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Victor R. Martinez

Current Research

My research focuses on the computational understanding of stories, both on the content and in the presentation. Specifically, I develop natural language processing models to identify narrative structures from movie scripts (e.g., violence and how it is portrayed by the characters) and in real-life domains (e.g., narratives as a window into psychotherapy).

Education

2015–2021 **PhD. Computer Science**, *University of Southern California*, Los Angeles, CA, **Advisor:** Prof. Shrikanth (Shri) S. Narayanan.

2014–2015 **MSc. Computer Science**, *Instituto Tecnologico Autonomo de Mexico*, Mexico City, Mexico, (*Summa Cum Laude*).

2007–2014 **BSc.Computer Engineering**, *Instituto Tecnologico Autonomo de Mexico*, Mexico City, Mexico, (*Magna Cum Laude*).

2007–2014 **BSc.Applied Mathematics**, *Instituto Tecnologico Autonomo de Mexico*, Mexico City, Mexico.

Expertise

1. Natural Language Processing
2. Machine Learning
3. Data Science
3. Computational Social Science

Languages

Spanish	Native	
English	Proficient	*TOEFL iBT 109*

Computer skills

Programming	Python, R, Scala, Java	*7+ Years*
	MATLAB, C++, C, PHP	*3+ Years*
Machine Learning	PyTorch, Keras, TensorFlow	
Data Science	Jupyter, Pandas, Sci-kit, NumPy, spaCy	
Tools	Git, Docker, EC2, MTurk	

Experience

2021– **Apple**, *Machine Learning Engineer*, Seattle, WA.

Research in E2E ASR

- Create groundbreaking technology for large scale systems, spoken language, big data and artificial intelligence
- Enhance and improve Siri through state of the art machine learning techniques
- Integrate applications that Siri interacts with into the Siri experience
- Build an elegant user experience for a distributed system at massive scale
- Develop new features, maintain existing code, fix bugs and contribute to overall system design
- Conduct performance analysis and tuning
- Work independently to identify issues, develop solutions, and surface to the appropriate team or technical leader
- Demonstrate leadership within the team, collaborate with and mentor others, and effectively represent own work as well as that of the team

2015–2021 **Signal Analysis and Interpretation Lab**, *Research Assistant*, Los Angeles, CA.

Research in Machine Learning, Natural Language Processing and Computational Social Sciences

- Pioneered a multi-task learning model to predict risk behavior content on movie scripts from linguistic cues.
  - Formalized the problem as a sequence classification, implemented a solution based on gated recurrent units (GRU) and Long short-term memory networks (LSTM) with self-attention, using keras.
  - Improved over 16% F1 score relative to the previous state-of-the-art baseline.
- Launched a proprietary automated online software tool for written-media content analysis with a focus on diversity and inclusion based on computational linguistics.
  - Quantified important objective assessments of characters in media: screen time, relations, and plot centrality.
  - Analyzed over 25 film scripts and books—totaling over 2,300 dialogues from 88 characters–for five production companies including Disney and NBCUniversal.
  - Awarded the USC Stevens 2019 Technology Advancement Grant.
  - US Patent 10,956,679
- Co-developed PyKaldi, an open-source Python wrapper for Kaldi speech recognition toolkit that provides support for 21 C++ libraries through CLIF, NumPy and OpenFST.
  - Built installation scripts and automated testing using docker, TravisCI, and anaconda.
  - As of October 2020, PyKaldi has over 3,000 downloads from anaconda cloud, 600 stars and 180 forks in Github.
- Coordinated 6 Ph.D. students to deliver production-level code for an automatic large-scale transcription and quality estimation service for Therapists.
  - Mentored students in the implementation of audio processing (VAD, DIAR, ASR) and NLP (transcription, quality estimators) models using docker, KaldiASR, sci-kit learn and TensorFlow.
  - Designed a privacy-preserving distributed system architecture to securely transfer session recordings of 40 therapists (over 1,235 hours of audio) from an American counseling center to USC internal network.

Summer 2020 **Apple**, *Machine Learning Intern*, Los Angeles, CA.

Research in Machine Learning and Dialogue Systems

- Analyzed auxiliary tasks and semi-supervised approaches to reduce the amount of labeled examples required to achieve start-of-the-art results in dialogue state tracking systems, decreasing the requirement of manual annotations by up to 40%.
- Integrated auxiliary tasks into state-of-the-art dialogue state tracking systems improving users' goal prediction accuracy by 23%.

Summer 2019 **Disney Research**, *Research & Development Lab Assoc*, Glendale, CA.

Research in Artificial Intelligence and Dialogue Systems

- Formulated a conversational model for multi-party conversations based on multiple simultaneous dyadic interactions boosting the maximum number of participants per session by 3 to 6 times.
  - Incorporated into a conversational agent prototype using RasaNLU and evaluated through user experience studies.
- Upgraded the intent framework to allow conversational agents recall past interactions (US Patent filed).
  - Evaluated the satisfaction levels of participants when interacting with a memory vs. non-memory agent, finding that, on average, participants preferred the agent with memory 16% satisfaction increment.

