Mohammed A. Awadallah, Ph.D

Current Position: The Head of Computer Science Department
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Personal Profile

- Strong experience in timetabling, optimization, combinatorial optimization problem, artificial intelligence, and metaheuristic methods such as genetic algorithm, harmony search, artificial bee colony, ant colony optimization, etc.
- Strong experience in technical writing, mathematical modelling, articles and lectures presentations, teaching.
- Excellent communication and organization skills.
- Effective problem solver with ability to handle multiple tasks simultaneously.
- Teaching experience in graduate and undergraduate computer science courses for more than (12) years.

Education

- 2010 – 2014. **Ph.D in Artificial Intelligence** (Evolutionary Computing), School of Computer Sciences, Universiti Sains Malaysia (USM), 11800, Palau Pinang, Malaysia.
  Thesis Topic: "*Enhanced Harmony Search Algorithm For Nurse Rostering Problem*".
  Adviser: Professor Ahmad Tajudin Khader and Dr. Mohammed Azmi Al-Betar.
  Area of Study: Optimization, Timetabling, Rostering, Artificial Intelligence.
  Thesis abstract: Nurse Rostering Problem (NRP) is a difficult optimization problem and finding a high quality solution within reasonable time is a challenging task due to its NP-hard nature. The most challenging aspect of the problem is the highly diverse set of constraints which makes it more complex. This thesis proposes new alternative approaches based on Harmony Search Algorithm (HSA). Initially, the HSA is adapted for NRP by modifying its operators with addition of a new repair strategy. This method is referred to as BHSA. The initial experiments show promising results, but also reveal several weaknesses related to the convergence behaviour of BHSA which occur due to the nature of the NRP search space. In view of the above, two enhanced versions of the BHSA are proposed. Firstly, the selection method of the memory consideration operator in the BHSA is replaced by other powerful selection methods to speed up the convergence and this version is referred to as MMHSA. Whereas in the second version, the pitch adjustment operator is removed from the improvisation loop and placed after the loop as a new step to manipulate some soft constraints and it is named MPHSA. The motivation to improve the exploitation capability of MPHSA led to the hybridization of MPHSA with Variable Neighbourhood Search, which is referred to as HHSA. The performance of the proposed harmony search-based algorithms (i.e., BHSA, MMHSA, MPHSA, and HHSA) for NRP is tested using standard dataset published in the first International Nurse Rostering Competition (INRC2010). The results produced by the proposed harmony search-based algorithms were compared against one another, where the HHSA achieved overall best results for all instances of INRC2010 dataset. Furthermore, in comparison with the state-of-theart methods, the HHSA outperforms others competitive methods in five instances and obtained the best-published results in 33 others out of 69 instances, while the other harmony search-based algorithms (i.e., BHSA, MMHSA, and MPHSA) produced comparable results.

- 2003 – 2005. M.Sc., of Computer Information System (CIS). The Arab Academy for Banking and Financial sciences, Amman, Jordan. The General grade average is "excellent" (87.3%).
- 1998 – 2002. B.Sc., of Computer Sciences. The Islamic University of Gaza, Palestine. The General grade average is "good" (78.27%).

Work Experience

- **Assistant Professor**, Al-Aqsa University, Gaza, Palestine, January 2015 - Until Now.
I have developed and prepared lectures, graded assignments, projects, and exams for the following undergraduate courses: Automata Theory; Concepts of programming languages; Programming Languages C++; Introduction to Computer Skills.

- **Lecturer**, Al-Aqsa University, Gaza, Palestine, September 2005 – March 2010.
I have developed and prepared lectures, graded assignments, projects, and exams for the following undergraduate courses: Artificial Intelligence; Expert Systems; Software Engineering; Automata Theory; System Analysis; Programming Languages (C and C++); Object Oriented programming (C++); Concepts of programming languages; Computer Networks; Operating Systems; Introduction to Computer Skills.

- **Department Head**, Department of Computer Sciences, Al-Aqsa University, Gaza, Palestine. (September 2015 – Now).

- **Department Head**, Department of Computer Sciences, Al-Aqsa University, Gaza, Palestine. (September 2008 – March 2010).

