

# Doğan Can

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RESEARCH INTERESTS     Machine Learning, Neural Networks, Automatic Speech Recognition, Natural Language Processing, Information Retrieval, Machine Translation, Spoken Dialogue Modeling, Weighted Finite State Automata, Algorithms and Theory

EDUCATION     ◇     **Ph.D. in Computer Science**     University of Southern California, Los Angeles

- Thesis : Weighted Factor Automata: A Finite-State Framework for Spoken Content Retrieval, Advisor: Shrikanth S. Narayanan
- Courses: Advanced Natural Language Processing, Statistical Machine Translation, Artificial Intelligence, Computer Vision, Advanced Analysis of Algorithms, Convex Optimization, Statistics
- GPA : 4.00/4.00

◇     **M.Sc. in Electrical Engineering**     Boğaziçi University, İstanbul

- Thesis : Indexing, Retrieval and Detection Techniques for Spoken Term Detection, Advisor: Murat Saraçlar
- Courses: Mathematical Methods for Signal Processing, Spectral Estimation, Advanced Speech Processing, Neural Networks
- GPA : 4.00/4.00

◇     **Coursework in Electrical Engineering**     Rensselaer Polytechnic Institute, Troy

- Courses: Random Processes, Detection and Estimation Theory, Information Theory, Pattern Recognition, Digital Image and Video Processing
- GPA : 3.84/4.00

◇     **B.Sc. in Electrical Engineering**     Boğaziçi University, İstanbul

- Courses: Speech Processing, Natural Language Processing
- GPA : 3.72/4.00

EXPERIENCE     ◇     **Machine Learning Engineer**

Apple     April 2019 - Present

- Org. : Siri

◇     **Senior Machine Learning Engineer**

Behavioral Signals     May 2018 - April 2019

- Group : Machine Learning Research
  - design and development of a scalable state-of-the-art speech recognition engine used at production (Kaldi, Tornado, WebSocket, Docker, AWS ECS)

◇     **Graduate Research Assistant**

Signal Analysis and Interpretation Lab, USC     August 2010 - May 2018

- Project : PyKaldi

- design and development of a Python wrapper for Kaldi speech recognition toolkit (Python, C++, CLIF)
- Project : DARPA LORELEI Program
  - research on multi-task learning of multilingual distributed text representations (Tensorflow)
- Project : iARPA BABEL Program
  - research on weighted finite-state transducer based lattice indexing, retrieval and ranking for spoken content retrieval (C++, OpenFst, Kaldi)
  - research on end-to-end deep learning for spoken content retrieval (PyTorch)
- Project : NIAAA Automating Behavioral Coding
  - research on modeling the dialogue in psychotherapy sessions and automatic prediction of behavioral codes (NLTK, CRFsuite, Wapiti)
  - design and development of data annotation tools and guidelines used by the research team
- Project : Barista
  - design and development of an online speech processing framework (Kaldi, C++, actor model)

◇ **Research Intern**

IBM Research

June 2013 - August 2013

- Project : Automatic Assessment of Language Learners' English Skills
  - research on finite-state techniques for pronunciation assessment (C++, OpenFst)

◇ **Graduate Research Assistant**

Signal and Image Processing Lab, Boğaziçi University

September 2007 - July 2010

- Project : Turkish Broadcast News Transcription and Retrieval
  - research on lattice indexing, retrieval and scoring for keyword search (C++, OpenFst)
  - development of the speech recognition systems used in the project (AT&T amtools, IBM Attila, HTK)

◇ **Researcher**

CLSP Summer Workshop on Human Language Technology

July 2008 - August 2008

- Group : Multilingual Spoken Term Detection
  - research on lattice indexing and pronunciation modeling for keyword search (C++, OpenFst)

◇ **Teaching Assistant**

ECSE Dept, Rensselaer Polytechnic Institute

August 2006 - May 2007

- Courses: Sensing and Imaging, Probability for Engineering Applications, Laboratory Introduction to Embedded Control