2015–2016 **Instituto Tecnologico Autonomo de Mexico**, *External Consultor*, Mexico City, Mexico.

- Mentored a team of 3 graduate-level student researchers in automatically identifying relevant topics from social media streams
- Systems performed 10% faster and 14% more accurate than traditional approaches.

2014–2015 **BlueMessaging**, *Researcher*, Mexico City, Mexico.

Research in Machine Learning and Natural Language Processing

- Constructed machine learning models for Spanish Entity Recognition:
  - Semi-supervised data augmentation approach
  - Improved 10%F1 over traditional baselines
- Designed machine learning models for automatic address resolution
  - Rule-based approach
  - Boosted 15%F1 compared to previous approach

2013–2015 **Instituto Tecnologico Autonomo de Mexico**, *Lab Manager*, Mexico City, Mexico.

- Founded Collective Information Analysis Lab for human behavior analysis through social media streams
- Collaborated with a Mexican hypermarket group in a study of social influence in visitors' moods

PUBLICATIONS

Patent Applications

1. Shrikanth Narayanan, Anil Ramakrishna, Nikolaos Malandrakis, **Victor Martinez**, Krishna Somandepalli, and Karan Singla. Linguistic analysis of differences in portrayal of movie characters, US Patent 10,956,679, 2021
2. James Kennedy and **Victor R. Martinez**. A solution for multi-party social dialogue with user personalization, 4 2020. Patent Filed

Book Chapters

1. Nikolaos Malandrakis, **Victor R. Martinez**, Anil Ramakrishna, Manoj Kumar, Karan Singla, Md Nasir, and Shrikanth Narayanan. Behavioral machine intelligence with language. In Morteza Dehghani and Ryan L. Boyd, editors, *The Atlas of Language Analysis of Psychology*. (To Appear)
2. **Victor Martinez** and Víctor M Gonzílez. Sentiment characterization of an urban environment via twitter. In *Ubiquitous computing and ambient intelligence. Context-awareness and context-driven interaction*, pages 394–397. Springer, Cham, 2013

Journal Articles

1. Armen C. Arevian, Daniel Bone, Nikolaos Malandrakis, **Victor R. Martinez**, Kenneth B. Wells, David J. Miklowitz, and Shrikanth Narayanan. Clinical state tracking in serious mental illness through computational analysis of speech. *PLOS ONE*, 15(1):1–17, 01 2020
2. Simon B. Goldberg, Nikolaos Flemotomos, **Victor R. Martinez**, Michael J Tanana, Patty B Kuo, Brian T Pace, Jennifer L Villatte, P. Georgiou, Jake Van Epps, Zac E. Imel, Shrikanth S. Narayanan, and David C. Atkins. Machine learning and natural language processing in psychotherapy research: Alliance as example use case. *Journal of counseling psychology*, 67 4:438–448, 2020
3. Nikolaos Malandrakis, Anil Ramakrishna, **Victor Martinez**, Tanner Sorensen, Dogan Can, and Shrikanth Narayanan. The elisa situation frame extraction for low resource languages pipeline for lorehlt'2016. *Machine Translation*, 32(1-2):127–142, 2018
4. **Victor R Martinez**, Miguel A Escalante, Mariano Beguerisse-Díaz, Elmer Garduño, and Victor M Gonzalez. Understanding human behavior in urban spaces using social network data: a mobility graph approach. *International Journal of Web Services Research (IJWSR)*, 13(4):54–66, 2016

Conference Articles

1. **Victor Martinez**, Krishna Somandepalli, Yalda Uhls, and Shrikanth Narayanan. Joint estimation and analysis of risk behavior ratings in movie scripts. In *EMNLP*, November 2020
2. **Victor R. Martinez** and J. Kennedy. A multiparty chat-based dialogue system with concurrent conversation tracking and memory. *Proceedings of the 2nd Conference on Conversational User Interfaces*, 2020
3. **Victor R Martinez**, Nikolaos Flemotomos, Victor Ardulov, Krishna Somandepalli, Simon B. Goldberg, Zac E. Imel, David C. Atkins, and Shrikanth S. Narayanan. Identifying therapist and client personae for therapeutic alliance estimation. In *INTERSPEECH 2019*, pages 1901–1905, 2019
4. **Victor R Martinez**, Krishna Somandepalli, Karan Singla, Anil Ramakrishna, Yalda T Uhls, and Shrikanth Narayanan. Violence rating prediction from movie scripts. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 33, pages 671–678, 2019
5. **Victor R Martinez**, Anil Ramakrishna, Ming-Chang Chiu, Karan Singla, and Shrikanth Narayanan. A system for the 2019 sentiment, emotion and cognitive state task of darpas lorelei project. In

Proceedings of the 8th International Conference on Affective Computing & Intelligent Interaction, 2019

