Nikolaos (Nikos) Flemotomos

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RESEARCH INTERESTS	Automatic Speech Recognition, Speaker Diarization and Identification, Natural Language Processing, Machine Learning for Healthcare

EDUCATION	**Ph.D., Electrical Engineering**	Aug 2022

University of Southern California, Los Angeles, CA, USA
Thesis: *Extracting and Using Speaker Role Information in Speech Processing Applications*

M.Sc., Computer Science Aug 2021
University of Southern California, Los Angeles, CA, USA
GPA: 3.94/4.00

M.Sc., Electrical Engineering Dec 2018
University of Southern California, Los Angeles, CA, USA
GPA: 4.00/4.00

Diploma (5-years degree)**, Electrical and Computer Engineering** Apr 2016
National Technical University of Athens, Athens, Greece
Thesis: *Robust Acoustic Features for Distant Speech Recognition*
GPA: 9.34/10.00

EXPERIENCE	**Apple**, Cambridge, MA, USA

Siri – Automatic Speech Recognition
Machine Learning Researcher Jun 2022 to present
Manager: Dr. Roger Hsiao

- Exploring machine learning algorithms and optimization techniques for acoustic modeling to improve the automatic speech recognition technologies behind Siri.
- Collaborating with the production teams to quickly deploy research ideas.

University of Southern California, Los Angeles, CA, USA
Signal Analysis and Interpretation Laboratory (SAIL)
Graduate Research Assistant May 2017 to May 2022
Supervisor: Prof. Shrikanth Narayanan

- Proposed methods and frameworks to extract speaker role information in structured conversational interactions and used this contextual information to improve the performance in various speech processing tasks (e.g., diarization, speech recognition)
- Led a subgroup of Ph.D. students that, in collaboration with experts from the medical field, developed a real-world system which processes audio recordings of psychotherapy sessions and gives feedback to the therapist. The system is used for computer-aided therapist training.
- Published results in top-tier journals and peer-reviewed conferences.

Apple, Los Angeles, CA, USA (home office)
Siri – Automatic Speech Recognition
Machine Learning Engineering Intern May 2021 to Aug 2021
Manager: Dr. Arnab Ghoshal

- Explored acoustic-based speaker adaptation methods for end-to-end speech recognition.

Microsoft Research, Bellevue, WA, USA
Speech and Dialog Research Group
Research Intern May 2019 to Aug 2019
Manager: Dr. Dimitrios Dimitriadis

- Worked on speaker identification and diarization in meeting scenarios.
- Proposed a novel algorithm for continuous speaker identification based on memory-augmented neural networks (presented at ICASSP '20).

Czech Technical University in Prague, Prague, Czech Republic
Biomedical Data and Signal Processing Group (BioDat)
Research Intern   Mar 2016 to Jun 2016
Supervisor: Assoc. Prof. Lenka Lhotská
- Developed an algorithm for automatic sleep staging from polysomnographic signals, motivated by ideas used in speech recognition.

National Technical University of Athens, Athens, Greece
Computer Vision, Speech Communication and Signal Processing Group (CVSP)
Undergraduate Research Assistant   Feb 2015 to Mar 2016
Supervisor: Prof. Petros Maragos
- Explored the Teager-Kaiser energy operator for energy estimation in speech signals.
- Developed a system for single-microphone distant speech recognition, comparing various acoustic feature sets, with an emphasis on those based on the AM-FM speech model.

SOFTWARE SKILLS	**Programming Languages**: Python, UNIX shell scripting, Matlab **Tools & Libraries**: Tensorflow, PyTorch, Kaldi, OpenFST, SRILM, LaTeX
GRADUATE COURSEWORK	Analysis of Algorithms, Multimodal Probabilistic Learning of Human Communication, Advanced Natural Language Processing, Law and Intellectual Property, Computational Social Sciences, Mathematics of High-Dimensional Data, Machine Learning Theory, Deep Learning, Machine Learning from Signals, Pattern Recognition, Statistics, Probability, Random Processes

TEACHING EXPERIENCE

University of Southern California, Los Angeles, CA, USA
Teaching Assistant   Spring 2019, 2020 & 2021
Speech Recognition and Processing for Multimedia

Society of Astronomy and Space, Volos, Greece
Teaching Assistant   Summer 2011 & 2012
Preparation for the International Olympiad on Astronomy and Astrophysics

HONORS AND AWARDS

Myronis Endowed Ph.D. Fellowship   Aug 2021 to May 2022
University of Southern California

Annenberg Ph.D. Fellowship   Aug 2016 to Aug 2020
University of Southern California

Phi Kappa Phi   initiation: May 2020
Member (academic honor society)

Gerontelis Graduate Studies Scholarship   Apr 2020
Gerontelis Foundation

Travel Grant   Sep 2018
International Speech Communication Association (ISCA)

Honorable Mention   Sep 2010
4th International Olympiad on Astronomy and Astrophysics

JOURNAL PUBLICATIONS

1. C. Berkel. D. Knox, **N. Flemotomos**, V.R. Martinez, D.C. Atkins, S. Narayanan, L.A. Rodriguez, C.G. Gallo, and J.D. Smith, "A Machine Learning Approach to Improve Implementation Monitoring of Family-Based Preventive Interventions in Primary Care", *Implementation Research and Practice*, 2023.

2. B. van der Woerd, Z. Chen, **N. Flemotomos**, M. Oljaca, L.T. Sund, S. Narayanan, and M.M. Johns III. "A Machine-Learning Algorithm for the Automated Perceptual Evaluation of Dysphonia Severity", *Journal of Voice*.

3. C.S. Soma, B. Wampold, **N. Flemotomos**, R. Peri, S. Narayanan, D.C. Atkins, and Z.E. Imel. "The Silent Treatment?: Changes in Patient Emotional Expression after Silence", *Counselling and Psychotherapy Research*, 2023.

