KU, TOKYO 105-0011, JAPAN
JAPAN

Go to Journal Table of Contents   Go to Ulrich's

Titles
ISO: IEICE Trans. Commun.
JCR Abbrev: IEICE T COMMUN

Categories
ENGINEERING, ELECTRICAL & ELECTRONIC - SCIE;
TELECOMMUNICATIONS - SCIE;

Languages
English

12 Issues/Year;

Return to Current Year page: Here

Key Indicators

Year	Total Cites Graph	Journal Impact Factor Graph	Impact Factor Without Journal Self Cites Graph	5 Year Impact Factor Graph	Immediacy Index Graph	Citable Items Graph	Cited Half-Life Graph	Citing Half-Life Graph	Eigenfacto Score Graph	Article Influence Score Graph	% Articles in Citable Items Graph	Normalizec Eigenfacto Graph	Average JIF Percentile Graph
2017	1,995	1.090	0.958	0.594	0.137	226	5.4	7.1	0.00...	0.136	100.00	0.38...	21.889
2016	1,734	0.827	0.687	0.449	0.105	276	5.5	7.1	0.00...	0.097	100.00	0.31...	15.547
2015	1,148	0.300	0.210	0.232	0.156	257	6.1	6.9	0.00...	0.070	100.00	0.27...	6.149
2014	1,107	0.227	0.163	0.213	0.054	241	6.0	6.6	0.00...	0.072	100.00	0.32...	5.586
2013	1,517	0.326	0.250	0.286	0.053	358	5.7	6.9	0.00...	0.083	100.00	0.42...	7.860
2012	1,510	0.314	0.230	0.302	0.075	558	5.3	6.5	0.00...	0.087	100.00	Not ...	11.542
2011	1,354	0.254	0.169	0.268	0.059	526	5.4	6.0	0.00...	0.077	100.00	Not ...	12.483
2010	1,467	0.301	0.209	0.339	0.033	539	4.9	6.0	0.00...	0.092	100.00	Not ...	17.279
2009	1,669	0.359	0.269	0.381	0.046	549	4.7	6.3	0.00...	0.107	100.00	Not ...	26.377
2008	1,743	0.427	0.326	0.446	0.048	587	4.4	5.9	0.00...	0.100	100.00	Not ...	28.127
2007	1,076	0.252	0.154	0.274	0.044	503	4.8	5.8	0.00...	0.112	100.00	Not ...	27.411
2006	1,046	0.290	0.182	Not ...	0.041	489	4.3	5.9	Not ...	Not ...	100.00	Not ...	27.569
2005	1,100	0.348	0.200	Not ...	0.041	630	4.5	5.8	Not ...	Not ...	100.00	Not ...	32.650
2004	908	0.330	0.204	Not ...	0.035	462	4.4	5.6	Not ...	Not ...	99.78	Not ...	32.855
2003	1,004	0.436	0.244	Not ...	0.092	414	4.2	5.8	Not ...	Not ...	99.52	Not ...	39.719
2002	949	0.487	0.315	Not ...	0.069	319	4.3	5.3	Not ...	Not ...	100.00	Not ...	50.367

Source Data

Rank

Cited Journal Data

Citing Journal Data

Box Plot

Journal Relationships

JCR Impact Factor

JCR Year	ENGINEERING, ELECTRICAL & ELECTRONIC			TELECOMMUNICATIONS		
	Rank	Quartile	JIF Percentile	Rank	Quartile	JIF Percentile
2017	193/260	Q3	25.962	72/87	Q4	17.816
2016	209/262	Q4	20.420	80/89	Q4	10.674
2015	240/257	Q4	6.809	78/82	Q4	5.488
2014	233/249	Q4	6.627	74/77	Q4	4.545
2013	227/248	Q4	8.669	73/78	Q4	7.051
2012	217/243	Q4	10.905	69/78	Q4	12.179
2011	220/245	Q4	10.408	68/79	Q4	14.557
2010	210/247	Q4	15.182	65/80	Q4	19.375
2009	195/246	Q4	20.935	53/77	Q3	31.818
2008	181/229	Q4	21.179	44/67	Q3	35.075
2007	177/227	Q4	22.247	45/66	Q3	32.576
2006	161/206	Q4	22.087	40/59	Q3	33.051
2005	152/208	Q3	27.163	37/59	Q3	38.136
2004	151/209	Q3	27.990	36/57	Q3	37.719
2003	136/205	Q3	33.902	31/56	Q3	45.536
2002	112/203	Q3	45.074	24/53	Q2	55.660
2001	123/200	Q3	38.750	29/49	Q3	41.837

컨퍼런스 포스터 첫장
(컨퍼런스 이름. 날짜. 장소 확인용)

식순 페이지
(본인 참여여부 확인용)

구두발표 세션 11월 17일(土)

6B – ICT 전략 II

좌장 : 김경배(서원대) 발표일시: 11월 17일(土), 13:30~14:30, 368호

6B-1 다중지능 검사를 위한 모바일 앱 UX/UI 설계
김민수, *최병근, 정철영, 손봉기(서원대학교, *충북대학교)

6B-2 모바일 지능 검사 시스템의 설계 및 구현
김민수, *최병근, 정철영, 손봉기(서원대학교, *충북대학교)

6B-3 현실적인 채널 모델을 적용한 IEEE 802.11p 기반 차량 통신 시스템의 End-to-End 성능 평가
주지훈, 김지훈, 오돈고스티븐요부, 한동석(경북대학교)

6B-4 레이더와 카메라 센서 융합 기반 측·후방 차량의 경로 추정 연구
김지훈, *한동석(경북대학교)

6B-5 블록체인 기반 IP-카메라 데이터 저장 관리 및 무결성 검증 시스템
김형태, 강소희, 이범식(조선대학교)

6B-6 BLE beacon based Indoor Positioning using Variance-Weighted KNN
Rohan Kumar Yadav, Jae-Young Pyun(Chosun University)

8B – 네트워크 분석 및 최적화

좌장 : 김정호(이화여대) 발표일시: 11월 17일(土), 13:30~14:30, 466호

8B-1 Task-based Spectrum Sharing for Cognitive Radio
Kong Hai Xiang, *Yan Jiao, **Inwhee Joe*(Hanyang Univ, *Dong Seoul Univ, ***Hanyang Univ)

8B-2 Spectrum Allocation with the Improved BAS Algorithm for Cognitive Radio Networks
[redacted] *Jiao Yan, **Joe Inwhee*(Hanyang Univ., *Dong Seoul Univ., ***Hanyang Univ.)

8B-3 데이터센터 네트워크 관리를 위한 프로그래머블 패킷 스케쥴러 적용 방안에 대한 연구
최진국, 천림, 임용재(고려대학교)

8B-4 Development of the Density Table based Synchronization system
Mahmoud Elsharief, Mohamed A. Abd El-Gawad(Chungbuk National University)

8B-5 BT-uTP 프로토콜 동작 방식에 관한 연구
이세린, *김명수, **배주혁, ***오태규, ****라도훈, *****최원영, ******이경문(아주대학교, *극동대학교, **한양대학교, ***동의대학교, ****울산제일고등학교, *****경찰대학교, ******중부대학교)