# Prof. MUSTAFA BORAHAN TÜMER

## Personal Information

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**International Researcher IDs**
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## Biography

Following a seven year highschool education in İstanbul Erkek Lisesi (Istanbuler Knabengymnasium), Prof. Tümer received both his B.Sc. and M.S. degrees in Computer Engineering from Boğaziçi University and İstanbul Technical University in 1987 and 1990, in respective order. After three years as a graduate assistant in the computer engineering department at the Faculty of Engineering, Marmara University, he pursued and received his Ph.D degree, with a scholarhip from the Higher Education Council, in Electrical and Computer Engineering at Marquette University, Milwaukee, Wisconsin, in 1998. He has been a faculty member at the Faculty of Engineering at Marmara University since 1998 where he currently serves as a professor at the Department of Computer Engineering.

His research interests include machine learning, syntactic pattern recognition, learning automata, time- and subject-varying systems, sequential decision making with an emphasis on reinforcement learning.

He likes photography, trekking, playing guitar, traveling and is an enthusiastic listener of standard & latin jazz.

## Education Information

Doctorate, Marquette University, Elektronik Ve Bilgisayar Mühendisliği, United States Of America 1991 - 1998
Postgraduate, Istanbul Technical University, Fen Bilimleri Enstitüsü, Bilgisayar Mühendisliği, Turkey 1987 - 1990
Undergraduate, Bogazici University, Faculty Of Engineering, Department Of Computer Engıneerıng, Turkey 1983 - 1987

## Foreign Languages

English, C1 Advanced
German, B2 Upper Intermediate

## Dissertations

Doctorate, A Fuzzy Syntactic Approach to Fault Diagnostics By Analysis of Time Sampled Signals, Marquette University, Faculty of Engineering, Department of Electrical and Computer Engineering, 1998
Postgraduate, A System Development Kit and Software Tool for Microcontroller 6805S1, Istanbul Technical University, Fen Bilimleri Enstitüsü, Bilgisayar Mühendisliği, 1990

## Research Areas

Artificial Intelligence, Computer Learning and Pattern Recognition

## Academic Titles / Tasks

Associate Professor, Marmara University, Faculty of Engineering, Computer Engineering, 2006 - Continues
Assistant Professor, Marmara University, Faculty of Engineering, Computer Engineering, 1999 - 2006
Research Assistant, Marmara University, Faculty of Engineering, Computer Engineering, 1991 - 1999

## Courses

Reinforcement Learning, Doctorate, 2020 - 2021, 2019 - 2020
Software Engineering, Undergraduate, 2020 - 2021, 2019 - 2020, 2018 - 2019, 2017 - 2018, 2016 - 2017, 2015 - 2016, 2014 - 2015, 2013 - 2014, 2012 - 2013, 2011 - 2012
Data Structures (Veri Yapıları), Undergraduate, 2020 - 2021, 2019 - 2020, 2018 - 2019, 2017 - 2018, 2016 - 2017, 2015 - 2016, 2012 - 2013
Machine Learning (Yapay Öğrenme), Postgraduate, 2019 - 2020
Learning Automata, Postgraduate, 2018 - 2019

## Advising Theses

Tümer M. B., Context Detection and Identification in Multi-Agent Reinforcement Learning on Non-Stationary Environments, Postgraduate, E.TALHA(Student), 2022
, Tümer M. B., A Reinforcement Learning Approach for Control Flow Error Detection in Automated Software Testing, Postgraduate, E.DURMAZ(Student), 2022
Tümer M. B., An adaptive weak estimation method based on stochastic learning, Postgraduate, A.KUTALMIŞ(Student), 2021
Tümer M. B., Multivariate time series clustering using variable order markov models and its applications on cyber-physical systems, Postgraduate, B.Gün(Student), 2019
Tümer M. B., MULTI-CLASS CATEGORIZATION OF USER-GENERATED CONTENT IN A DOMAIN SPECIFIC MEDIUM: INFERRING PRODUCT SPECIFICATIONS FROM E-COMMERCE MARKETPLACES, Postgraduate, K.TOPRAK(Student), 2019
Tümer M. B., Reinforcement learning in non-stationary environments using spatiotemporal analysis, Postgraduate, B.MUHAMMED(Student), 2017
TÜMER M. B., Tümer B., Hıerarchıcal reınforcement learnıng on non-statıonary envıronments, Postgraduate, Y.Efe(Student), 2015
Tümer M. B., A heterogeneous multi agent intelligent player for a real-time strategy game, Postgraduate, M.CİHAN(Student), 2010
Tümer M., Development of an autonomous sailor: an application of hierarchical reinforcement learning to sailing, Postgraduate, H.Şencan(Student), 2009
Tümer M., A methodology for constructive development of a syntactic pattern recognition machine (SPRM) using reinforcement learning principles, Postgraduate, F.Geleri(Student), 2008
Tümer M., Cycle detection in noisy signals by constructive automata: An adaptive syntactic approach to pattern recognition, Postgraduate, A.Ustimov(Student), 2006
Tümer M., A software tool for designing adaptive control systems based on reinforcement learning, Postgraduate, M.Bişirgen(Student), 2004
TÜMER M. B., Tümer B., Generating 3D face models from photographs, Postgraduate, M.Yıldıray(Student), 2003
Tümer M. B., Adaptive data compression in networks: A learning automaton approach, Postgraduate,

