

# Ali Fahmi

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## SCIENTIFIC CAREER AND EDUCATION

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### Postdoctoral Research Associate in Statistics and Epidemiology, The University of Manchester

Mar 2021 – present

- Supervised by Prof Tjeerd van Staa.
- Research areas:
  - \* Contributing to the BRIT2 research project focusing on modelling risk prediction of hospital admissions related to common infections using OpenSAFELY data.
  - \* Evaluation and interpretation of polypharmacy risks using CPRD data.

### PhD in Computer Science, Queen Mary University of London

Dec 2017 – Apr 2021

- Supervisors: Dr William Marsh, Prof Norman Fenton, and Prof Martin Neil.
- Thesis: **Decision-Support for Rheumatoid Arthritis Using Bayesian Networks: Diagnosis, Management, and Personalised Care.** In the framework of the EPSRC-funded PamBayesian project, we investigated the available knowledge and data to develop Bayesian network (BN) models for rheumatoid arthritis (RA). We proposed an approach to build BN models from clinical guidelines and experts' knowledge. By eliciting knowledge and manipulating and using the available data, we created multiple BN models for decision support in diagnosis, personalised self-management, and treatment of RA.
- Key achievements:
  - \* I developed a BN model for diagnosis of RA, a dynamic BN model for treatment of RA, and a recommender system with a BN model to suggest personalised advice for living with RA. The BN models support clinicians in making clinical decisions and the recommender system assists patients in selecting lifestyle choices and managing their quality of life.
  - \* Experienced in data analysis, visualisation, and manipulation.
  - \* Well-versed in knowledge elicitation and knowledge retrieval from ontologies and terminologies.
  - \* Improved my teamwork skills to collaborate with clinicians, health informaticians, computer scientists, and statisticians. Elicited clinical knowledge from rheumatologists by having weekly meetings (more than 30 times) and joining the meeting of a Patient and Public Involvement group.
  - \* Contributed to a scoping review on BN applied in healthcare and involved in writing two review papers.
  - \* Have been writing four academic papers: two journal papers in preparation and two conference papers.
- Extensive programming and software knowledge:
  - \* Used Pandas and Matplotlib libraries of Python to analyse, visualise, and manipulate data.
  - \* Learnt to retrieve data from SNOMED CT and UMLS terminologies to extract medical knowledge. Used Protege to create knowledge graphs.
  - \* Created BN models in AgenaRisk software. Wrote Java code to do causal inference by AgenaRisk API.
- Selected training courses:
  - \* Mind Mapping for Researchers, Digital Identity and Social Media, Introduction to Marketing and Communications, Influencing and Negotiation Skills.

### MSc in Management Engineering, Istanbul Technical University

Sep 2013 – Jul 2016

- Thesis: **Modelling the Effects of Brand Image Components on Advertising Awareness Using a Neuro-Fuzzy System.** Analysed a data set containing the brand image components and advertising awareness metrics. Built two models: an artificial neural network and a neuro-fuzzy network to predict the future advertising awareness.

- Key achievements:
  - \* Used two data-driven methods to predict the advertising awareness and compared their performances.
  - \* Wrote one journal paper and one conference paper.
- Programming knowledge:
  - \* Used MATLAB to build models and created a user interface to enter the inputs, customise the method specifications, plot the results, and compare the performance of models.
- Relevant courses:
  - \* Multivariate Statistical Analysis, Research Methods I, Multiple Objective Decision Making.

## BSc in Industrial Engineering, University of Tabriz

Sep 2008 – Jul 2013

- Thesis: Intelligent Decision Support System (IDSS) for Medical Nutrition Therapy.
- Relevant courses:
  - \* Project Control, Operations Research I, Information Systems and Control Plan, Statistical Quality Control, System Analysis, Principles of Simulation, Strategic Management of Information Technology.

## SCIENTIFIC AND WORK EXPERIENCE

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### Teaching assistant at University of Manchester:

- Introduction to Health Data Science module. Autumn 2022  
Assisted Dr Sabine van der Veer and Dr Glen Martin by presenting the BRIT project as a case-study.
- Decision Support Systems module. Spring 2022  
Assisted Prof Niels Peek by demonstrating computer practical to computerise the clinical guidelines.

### Master student supervision at University of Manchester:

- Co-supervised Master dissertation of Zeren Tan. Summer 2022  
Dissertation titled *The Method to Construct the Knowledge Graph of Medicine based on MoleculeNet*.
- Co-supervised Master dissertation of Mengyu Cai. Summer 2022  
Dissertation titled *The success and failure factors of decision support system in electronic medical record system*.

