Chapter 10
Machine Learning and Text Analysis in an Artificial Intelligent System for the Training of Air Traffic Controllers

Tetiana Shmelova
https://orcid.org/0000-0002-9737-6906
National Aviation University, Ukraine

Yuliya Sikirda
https://orcid.org/0000-0002-7303-0441
Kirovograd Flight Academy of the National Aviation University, Ukraine

Nina Rizun
https://orcid.org/0000-0002-4343-9713
Gdansk University of Technology, Poland

Vitaliy Lazorenko
National Aviation University, Ukraine

Volodymyr Kharchenko
National Aviation University, Ukraine

ABSTRACT

This chapter presents the application of new information technology in education for the training of air traffic controllers (ATCs). Machine learning, multi-criteria decision analysis, and text analysis as the methods of artificial intelligence for ATCs training have been described. The authors have made an analysis of the International Civil Aviation Organization documents for modern principles of ATCs education. The prototype of the neural network for evaluating the timeliness and correctness of the decision making

DOI: 10.4018/978-1-7998-5357-2.ch010

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

by ATCs has been developed. The new theoretical and practical tasks for simulation and pre-simulation training have been obtained using expert judgment method. The methodology for sentiment analyzing the airline customers' opinions has been proposed. In addition, the examples of artificial intelligence systems and expert systems by the authors, students and colleagues from National Aviation University, Ukraine and Gdansk University of Technology, Poland have been proposed.

INTRODUCTION

In recent years we have observed large changes in the education system for training of air traffic controllers and other aviation professionals due using new information technology in aviation. One of the scientific and methodical fields which gained goals as a result of this was Data Analysis and Decision Making (DM) under various names: Statistics, Big Data, Data Mining, Machine Learning, Text Mining, Sentiment Analysis, Intelligence Data Analysis, Artificial Intelligence System, Knowledge Discovery, etc.

The aviation system is a complex system that requires investigation of the human contribution to safety and an understanding of how human performance may be affected by its multiple and interrelated components such as technical, political, physical, social, economic, informational, training culture etc. (International Civil Aviation Organization [ICAO], 2004, 2009, 2016b). The Human Factor (HF) remains a major cause of aviation accidents. That is why the current system of education needs to improve. The HF as a term requires a precise definition because when it is used in everyday life, it often encompasses all aspects of human activity (ICAO, 1998, 2002). People are the most flexible, adaptable and important element in the aviation system and the most vulnerable in terms of opportunities effect on its activity. At the initial stage of development of aviation, many problems have been associated with exposure to human noise, vibration, heat, cold and acceleration forces. But optimization of the human role in complex systems is related to all aspects of human activity, such as DM processes and knowledge; design configuration displays, controls and equipment cockpit and cabin; maintaining communications and software; preparation of plans and maps.

Air traffic controllers (ATCs) – are the experts in Air Traffic Management (ATM) for dynamic, integrated management of air traffic and airspace. The ATM system is a system that provides air traffic management through the collaborative integration of humans, information, technology, facilities and services, supported by air, ground and/or space-based Communications, Navigation and Surveillance (CNS). Statistical data show that human errors account for up to 80% of all causes of aviation accidents (Leychenko, Malishevskiy, & Mikhalic, 2006; Aviation Accident Statistics, 2018). Safety in aviation will continue to be highly dependent on the reliability of Air Traffic Service (ATS). This reliability will be directly linked to the ability of ATS planners and managers to incorporate the many lessons of history regarding the impact of HF on controller performance. According to the list of factors, performance includes quality of selection criteria, initial and recurrent training, and retention programs for ATCs (ICAO, 2008; European Organization for the Safety of Air Navigation [Eurocontrol], 2004a, 2004b). Quality of aviation training is important to decrease the influence of the HF.

MOST WIEDZY Downloaded from mostwiedzy.pl

48 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the product's webpage:
www.igi-global.com/chapter/machine-learning-and-text-analysis-in-an-artificial-intelligent-system-for-the-training-of-air-traffic-controllers/263169?camid=4v1

Related Content

International Aeronautical Emission: EU Charge of Fees
Nauman Ehsan Hashmi and Atif Manzoor (2011). *International Journal of Aviation Technology, Engineering and Management (pp. 30-36).*
www.igi-global.com/article/international-aeronautical-emission/58944?camid=4v1a

Advances in Fuzzy Dynamic Programming
Felix Mora-Camino, Elena Capitanul Conea, Fabio Krykhtine, Walid Moudani and Carlos Alberto Nunes Cosenza (2021). *Research Anthology on Reliability and Safety in Aviation Systems, Spacecraft, and Air Transport (pp. 166-186).*
www.igi-global.com/chapter/advances-in-fuzzy-dynamic-programming/263167?camid=4v1a

Next Generation Surveillance Technology for Airport and ATC Operations
Werner Langhans and Tim Quilter (2012). *Technology Engineering and Management in Aviation: Advancements and Discoveries (pp. 182-189).*
www.igi-global.com/chapter/next-generation-surveillance-technology-airport/55975?camid=4v1a

BOREAS Space and the Prospects for Private Spaceflight in Bulgaria
Zdravko Dimitrov, Boncho Nikov, Georgi Petrov and Boris Tashev (2013). *International Journal of Space Technology Management and Innovation (pp. 55-67).*
www.igi-global.com/article/boreas-space-and-the-prospects-for-private-spaceflight-in-bulgaria/85345?camid=4v1a

MOST WIEDZY Downloaded from mostwiedzy.pl