4. Z. Chen, **N. Flemotomos**, K. Singla, T.A. Creed, D.C. Atkins, and S. Narayanan, "An Automated Quality Evaluation Framework of Psychotherapy Conversations with Local Quality Estimates", *Computer Speech & Language*, 2022.

5. **N. Flemotomos**, V.R. Martinez, Z. Chen, K. Singla, V. Ardulov, R. Peri, D. Caperton, J. Gibson, M.J. Tanana, P. Georgiou, J. Van Epps, S.P. Lord, T. Hirsch., Z.E. Imel, D.C. Atkins, and S. Narayanan. "Automated Evaluation of Psychotherapy Skills Using Speech and Language Technologies", *Behavior Research Methods*, 2022.

6. **N. Flemotomos**, V.R. Martinez, Z. Chen, T.A. Creed, D.C. Atkins, and S. Narayanan, "Automated Quality Assessment of Cognitive Behavioral Therapy Sessions through Highly Contextualized Language Representations", *PLOS ONE*, 2021.

7. S.B. Goldberg, **N. Flemotomos**, V.R. Martinez, M. Tanana, P. Kuo, B.T. Pace, J.L. Villatte, P. Georgiou, J. Van Epps, Z.E. Imel, S. Narayanan, and D.C. Atkins. "Machine Learning and Natural Language Processing in Psychotherapy Research: Alliance as Example Use Case", *Journal of Counseling Psychology*, 2020.

PEER REVIEWED CONFERENCE & WORKSHOP PROCEEDINGS

1. Z. Chen, **N. Flemotomos**, T.A. Creed, Z.E. Imel, D.C. Atkins, and S. Narayanan. "Leveraging Open Data and Task Augmentation to Automated Behavioral Coding of Psychotherapy Conversations in Low-Resource Scenarios", *Findings of EMNLP*, 2022.

2. **N. Flemotomos** and S. Narayanan. "Multimodal Clustering with Role Induced Constraints for Speaker Diarization", *Interspeech*, 2022.

3. Z. Chen, **N. Flemotomos**, V. Ardulov, T.A. Creed, Z.E. Imel, D.C. Atkins, and S. Narayanan. "Feature Fusion Strategies for End-to-End Evaluation of Cognitive Behavior Therapy Sessions", *EMBC*, 2021.

4. **N. Flemotomos**, P. Georgiou, and S. Narayanan. "Linguistically Aided Speaker Diarization Using Speaker Role Information", *Odyssey*, 2020.
Best Student Paper Finalist

5. **N. Flemotomos** and D. Dimitriadis. "A Memory Augmented Architecture for Continuous Speaker Identification in Meetings", *ICASSP*, 2020.

6. T.J. Park, M. Kumar, **N. Flemotomos**, M. Pal, R. Peri, R. Lahiri, P. Georgiou, and S. Narayanan. "The Second DIHARD Challenge: System Description for USC-SAIL Team", *Interspeech*, 2019

7. V.R. Martinez, **N. Flemotomos**, V. Ardulov, K. Somandepalli, S.B. Goldberg, Z.E. Imel, D.C. Atkins, and S. Narayanan. "Identifying Therapist and Client Personae for Therapeutic Alliance Estimation", *Interspeech*, 2019.

8. **N. Flemotomos**, P. Georgiou, D.C. Atkins, and S. Narayanan, "Role Specific Lattice Rescoring for Speaker Role Recognition from Speech Recognition Outputs", *ICASSP*, 2019.

9. **N. Flemotomos**, Z. Chen, D.C. Atkins, and S. Narayanan, "Role Annotated Speech Recognition for Conversational Interactions", *SLT*, 2018.

10. **N. Flemotomos**, P. Papadopoulos, J. Gibson, and S. Narayanan, "Combined Speaker Clustering and Role Recognition in Conversational Speech", *Interspeech*, 2018.

11. **N. Flemotomos**, V.R. Martinez, J. Gibson, D.C. Atkins, T.A. Creed, and S. Narayanan, "Language Features for Automated Evaluation of Cognitive Behavior Psychotherapy Sessions", *Interspeech*, 2018.

12. K. Singla, Z. Chen, **N. Flemotomos**, J. Gibson, D. Can, D.C. Atkins, and S. Narayanan, "Using Prosodic and Lexical Information for Learning Utterance-level Behaviors in Psychotherapy", *Interspeech*, 2018.

INVITED & CAMPUS TALKS	1. **The Alan Turing Institute**, London, UK Data Science for Mental Health Interest Group *Automated Quality Assessment of Cognitive Behavioral Therapy Sessions Through* *Highly Contextualized Language Representations*	Mar 2022
	2. **Alberta Hospital Edmonton/University of Alberta**, Edmonton, AB, Canada Forensic Grand Rounds *Towards Automated Large-Scale Evaluation of Psychotherapy*	Sep 2021
	3. **University of Southern California**, Los Angeles, CA, USA Interaction Lab *Who Spoke When? and how speaker roles can help us find the answer*	Apr 2021

REVIEWER

Journals:
BMC Psychiatry, iScience, International Journal of Human-Computer Interaction, npj Mental Health Research, Applied Artificial Intelligence, PLOS ONE, Cogent Psychology, Behavior Research Methods

Conferences:
International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)

SERVICE AND VOLUNTARY WORK

USC Behavioral Science Society
Student executive board member — Dec 2020 to May 2022

Hellenic Student Association of USC
Student volunteer and board member — Jan 2018 to May 2019

IEEE Engineering in Medicine & Biology Society NTUA Student Chapter
President — Sep 2014 to Jun 2015
Student volunteer — Sep 2013 to Jun 2014