SKILLS

- ◇ Languages: English (fluent), Turkish (native)
- ◇ Programming Languages: C/C++, Python, Perl, bash, MATLAB, L<sup>A</sup>T<sub>E</sub>X, HTML/JavaScript, Ruby, Julia, Rust, Swift
- ◇ Machine Learning: PyTorch, Tensorflow, Theano, Keras, Blocks, scikit-learn, libSVM, Weka
- ◇ Speech: Kaldi, IBM Attila, AT&T LVR (FSM, GRM, AMTOOLS, DCD), HTK, SRILM
- ◇ NLP: OpenFst, NLTK, spaCy, CoreNLP, Moses, UCAM-SMT, SGNMT, CRFsuite, Wapiti

- HONORS & AWARDS
- ◇ Annenberg Graduate Fellowship (University of Southern California)
  - ◇ Graduate Scholarship (Scientific & Technological Research Council of Turkey)
  - ◇ Outstanding Academic Merit Scholarship (Boğaziçi University)

PUBLICATIONS

**Journal Articles**

- ◇ N. Malandrakis, A. Ramakrishna, V. Martinez, T. Sorensen, **D. Can**, and S. S. Narayanan  
“The ELISA Situation Frame extraction for low resource languages pipeline for LoReHLT’2016.”  
In *Machine Translation*, 32(1-2), 127-142, 2018
- ◇ **D. Can**, R. Marin, P. G. Georgiou, Z. Imel, D. C. Atkins, S. S. Narayanan  
““It sounds like...”: A natural language processing approach to detecting counselor reflections in motivational interviewing.”  
In *Journal of counseling psychology*, 2016
- ◇ S. P. Lord **D. Can**, M. Yi, R. Marin, C. W. Dunn, Z. Imel, P. G. Georgiou, S. S. Narayanan, M. Steyvers and D. C. Atkins  
“Advancing methods for reliably assessing motivational interviewing fidelity using the motivational interviewing skills code”  
In *Journal of substance abuse treatment*, 2015
- ◇ **D. Can** and M. Saraçlar  
“Lattice Indexing for Spoken Term Detection”  
*IEEE Transactions on Audio, Speech and Language Processing*, 19(8):2338-2347, November 2011
- ◇ E. Arısoy, **D. Can**, S. Parlak, H. Sak and M. Saraçlar  
“Turkish Broadcast News Transcription and Retrieval”  
*IEEE Transactions on Audio, Speech and Language Processing*, 17(5):874-883, July 2009

**Peer-Reviewed Conference Papers**

- ◇ **D. Can**, V. R. Martinez, P. Papadopoulos and S. S. Narayanan  
“Pykaldi: A Python Wrapper for Kaldi”  
In *Proceedings of ICASSP*, 2018
- ◇ K. Singla, **D. Can** and S. S. Narayanan  
“A Multi-task Approach to Learning Multilingual Representations”  
In *Proceedings of ACL*, 2018
- ◇ K. Singla, Z. Chen, N. Flemotomos, J. Gibson, **D. Can**, D. C. Atkins and S. S. Narayanan  
“Using Prosodic and Lexical Information for Learning Utterance-level Behaviors in Psychotherapy.”  
In *Proceedings of Interspeech*, 2018
- ◇ J. Gibson, **D. Can**, P. Georgiou, D. C. Atkins and S. S. Narayanan  
“Attention networks for modeling behaviors in addiction counseling.”  
In *Proceedings of Interspeech*, 2017
- ◇ D. Bone, J. Gibson, T. Chaspari, **D. Can** and S. S. Narayanan  
“Speech and language processing for mental health research and care”  
In *Signals, Systems and Computers*, 2016 50th Asilomar Conference on (pp. 831-835). IEEE.
- ◇ J. Gibson, **D. Can**, B. Xiao, Z. Imel, D. C. Atkins, P. Georgiou and S. S. Narayanan  
“A Deep Learning Approach to Modeling Empathy in Addiction Counseling”  
In *Proceedings of ISCA Interspeech*, 2016
- ◇ B. Xiao, **D. Can**, J. Gibson, Z. Imel, D. C. Atkins, P. Georgiou and S. S. Narayanan  
“Behavioral Coding of Therapist Language in Addiction Counseling using Recurrent Neural Networks”  
In *Proceedings of ISCA Interspeech*, 2016

