The Mathematics of Misinformation

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The spread of false or misleading information online is destructive to our society and democracy. From a mathematical perspective, how do social media networks and algorithms enable the spread of misinformation on the internet, and how can it be fixed?

**Background**
- Misinformation spread had a significant impact on 2016 & 2020 elections
- Factors that influence spread: Information overload, Time limitation (limited attention span), and Network structure ("superconnected" and "echo chamber" clusters as opposed to random connections)
- It’s the system, not the viral nature of information, that causes spread
- How can math & statistical modeling be used to curb the spread of misinformation?

**References**
Science Daily
PNAS
American Univ (via Scientific American)

**The Problem**
Adopting disease models to track and understand misinformation spread:
- Agent-based model (dots represent individuals, connected via lines)
- Using proxies for information load (probability of posting) & attention span (items viewed before sharing), simulate information spread under various conditions

**Modeling**
Criticism: human behavior is complicated to model, and information is not a virus!

**The Big Picture**
Relates to our discussions on policing algorithms: how can info classification & elimination be equitable?

**Solutions**
1) Using crowdsourced judgments of news source quality (PNAS): partisan differences in determining trust, but strong correlation with certified fact-checkers; difficult in practice since outlets & networks seek profit; issues with familiarity/picking users
2) Machine learning (American Univ.): using statistical modeling to classify misinformation through linguistic analysis; achieved 90% accuracy on 112 tweets