Awards:

- **School of Computer Sciences, University Sains Malaysia** High Impact Publications. Award Malaysia, in 2014.
- **School of Computer Sciences, University Sains Malaysia** High Impact Publications. Award Malaysia, in 2012

Editorship and Refereeing Activities:

- I am a Reviewer in **Information Sciences Journal** under Elsevier Publisher.
- I am a Reviewer in journal of **Applied Soft Computing** under Elsevier Publisher.
- I am a Reviewer in journal of **Swarm and Evolutionary Computation** under Elsevier Publisher.
- I am a Reviewer in journal of **Egyptian informatics journal** under Elsevier Publisher.
- I am a Reviewer in journal of **Neural Computing & Applications** under Springer Publisher.
- I am a Reviewer in **Memetic Computing** journal under Springer Publisher.
- I am a Reviewer in journal of **IIE Transactions on Healthcare Systems Engineering** under Taylor & Francis Publisher
- I am a Reviewer in **IEEE Sensors Journal** under IEEE Publisher.
- I am a Reviewer in **2017 IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE2017), Malaysia.**
- I am a Reviewer in the **Second Palestinian International Conference on Information and Communication Technology (PICICT 2017),** Palestine**.**
- I am a Reviewer in **International Conference on Computer and Knowledge Engineering (ICCKE 2015), Iran.**

Research Interests

Optimization methods, metaheuristic methods, and combinatorial optimization problems like Scheduling, Rostering and Timetabling problems.

Academic research members

- International Scientific Committee, 2018 International Symposium on Electrical, Electronics and Information Engineering(ISEEIE 2018), Dec. 14-16,2018, Wellington, New Zealand. (http://www.iseeie.org/commit.html)
- Program committee member, International Conference on Promising Electronic Technologies (ICPET 2018), Oct 3-4, 2018, Gaza, Palestine. (http://icpet.net/committees)
- Program committee member, International Conference on Promising Electronic Technologies (ICPET 2017), Oct 16-17, 2017, Gaza, Palestine. (https://www.ptcdb.edu.ps/site/icpet/committees/)
- Program committee member, the Fourth International Conference on Bioinformatics and Bioscience (ICBB 2017), May 27-28, 2017, Vienna, Austria. (http://ccseit2016.org/2017/icbb/committee.html)
- Program committee member, the Second Palestinian International Conference on Information and Communication Technology (PICICT 2017), May 8-9, 2017, Gaza, Palestine. (http://fit.iugaza.edu.ps/Portals/115/PICICT2017/index.html#content-inner-4)

Publications: (total number of publications = 41)

Journals with impact factors:

1. Al-Betar, M., **Awadallah, M.**, Doush, I., Alsukhni E., and ALkhraisat, H., (2018). *A Non-convex Economic Dispatch Problem with Valve Loading Effect Using a New Modified β-Hill Climbing Local Search Algorithm*. Arabian Journal for Science and Engineering, DOI:10.1007/s13369-018-3098-1 (Impact Factor= 0.865)

2. Alyasseri, Z., Khader, A., Al-Betar, M., and **Awadallah, M.**, (2018). *Hybridizing β-Hill Climbing with Wavelet Transform for Denoising ECG Signals*. Information Sciences, 429, 229-246. (Impact Factor= 4.832)

3. Al-Betar, M., **Awadallah, M.**, Faris H., Yang X., Khader, A., and Al-Omari O. (2018). *Bat-inspired algorithms with natural selection mechanisms for global optimization*. Neurocomputing, 273, 448-465. (Impact Factor= 3.317)

4. Al-Betar, M., **Awadallah, M.,** Khader, A., Bolaji, A., and Almomani, A. (2018). *Economic load dispatch problems with valve-point loading using natural updated harmony search*. Neural Comput & Applic, 29(10), 767–781 (Impact Factor= 2.505)

5. **Awadallah, M.**, Al-Betar, M., Khader, A., Bolaji, A., and Alkoffash, M. (2017). *Hybridization of harmony search with hill climbing for highly constrained nurse rostering problem*. Neural Comput & Applic**,** 28 (3), 463-482 (Impact Factor= 2.505).

6. Bolaji, A., Al-Betar, M., **Awadallah, M.,** Khader, A., and Abualigah, L. (2016). *A comprehensive review: Krill Herd algorithm (KH) and its applications*. Applied Soft Computing 49, 437–446. (Impact Factor= 2.857)

7. Al-Betar, M., Alyasseri, Z., Khader, A., Bolaji, A., and **Awadallah, M.** (2016). *Gray image enhancement using harmony search*. International Journal of Computational Intelligence Systems 9 (5), 932-944. (Impact Factor= 0.39)

8. Al-Betar, M., **Awadallah, M.**, Khader, A., and Bolaji, A. (2016). *Tournament-based harmony search algorithm for non-convex economic load dispatch problem*. Applied Soft Computing 47, 449-459. (Impact Factor= 2.857)

9. **Awadallah, M.**, Al-Betar, M., and Bolaji, A. (2015). A hybrid artificial bee colony for a nurse rostering problem. Applied Soft Computing, 35, 726–739. (Impact Factor= 2.857)

10. Al-Betar, M., **Awadallah, M.**, Khader, A., and Abdalkareem, Z. (2015). *Island-based*

harmony search for optimization problems, Expert Systems with Applications, 42 (4), 2026-2035. (Impact Factor= 2.240)

11. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2015). *University course timetabling using hybridized artificial bee colony with hill climbing optimizer*, Journal of Computational Science, 5 (5), 809–818. (Impact Factor= 1.231)**.**

12. **Awadallah, M.**, Khader, A., Al-Betar, M. and Bolaji, A. (2014). *Harmony search with novel selection methods in memory consideration for nurse rostering problem*, Asia Pacific Journal of Operational Research, 31(3), 1450014-1 - 1450014-39. (Impact Factor= 0.303).