- ◇ **D. Can** and S. S. Narayanan  
“A Dynamic Programming Algorithm for Computing N-gram Posteriors from Lattices”  
In *Proceedings of EMNLP*, 2015
- ◇ **D. Can**, D. C. Atkins and S. S. Narayanan  
“A dialog act tagging approach to behavioral coding: A case study of addiction counseling conversations”  
In *Proceedings of ISCA Interspeech*, 2015
- ◇ **D. Can**, J. Gibson, C. Vaz, P. G. Georgiou and S. S. Narayanan  
“Barista: A framework for concurrent speech processing by USC-SAIL”  
In *Proceedings of ICASSP*, 2014
- ◇ **D. Can** and S. S. Narayanan  
“On the computation of document frequency statistics from spoken corpora using factor automata”  
In *Proceedings of InterSpeech*, 2013
- ◇ F. Morbini, K. Audhkhasi, K. Sagae, R. Artstein, **D. Can**, P. Georgiou, S. Narayanan, A. Leuski, D. Traum  
“Which ASR should I choose for my dialogue system.”  
In *Proceedings of SIGdial*, 2013
- ◇ **D. Can**, P. G. Georgiou, D. C. Atkins and S. S. Narayanan  
“A Case Study: Detecting Counselor Reflections in Psychotherapy for Addictions using Linguistic Features”  
In *Proceedings of ISCA Interspeech*, 2012
- ◇ B. Xiao, **D. Can**, P. G. Georgiou, D. C. Atkins and S. S. Narayanan  
“Analyzing the Language of Therapist Empathy in Motivational Interview based Psychotherapy”  
In *Proceedings of APSIPA Annual Summit and Conference*, 2012
- ◇ H. Wang, **D. Can**, A. Kazemzadeh, F. Bar and S. Narayanan  
“A System for Real-Time Twitter Sentiment Analysis of 2012 U.S. Presidential Election Cycle”  
In *Proceedings of ACL*, 2012
- ◇ O. Çakmak, A. Kazemzadeh, **D. Can**, S. Yildirim and S. Narayanan  
“Root-Word Analysis of Turkish Emotional Language”  
Emotion Sentiment and Social Signals - ES<sup>3</sup> 2012
- ◇ **D. Can**, E. Cooper, A. Ghoshal, M. Jansche, S. Khudanpur, B. Ramabhadran, M. Riley, M. Saraçlar, A. Sethy, M. Ulinski, C. White  
“Web derived Pronunciations for Spoken Term Detection”  
In *Proceedings of ACM-SIGIR*, 2009
- ◇ **D. Can** and M. Saraçlar  
“Score Distribution Based Term Specific Thresholding for Spoken Term Detection”  
In *Proceedings of NAACL-HLT*, 2009
- ◇ **D. Can**, E. Cooper, A. Sethy, C. M. White, B. Ramabhadran and M. Saraçlar  
“Effect of Pronunciations on OOV Queries in Spoken Term Detection”  
In *Proceedings of IEEE ICASSP*, 2009
- ◇ T. Som, **D. Can**, and M. Saraçlar  
“HMM-based Sliding Video Text Recognition for Turkish Broadcast News”  
In *Proceedings of IEEE ISCIS*, September 2009.
- ◇ **D. Can** and M. Saraçlar  
“Turkish Broadcast News Transcription with Open-Source Software”  
In *Proceedings of IEEE Signal Processing and Communications Applications Conference*, 2009 (in Turkish)