



Nitin Agarwal, PhD

Unveiling the Hidden

An Arkansas Researcher's Mission for a Safer Digital World

Dr. Nitin Agarwal, the founding director of the COSMOS (Collaboratorium for Social Media and Online Behavioral Studies) Research Center at the University of Arkansas at Little Rock, is at the forefront of advancing the understanding of social media and its impact on society. His research focuses on the positive, negative, and disruptive aspects of online social networks (OSNs), particularly in relation to cognitive security and malicious behavior.

With over \$25 million in funding from U.S. federal agencies, including the Department of Defense (DoD), the Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF), Dr. Agarwal leads groundbreaking projects that tackle the challenges posed by cybercrime, cyberterrorism, cognitive attacks at micro and macro levels, and other deviant behaviors on social media platforms.

The Challenge

The growth of social media has democratized information production and consumption, providing opportunities for individuals to share their thoughts on a global scale. However, this openness has also given rise to aggressive, malicious, and deviant behaviors that threaten vulnerable populations and perpetuate toxic and polarizing discourse.

The lack of transparency in social media algorithms further exacerbates these issues, leading to implicit biases and manipulative influence campaigns. Addressing these challenges requires efficient and explainable methods to detect and dismantle coordinated groups of malicious users in a rapidly evolving socio-techno-behavioral environment, safeguarding the integrity and safety of online spaces.

The Solution

The main objective of Dr. Agarwal's research is to identify and track malicious groups in real-world networks that hide in plain sight. The COSMOS team's research proposes a way to identify key groups and their tactics, investigate their interest, and predict their influence in the network. This is the first step in ensuring these online platforms unite our communities, connect individuals, and serve as a medium for civil discourse. The next step is strengthening resiliency in communities to mitigate the impacts of such cognitive attacks.

 **COSMOS**
Collaboratorium for Social Media
and Online Behavioral Studies


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Dr. Agarwal's work at COSMOS has made significant contributions to computational social network analysis, social cyber forensics, disinformation dissemination, and privacy protection. The center has developed publicly available social media mining tools, such as Blogtrackers and VTracker (video tracker), which have been utilized during NATO's military exercises. NATO's Innovation Hub recognized these tools as a top-10 solution in a challenge titled "The Invisible Threat: Countering Cognitive Warfare," which involved 132 teams from 30 NATO member nations.

COSMOS also initiated a project supported by seed funding from the Arkansas Research Alliance (ARA) to combat COVID-19 misinformation and scams in Arkansas through research-driven education. Recognized by the World Health Organization as a key technological innovation, this project has received additional funding from the U.S. DoD and NSF to sustain this effort. This research was also featured in the US Army Research Office Year in Review 2022 Magazine as a success story for research titled "Developing Research Infrastructure to Strengthen Socio-Cognitive Security for Combating Misinformation and Deviant Connective Action."

Methods & Data

COSMOS employs social computation technologies pioneered by Dr. Agarwal to ingest and analyze vast amounts of multi-modality data from a plethora of social platforms, distinguishing meaningful signals from noise. By developing advanced information processing capabilities, the research team identifies key narratives; influencers; amplifiers; tactics, techniques & procedures (TTPs); and agenda-setters within online networks.

Next Steps

Dr. Agarwal is expanding COSMOS' research focus to study multi-platform and multimedia information environments in diverse domains, countries, and cultures worldwide. By studying the role of digital communication platforms and understanding how they are exploited by malicious information actors, COSMOS aims to navigate changing technology landscapes and address complex problems. This expansion creates opportunities for interdisciplinary contributions to understand the co-evolution of communication technologies and human behavior.

The university has invested in Phase 1 to renovate the COSMOS workspace and further enable its groundbreaking research. Phase 2 of the project involves outfitting the space with advanced technology and multipurpose pods. The COSMOS research center will serve as a central hub, facilitating collaboration among interdisciplinary teams, fostering idea exchange, and supporting education and training initiatives.

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