USC Viterbi School of Engineering

Department of Computer Science &
Information Sciences Institute

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Vitae: Dr. Ferrara's research focuses on studying techno-social systems, designing machine-learning frameworks to model and predict individual behavior, characterize information diffusion online, and predict abuse. Ferrara has published over 100 articles on Machine Learning, Network Science, AI and Social Media Research, appeared in top venues including *Proceedings of the National Academy of Sciences*, *Communications of the ACM*, *Physical Review Letters*, etc. His research on social networks has been featured on major news outlets and tech magazines. His research is supported by DARPA, IARPA, ONR, ARO, and AFOSR. Dr. Ferrara has been appointed as the *2016 Senior Fellow* of *UCLA's Institute of Pure and Applied Mathematics*, he received the *2016 DARPA Young Faculty Award*, and the *2016 Complex System Society Junior Scientific Award* for "outstanding contributions to complex system sciences."

Publication highlights:

- The rise of social bots. *Communications of the ACM* (2016)
- Social bots distort the 2016 US Presidential election online discussion. *First Monday* (2016)
- Defining and identifying Sleeping Beauties in science. *Proceedings of the National Academy of Sciences* (2015)
- On Facebook, most ties are weak. *Communications of the ACM* (2014)
- Optimal network modularity for information diffusion. *Physical Review Letters* (2014)

Current projects:

- (PI) *Cognitive Online Simulation of Information Network Environments*. DARPA SocialSim (2017-2020) ~**$5M**
- (PI) *Modeling behavioral trajectories & incentives in gamified techno-social environments*. DARPA (2016-19) **$1M**
- (Co-PI) *TILES: Tracking individual performance with sensors*. IARPA MOSAIC (2017-21) **~$13M**
- (Co-PI) *Digital deception: the cognitive and social mechanisms of the spread of fake news*. AFOSR (2017-20) **$600K**
- (Senior Personnel) *SAGE: Synergistic anticipation of geopolitical events*. IARPA HFC (2017-2021)
- (Senior Personnel) *EFFECT: Effectively forecasting evolving cyber threats*. IARPA CAUSE (2016-19)
- (Senior Personnel) *SAFE: SIGINT-based anticipation of future events*. IARPA Mercury (2016-18)

Recent research: I developed a strong portfolio of computational methods and analytical techniques to sift through Big Data. I led a scientific effort funded by DARPA SMISC to design a detection system to identify persuasion campaigns and social bots online. The deployed system ranked top 3 at the *2015 DARPA Twitter Bot Challenge*. I joined USC in 2015, and ever since worked on machine learning applications to techno-social systems. I was selected as the recipient of the *2016 DARPA Young Faculty Award* with a proposal on modeling online human behavior under incentives. I lead the *DARPA SocialSim* effort to create cognitive online simulation of information and social networks I co-lead IARPA projects on hybrid forecasting, cyber-threat prediction, and anticipation of violent social events.

Future directions: My long-term vision is to develop AI-fueled computational frameworks to describe, understand, and predict human behavior from Big Data. The interdisciplinary nature of my work interconnects computation, AI and machine learning, with social sciences, to generate insights from data and transform them into actionable items. My plan is to build machines that can help improve our society by supporting decision making, policy design and implementation.