### Teaching assistant at Queen Mary University of London:

- Machine Learning module. Marked the final exam scripts. Spring 2020
- Data Mining module for two consecutive years. Spring 2019 and 2020  
Assisted Prof Ioannis Patras and Dr Jesus Requena-Carrion in demonstrating weekly lab questions and marking the final exam scripts.
- Bayesian Decision and Risk Analysis module for two consecutive years. Autumn 2018 and 2019  
Assisted Prof Martin Neil in demonstrating weekly lab questions and marking the courseworks and the final exam scripts.
- Enterprise Management module. Assisted Dr Bing Han in checking the final exam scripts. Spring 2018
- Business Modelling module. Assisted Dr Liu Liu in demonstrating courseworks. Spring 2018

### Hackathon attendant:

- Data Study Group at the Alan Turing Institute. Sep 2020  
Joined the CRUK Cambridge Institute challenge. Analysed a data set containing gene interaction records related to breast cancer. Used bnlearn package in R to apply structure learning algorithms to build multiple BN models and compared the resulting models.
- AgriFood Data Study Group at the Knowledge Transfer Network. Sep 2020  
Retrieved and analysed data, collaborated with food supply chain experts and created a dynamic BN model to identifying UK's dependencies to international food supply chains.
- Turing Network Data Study Group Bristol. Aug 2019  
Joined the challenge on tackling hidden hunger through soils in partnership with Rothamsted Research. Used bnlearn package in R to built a BN model to analyse the soil elements after fertilisation.

### Project member:

- Employment barriers of Syrian refugees in Turkey. 2016 - 2017  
Prepared proposal, formed questionnaires for employees, interviewed with employers, and analysed data using SPSS. Granted by the European Association of Work and Organizational Psychology, supervised by Dr Idil Isik from Istanbul Bilgi University.

## Teaching assistant at University of Tabriz:

- Systems Engineering module. Assisted Dr Mahdi Zarghami in marking the courseworks. Autumn 2012
- Information Systems and Control Plan module. Spring 2012  
Assisted Prof Behzad Salmani in preparing and marking the final projects.
- Technical English module. Assisted Dr Mahdi Zarghami in preparing and marking the final projects. Spring 2012

## AWARDS

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- Awarded the Best Student Paper and \$500 prize at IEEE International Conference on Healthcare Informatics 2020.
- Awarded the Best Student Poster Presentation by STEMM Global Scientific Community at STEMM MIT CSAIL AI in Healthcare Summit 2020.
- Awarded the scholarship of Queen Mary University of London for PhD programme covering my entire tuition fee and maintenance for 3 years, and awarded 3 months extension due to the COVID-19 pandemic (more than £125k in total).
- Awarded a grant from the European Association of Work and Organizational Psychology (EAWOP) to investigate the employment barriers of Syrian refugees in Turkey, 2016 (€5000 in total).

## JOURNAL PUBLICATIONS

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- **Fahmi, A.**, Wong, D., Walker, L., Buchan, I., Pirmohamed, M., Sharma, A. Cant, H., Ashcroft, D. M., van Staa, T. P. (2022). Combinations of medicines in patients with polypharmacy aged 65-100 in primary care: large variability in risks of adverse drug related and emergency hospital admissions. *PLOS One* (accepted).
- **Fahmi, A.**, Palin, V., Zhong, X., Pate, A., Yang, Y., Watts, S., Ashcroft, D. M., Goldacre, B., Mackenna, B., Mehrkar, A., Bacon, S. C. J., Massey, J., Fisher L., Inglesby, P., the OpenSAFELY collaborative, Hand, K., van Staa, T. (2022). Prediction of hospital admission related to common infections in patients without Covid-19 using OpenSAFELY data (in progress).
- Yang, Y., Zhong, X., **Fahmi, A.**, Ashcroft, D. M., Mackenna, B., Fisher L., Massey, J., Hand, K., van Staa, T., Palin V. (2022). The impact of COVID-19 on the treatment of common infections in primary care and the change to antibiotic prescribing in England. Submitted to *eClinicalMedicine*.
- Zhong, X., Pate, A., Yang, Y., **Fahmi, A.**, Ashcroft, D. M., Goldacre, B., Mackenna, B., Mehrkar, A., Bacon, S. C. J., Massey, J., Fisher L., Inglesby, P., the OpenSAFELY collaborative, Hand, K., van Staa, T., Palin V. (2022). The impact of COVID-19 on antibiotic prescribing in primary care in England: evaluation and risk prediction of appropriateness of type and repeat prescribing. Submitted to *Journal of Infection*.
- Yang, Y., Wong, D., Ashcroft, D. M., Mackenna, B., Massey, J., Fisher L., Goldacre, B., Mehrkar, A., Bacon, S. C. J., the OpenSAFELY collaborative, Hand, K., Zhong, X., **Fahmi, A.**, van Staa, T., and Palin, V. (2022). Repeated antibiotic exposure and risk of severe outcomes following COVID-19 infection: an OpenSAFELY case-control study investigating the risks of hospital admission, intensive care admission or death (in progress).
- Kyrimi, E., Mclachlan, S., Dube, K., Neves, M. R., **Fahmi, A.**, and Fenton, N., (2020). A Comprehensive Scoping Review of Bayesian Networks in Healthcare: Past, Present and Future. *Artificial Intelligence in Medicine* (accepted).
- Kyrimi, E., Dube, K., Fenton, N., **Fahmi, A.**, Neves, M. R., Marsh, W., and Mclachlan, S., (2020). Bayesian Networks in Healthcare: What is preventing their adoption?, *Artificial Intelligence in Medicine* (accepted).
- **Fahmi, A.**, and Kahraman, C., (2017). Fuzzy Evaluation of Examinees through Multiple Choice Questions, *INFORMATICA*, 28(1), 609-628.
- **Fahmi, A.**, Ulengin, K. B., Kahraman, C., (2017). Analysis of Brand Image Effect on Advertising Awareness Using A Neuro-Fuzzy and A Neural Network Prediction Models, *International Journal of Computational Intelligence Systems*, 10(1), 690-710.
- **Fahmi, A.**, Kahraman, C., and Bilen, U., (2016). ELECTRE I Method Using Hesitant Linguistic Term Sets: An Application to Supplier Selection, *International Journal of Computational Intelligence Systems*, 9(1), 153-167.
- **Fahmi, A.**, Dorostanian, A., Rezazadeh, H., and Ostadrahimi, A., (2013). An Intelligent Decision Support System (IDSS) for Nutrition Therapy: Infrastructure, Decision Support and Knowledge Management Design. *International Journal of Reliable and Quality E-Healthcare*, 2(4), 14-27.