13. Al-Betar, M., Khader, A., **Awadallah, M.**, Alawan, M. and Zagaibeh, B. (2013). *Cellular Harmony Search for Optimization Problems*, Journal of Applied Mathematics, doi:10.1155/2013/139464. (Impact Factor= 0.834)

14. Al-Betar, M., Doush, I., Khader, A. and **Awadallah, M.** (2013). *An analysis of selection methods in memory consideration for harmony search*, Applied Mathematics and Computation 219(22): 10753–10767. (Impact Factor= 1.534)

15. Al-Betar, M., Doush, I., Khader, A. and **Awadallah, M.** (2011). *Novel selection schemes for harmony search*, Applied Mathematics and Computation 218(10): 6095–6117. (Impact Factor= 1.534)

Other journals:
1. Alsukhni E., Arabeyyat O., **Awadallah, M.**, Alsamarraie L., Doush, I., and Al-Betar, M. (2017). *Multiple-Reservoir Scheduling Using β-Hill Climbing Algorithm*, Journal of Intelligent Systems, DOI: https://doi.org/10.1515/jisys-2017-0159.

2. Doush, I., Quran, A., Al-Betar, M. and **Awadallah, M.** (2017). *MAX-SAT Problem using Hybrid Harmony Search Algorithm*, Journal of Intelligent Systems, DOI: https://doi.org/10.1515/jisys-2016-0129.

3. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2015). *A Hybrid Nature Inspired Artificial Bee Colony Algorithm for Uncapacitated Examination Timetabling Problems*, Journal of Intelligent Systems, 24 (1), 37-54.

4. **Awadallah, M.**, Khader, A., Al-Betar, M. and Bolaji, A. (2013). *Global best harmony search with a new pitch adjustment designed for nurse rostering*, Journal of King Saud University-Computer and Information Sciences 25(2): 145–162.

5. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2013). *Artificial Bee Colony Algorithm, Its Variants And Applications: A Survey*, Journal of Theoretical and Applied Information Technology (JATIT) 47(2): 435 – 459.

6. Doush, I., Al-Betar, M. , Khader, A., **Awadallah, M**., and Mohammed, A. (2013). *Analysis of takeover time and convergence rate for harmony search with novel selection methods*, International Journal of Mathematical Modelling and Numerical Optimisation 4(4): 305-322.

7. **Awadallah, M.**, Khader, A., Al-Betar, M. and Bolaji, A. (2012). *Harmony search with greedy shuffle for nurse rostering*, International Journal of Natural Computing Research (IJNCR) 3(2): 22–42.

8. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2012). *Artificial bee colony algorithm for solving educational timetabling problems*, International Journal of Natural Computing Research (IJNCR) 3(2): 1–21.

Book Chapters:
1. Alyasseri, Z., Khader, A., Al-Betar, M., **Awadallah, M.**, and Yang, X. (2018). *Variants of the Flower Pollination Algorithm: A Review*. In Nature-Inspired Algorithms and Applied Optimization, Springer, Cham, pp. 91-118.

2. Anwar, K., Khader, A., Al-Betar, M. and **Awadallah, M.** (2014). *Development on Harmony Search Hyper-heuristic Framework for Examination Timetabling Problem*, Advances in Swarm Intelligence, Vol. 8795 of LNCS, Springer International Publishing, pp. 87-95.

3. Al-Betar, M., Ahmad, O., Khader, A. and **Awadallah, M.** (2013). *Incorporating great deluge*

with harmony search for global optimization problems, in J. C. Bansal, P. K. Singh, K. Deep, M. Pant and A. Nagar (eds), Proceedings of Seventh International Conference on Bio-Inspired Computing: Theories and Applications (BIC-TA 2012), Vol. 201 of Advances in Intelligent Systems and Computing, Springer India, pp. 275– 286.

4. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2013). *A Modified Artificial Bee Colony Algorithm for Post-enrolment Course Timetabling*, in Tan, Ying and Shi, Yuhui and Mo, Hongwei, Advances in Swarm Intelligence, Vol. 7928 of LNCS, Springer Berlin Heidelberg, pp. 377-386.