E.BAYDOĞAN(Student), 2001

## Jury Memberships

PhD Thesis Monitoring Committee Member, PhD Thesis Monitoring Committee Member, Marmara Üniversitesi, December, 2022
PhD Thesis Monitoring Committee Member, PhD Thesis Monitoring Committee Member, Marmara Üniversitesi, September, 2019
PhD Thesis Monitoring Committee Member, PhD Thesis Monitoring Committee Member, Boğaziçi Üniversitesi, June, 2019
PhD Thesis Monitoring Committee Member, PhD Thesis Monitoring Committee Member, Boğaziçi Üniversitesi, January, 2019
PhD Thesis Monitoring Committee Member, PhD Thesis Monitoring Committee Member, Marmara Üniversitesi, April, 2018

## Published journal articles indexed by SCI, SSCI, and AHCI

I. **Autonomous acquisition of arbitrarily complex skills using locality based graph theoretic features: a syntactic approach to hierarchical reinforcement learning**
Kumralbaş Z., Çavuş S. H., Coşkun K., Tümer B.
Evolving Systems, vol.14, no.6, pp.957-980, 2023 (SCI-Expanded)

II. **Learning under concept drift and non-stationary noise: Introduction of the concept of persistence**
Coşkun K., Tümer B.
Engineering Applications of Artificial Intelligence, vol.123, 2023 (SCI-Expanded)

III. **An adaptive estimation method with exploration and exploitation modes for non-stationary environments**
Coskun K., TÜMER M. B.
PATTERN RECOGNITION, vol.129, 2022 (SCI-Expanded)

IV. **Intelligent software debugging: A reinforcement learning approach for detecting the shortest crashing scenarios**
Durmaz E., TÜMER M. B.
Expert Systems with Applications, vol.198, 2022 (SCI-Expanded)

V. **Multivariate Time Series Clustering and its Application in Industrial Systems**
Surmeli B. G., Tumer M. B.
CYBERNETICS AND SYSTEMS, vol.51, no.3, pp.315-334, 2020 (SCI-Expanded)

VI. **An adaptive signal compression system with pre-specified reconstruction quality and compression rate**
Tumer M. B., Demir M.
COMPUTER METHODS AND PROGRAMS IN BIOMEDICINE, vol.81, no.2, pp.99-105, 2006 (SCI-Expanded)

VII. **A syntactic methodology for automatic diagnosis by analysis of continuous time measurements using hierarchical signal representations**
Tumer M. B., Belfore L. A., Ropella K. M.
IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART B-CYBERNETICS, vol.33, no.6, pp.951-965, 2003 (SCI-Expanded)

## Books & Book Chapters

I. **Signal Compression Using Growing Cell Structures: A Transformational Approach**
Tümer M. B.

in: Lecture Notes in Computer Science - vol. LNCS2869, Adnan Yazıcı,Cevat Şener, Editor, Springer-Verlag , Heidelberg, pp.952-959, 2003

## Refereed Congress / Symposium Publications in Proceedings

I. **An AI-based Architecture Framework for Improving End-of-line Reliability Tests of Electric Motors**
SOYTÜRK M., Coşkun A. K., İzmitlioğlu M. O., TÜMER M. B., Saraçoğlu S., BULUT B., Ketmen H. B., AŞAN T., HANEDAR İ., Aydın E.
IEEE IECON 2022, 48th Annual Conference of the Industrial Electronics Society, Belgium, 17 October 2022

II. **A Syntactic Pattern Recognition Based Approach to Online Anomaly Detection and Identification on Electric Motors**
Coskun K., Kumralbas Z., Cavus H., TÜMER M. B.
44th DAGM German Conference on Pattern Recognition (DAGM GCPR), Konstanz, Germany, 27 - 30 September 2022, vol.13485, pp.116-132