## CONFERENCE PAPERS, POSTERS, & ABSTRACTS

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- Cant, H., van Staa, T., Jury, F., Hurley, R., Tempest, E., **Fahmi, A.**, Sharma, A. The use of a Knowledge Support System to optimise prescribing in UK primary care settings: experience in the antibiotic setting, and extending to mental health, at British Journal of General Practice Conference, 31 Mar 2023.
- **Fahmi, A.**, MacBrayne, A., Marsh, W., and Humby, F., A dynamic Bayesian network model for self-monitoring of rheumatoid arthritis, at STEMM MIT CSAIL AI in Healthcare Summit 2020, 1-2 Oct 2020 (poster presentation).
- **Fahmi, A.**, Soyel, H., Marsh, W., Curzon, P., MacBrayne, A., and Humby, F., From personalised predictions to targeted advice: improving self-management in rheumatoid arthritis, EFMI STC2020: Integrated Citizen centered digital health and social care - Citizens as data producers and service co-creators, 26-27 Nov 2020, e-conference (oral presentation).
- **Fahmi, A.**, MacBrayne, A., Kyrimi, E., Maclachlan, S., Humby, F., Marsh, W., and Pitzalis, C., Causal Bayesian networks for medical diagnosis: a case study in rheumatoid arthritis, 8<sup>th</sup> IEEE International Conference on Healthcare Informatics, 30 Nov - 3 Dec 2020, e-conference (oral presentation).
- Isik, I., Yilmaz, S., **Fahmi, A.**, Kanca, R., and Seven Bozcay, E., Employment barriers of refugees in Turkey: identifying potential labor force and competencies, European Association of Work and Organizational Psychology Congress: EAWOP 2017, abstract book p. 449, May 9-10, 2017, Dublin, Ireland.
- **Fahmi, A.**, and Kaya, T., Evaluation of alternative energy scenarios for Turkey using Bayesian network analysis, International Symposium on Energy System Optimization, Nov 9-10, 2015, Heidelberg, Germany.
- **Fahmi, A.**, Derakhshan, A., and Kahraman, C., Human resources management using interval valued intuitionistic fuzzy analytic hierarchy process, IEEE International Conference on Fuzzy Systems: FUZZ-IEEE 2015, Aug 2-5, 2015, Istanbul, Turkey.
- **Fahmi, A.**, and Kahraman, C., May the success be a matter of degree? Fuzzy examination and scoring through multiple choice questions, 27<sup>th</sup> European Conference on Operational Research: EURO 2015, programme handbook, p. 185, Jul 12-15, 2015, Glasgow, UK.
- **Fahmi, A.**, Dorostanian, A., Rezazaeh, H., and Ostadrahimi, A., An intelligent decision support system (IDSS) for nutrition therapy: infrastructure, decision support, and knowledge management design, 1<sup>st</sup> International Conference on Electronic Health: ICEH 2012, Nov 29-30, 2012, Tehran, Iran.
- **Fahmi, A.**, Dorostanian, A., Rezazadeh, H., and Ostadrahimi A., A fuzzy decision support system for nutrition therapy, mini EURO Conference on Computational Biology, Bioinformatics and Medicine: CBBM 2012, Sep 13-15, 2012, Nottingham, UK.

## EXTRACURRICULAR ACTIVITIES

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- Representative of PhD students. 2018 – 2020  
Representing PhD students of the Risk and Information Management group at School of Electronic Engineering and Computer Science of Queen Mary University of London.
- Twitter account admin, writing posts, and publishing videos. 2018 – 2020  
Volunteer admin of the Twitter account of Risk and Information Management group, wrote posts for the website of PamBayesian project, and volunteered to edit the videos of my second supervisor's talks and published in YouTube.

## REFEREES

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- Prof Tjeerd van Staa (postdoc supervisor), School of Health Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester M13 9YP, UK. Email: n.fenton@qmul.ac.uk
- Dr William Marsh (primary PhD supervisor), Risk and Information Management Research Group, Queen Mary University of London, London E1 4NS, UK. Email: d.w.r.marsh@qmul.ac.uk