5. **Awadallah, M.**, Khader, A., Al-Betar, M. and Woon, P. (2012). *Office-space-allocation problem using harmony search algorithm*, in T. Huang, Z. Zeng, C. Li and C. Leung (eds), Neural Information Processing, Vol. 7664 of LNCS, Springer Berlin Heidelberg, pp. 365–374.

6. **Awadallah, M.**, Khader, A., Al-Betar, M. and Bolaji, A. (2011). *Nurse rostering using modified harmony search algorithm*, in B. Panigrahi, P. Suganthan, S. Das and S. Satapathy (eds), Swarm, Evolutionary, and Memetic Computing, Vol. 7077 of LNCS, Springer Berlin Heidelberg, pp. 27–37.

Conferences:

1. Al-Betar, M., **Awadallah, M**., Bolaji, A., and Alijla, B. (2017). *β-Hill Climbing Algorithm for Sudoku Game*, 2017 Palestinian International Conference on, Information and Communication Technology (PICICT), Gaza, Palestine, 84-88.

2. Abualigah, L., Khader, A., Al-Betar, M., and **Awadallah, M**. (2016). *A Krill Herd Algorithm For Efficient Text Documents Clustering*, 2016 IEEE Symposium on, Computer Applications & Industrial Electronics (ISCAIE), Penang, Malaysia, 67-72

3. Bolaji, A., **Awadallah, M.**, Al-Betar, M. and Khader, A. (2015). *Solving Nurse Rostering Problem Using Artificial Bee Colony Algorithm*, ICIT 2015 The 7th International Conference on Information Technology, Amman, Jordan, 32-38.

4. Anwar, K., **Awadallah, M.**, Khader, A., and Al-Betar, M. (2014). *Hyper-heuristic approach for solving nurse rostering problem*, 2014 IEEE Symposium on, Computational Intelligence in Ensemble Learning (CIEL), IEEE, pp. 1–6.

5. **Awadallah, M.**, Khader, A., Al-Betar, M. and Bolaji, A. (2013). *Hybrid Harmony Search for Nurse Rostering Problems*, 2013 IEEE Symposium on, Computational Intelligence in Scheduling (SCIS), pp. 60–67.

6. Al-Betar, M., **Awadallah, M.**, Khader, A., Woon, P., and Doush, I. (2013). *A Modified Harmony Search for Office-Space-Allocation*. ICIT 2013 The 6th International Conference on Information Technology, pp. 1-8.

7. Anwar, K., Khader, A., Al-Betar, M. and **Awadallah, M.** (2013). *Harmony Search-based Hyper-heuristic for Examination Timetabling*, 2013 IEEE 9th International Colloquium on Signal Processing and its Applications, pp. 176–181.

8. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2012). *The effect of neighborhood structures on examination timetabling with artificial bee colony,* 9th International Conference on the Practice and Theory of Automated Timetabling (PATAT 2012), August 2012, Son, Norway, pp. 131–144.

9. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2012). *Tackling University Course Timetabling Problem Using Artificial Bee Colony Algorithm*, Frontiers In Information Technology. 2012, Amman, Jordan, pp. 87-96.

10. **Awadallah, M.**, Khader, A., Al-Betar, M. and Bolaji, A. (2011). *Nurse scheduling using harmony search*, 2011 Sixth International Conference on, Bio-Inspired Computing: Theories and Applications (BIC-TA), pp. 58–63.

11. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2011). *An improved artificial bee colony for course timetabling*, Bio-Inspired Computing: Theories and Applications (BICTA), 2011 Sixth International Conference on, IEEE, pp. 9–14.

12. Bolaji, A., Khader, A., Al-Betar, M. and **Awadallah, M.** (2011). *Artificial bee colony*

algorithm for curriculum-based course timetabling problem, 5th international conference on information technology (ICIT 2011), pp. 1–6.

Language Skills
My mother language is Arabic and I can speak, read, write fluently this language and develop any documents in the Arabic Language in an effective form. I also have competence in English Language, and can speak, read, and write this language well.

Names, affiliation and contact details potential referees:

1. Prof. Dr. Ahamad Tajudin Khader
   The Dean of the school of Computer Sciences,
   University sains Malaysia, 11800, Penang, Malaysia.
   Email: tajudin@cs.usm.my

2. Associate Prof. Dr. Mohammed Azmi Al-betar
   Department of Information Technology,
   Al-Huson University College,
   Al-Balqa Applied University, P.O. Box 50, Al-Huson, Irbid, Jordan.
   Email: mohbetar@bau.edu.jo

3. Associate Prof. Dr. Eyad Abu Doush
   The Head of computer science department Yarmouk University, Irbid, Jordan
   Email: iyad.doush@yu.edu.jo