6. **Victor R. Martinez**, Krishna Somendapalli, K. Singla, Anil Ramanakrishna, Yalda T. Uhls, and Shrikanth S. Narayanan. Victim or perpetrator? analysis of violent characters portrayals from movie scripts. *Proceedings of the 3rd workshop on Media Analytics for Societal Trends*, 2019
7. Nikolaos Flemotomos, **Victor R Martinez**, James Gibson, David C Atkins, Torrey Creed, and Shrikanth Narayanan. Language features for automated evaluation of cognitive behavior psychotherapy sessions. In *Interspeech*, pages 1908–1912, 2018
8. Krishna Somandepalli, **Victor Martinez**, Naveen Kumar, and Shrikanth Narayanan. Multimodal representation of advertisements using segment-level autoencoders. In *Proceedings of the 2018 on International Conference on Multimodal Interaction*, pages 418–422. ACM, 2018
9. Doğan Can, **Victor R Martinez**, Pavlos Papadopoulos, and Shrikanth S Narayanan. Pykaldi: A python wrapper for kaldi. In *Acoustics, Speech and Signal Processing (ICASSP), 2018 IEEE International Conference on*, 2018
10. Anil Ramakrishna, **Victor R Martinez**, Nikolaos Malandrakis, Karan Singla, and Shrikanth Narayanan. Linguistic analysis of differences in portrayal of movie characters. In *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 1669–1678, 2017
11. Jesus Garcia-Mancilla, **Victor R Martinez**, Victor M Gonzalez, and Angel F Fajardo. Social influence and emotional state while shopping. In *International Conference on HCI in Business, Government, and Organizations*, pages 386–394. Springer, Cham, 2016
12. **Victor R Martinez**, Luis Eduardo Pérez, Francisco Iacobelli, Salvador Suárez Bojórquez, and Víctor M González. Semi-supervised approach to named entity recognition in spanish applied to a real-world conversational system. In *Mexican Conference on Pattern Recognition*, pages 224–235. Springer, Cham, 2015
13. **Víctor R Martinez** and Víctor M González. Spatial-temporal characterization of an urban environment using twitter. In *2014 International Conference on Collaboration Technologies and Systems (CTS)*, pages 80–84. IEEE, 2014
14. Oscar Daniel Camarena Gomez, Rodrigo Juarez Armenta, Hugo Huipet, and **Victor Martinez**. weremember: letting ad patients to enjoy their home and their families. In *CHI'12 Extended Abstracts on Human Factors in Computing Systems*, pages 1255–1260. ACM, 2012

Technical Reports

1. L. Cheung, Thamme Gowda, U. Hermjakob, Nelson H S Liu, Jonathan May, Alexandra Mayn, Nima Pourdamghani, Michael Pust, K. Knight, Nikolaos Malandrakis, P. Papadopoulos, Anil Ramakrishna, K. Singla, **Victor R. Martinez**, C. Vaz, Doğan Can, Shrikanth S. Narayanan, Kenton Murray, Toan Q. Nguyen, David Chiang, Xiaoman Pan, Boliang Zhang, Y. Lin, D. Lu, Lifu Huang, Kevin Blissett, Tongtao Zhang, O. Glembek, M. Baskar, Santosh Kesiraju, L. Burget, K. Benes, I. Szoke, K. Veselý, Camille Goudeseune, M. H. Johnson, Leda Sari, Wenda Chen, and A. Liu. Elisa system description for lorehlt 2017. 2017

Non-Peer Reviewed

1. **Victor R Martinez**, Antonio Mancilla, and Victor M Gonzalez. Tweeting over the border: an empirical study of transnational migration in san diego and tijuana. *arXiv preprint arXiv:1507.05989*, 2015

Teaching Experience

Spring 2020 **CSCI 567 – Machine Learning**, *Teaching Assistant*, USC.
Teaching Assistant for Machine Learning with Prof. Yan Liu

Invited Talks

November 2020 **Grupo Salinas**, *Modelos Computacionales Narrativos*.

October 2020 **ITAM**, *Computational Narrative Models for Predicting Impact of Stories based on Representations of its Characters*.

Service

Member, *Association for Computational Linguistics*, ACL.

Member, *Association for Computing Machinery*, ACM.

2020 **Workshop Organizer**, *3rd workshop on Media Analytics for Societal Trends*, ACM MM 2020.

2020 **PC Member**, *Special Track on AI for Social Impact*, AAAI-21.

2019 **PC Member**, *Special Track on AI for Social Impact*, AAAI-20.

2018 **PC Member**, *Southern California Natural Language Processing symposium*.

Awards and Honors

2019 **USC Stevens**, *Technology Advancement Grant*.

2015–2018 **CONACYT**, *PhD Fellowship*.

2016 **ITAM Alumni Association**, *Research Award*.
Granted for the MSc Thesis: Human Mobility Study using Social Network data

2013 **FIRST**, *Outstanding Volunteer*.
Head of Volunteers for FIRST Lego League 2012, 2013

2008 **FIRST**, *Rookie All-Star*.
Head of Programming for FRC Team 2283