III. **Context Detection and Identification In Multi-Agent Reinforcement Learning With Non-Stationary Environment Çok Etmenli Pekiştirmeli Öğrenmede Devingen Ortamlarda Bağlam Değişim Tespiti ve Tanimlama**
Talha Selamet E., Tumer B.
30th Signal Processing and Communications Applications Conference, SIU 2022, Safranbolu, Turkey, 15 - 18 May 2022

IV. **Multi-class categorization of user-generated content in a domain specific medium: Inferring product specifications from e-commerce marketplaces**
Toprak Uçar K., Tümer M. B., Kıraç M.
International Conference on Intelligent and Fuzzy Systems, INFUS 2019, İstanbul, Turkey, 23 - 25 July 2019, vol.1029, pp.247-256

V. **Unsupervised Mode Detection in Cyber-Physical Systems using Variable Order Markov Models**
Surmeli B. G., Eksen F., Dinc B., Schuller P., Tumer B.
15th IEEE International Conference on Industrial Informatics (INDIN), Emden, Germany, 24 - 26 July 2017, pp.841-846

VI. **Detection of Regime Switching Points in Non-Stationary Sequences using Stochastic Learning based Weak Estimation Method**
Aslanci E., Coskun K., Schuller P., Tumer B.
15th IEEE International Conference on Industrial Informatics (INDIN), Emden, Germany, 24 - 26 July 2017, pp.787-792

VII. **Hierarchical Reinforcement Learning with Context Detection (HRL-CD)**
YÜCESOY Y. E., TÜMER M. B.
7th International Conference on Machine Learning and Computing (ICMLC 2015), Floransa, Italy, 19 March 2015, vol.5, no.5, pp.353-358

VIII. **A Low-Complexity Constructive Learning Automaton Approach to Handwritten Character Recognition**
Ustimov A., TÜMER M. B., GÜNGÖR T.
11th International Conference on Intelligent Text Processing and Computational Linguistics (CICLING 2010), Yaş, Romania, 21 March 2010, vol.46, pp.311-322

IX. **Construction of a learning automaton for cycle detection in noisy data sequences**
Ustimov A., Tümer M. B.
International Symposium on Computer and Information Sciences (ISCIS 2005), İstanbul, Turkey, 26 October 2005, vol.3733, pp.543-552

X. **A Genetic Approach to Data Dimensionality Reduction Using a Special Initial Population**
TÜMER M. B., Demir M.
International Work-Conference on the Interplay Between Natural and Artificial Computation (IWINAC 2005), Las

Palmas, Spain, 15 June 2005, vol.3562, pp.310-316

XI. **Signal compression using growing cell structures: A transformational approach**
BOZ B., TÜMER M. B.
Computer and Information Sciences - ISCIS 2003, Antalya, Turkey, 3 - 05 November 2003, vol.952

XII. **Demand Forecasting via Learning Automata**
Demir M., TÜMER M. B.
23. Conference on Operational Reearch and Industrial Engineering, İstanbul, Turkey, 15 January 2002

XIII. **A diagnosis methodology for continuous time measurements using hierarchical signal representations**
TÜMER M. B., Belfore L. A., Ropella K.
1998 IEEE International Conference on Systems, Man, and Cybernetics. Part 3 (of 5), San Diego, United States Of America, 11 October 1998, pp.3038-3043

XIV. **Applying hierarchical fuzzy automatons to automatic diagnosis**
Tumer M., Belfore L., Ropella K.
1998 Conference of the North American-Fuzzy-Information-Processing-Society, Florida, United States Of America, 20 - 21 August 1998, pp.315-319

## Supported Projects

Soytürk M., Tümer M. B., Coşkun A. K., Kumralbaş Z., Çavuş S. H., H2020 Project, intelligent Reliability 4.0, 2020 - 2023
Tümer M. B., H2020 Project, Innovative Modeling Approaches for Production Systems to Raise Validatable Efficiency, 2015 - 2018
Tümer M. B., Project Supported by Other Official Institutions, Automatic Diagnosis by Analysis of Medical Signals Using Syntactic Techniques, 1999 - 2004
Tümer M. B., Project Supported by Other Official Institutions, Performance Analysis of Well-Known Signal Compression Techniques, 2000 - 2002

## Scientific Refereeing

IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART B-CYBERNETICS, Journal Indexed in SCI-E, February 2010

## Scientific Consultations

KOÇFİNANS, Project Consultancy, Marmara University, Faculty of Engineering, Computer Engineering, Turkey, 2019 - 2022

## Scientific Research / Working Group Memberships

Machine Intelligence And Designery (Mınd), Marmara University, Türkiye, http://mind-rg.com/, 2019 - Continues

## Metrics

Publication: 22
Citation (WoS): 24
Citation (Scopus): 16
H-Index (WoS): 3

H-Index (Scopus): 2