عنوان مقاله:

Rumor spread dynamics and its sensitivity analysis under the influence of the Caputo fractional derivatives

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خلاصه مقاله:

Rumor spreading is the circulation of doubtful messages on the social network. Fact retrieving process that aims at preventing the spread of the rumor, appears to have a significant global impact. In this research, we have investigated a mathematical model projecting rumor spread by considering six groups of individuals namely ignorant, exposed, intentional rumor spreader, unintentional rumor spreader, stifler, and fact retriever. To represent the current abnormal and fast pattern of the message spread around various platforms, in the projected model, we have implemented the fractional derivative in the Caputo context. Using the existing theory of the fractional derivative, we have examined the theoretical aspects such as the existence and uniqueness of the solutions, the existence and stability of the rumor-free and rumor equilibrium points, and the global stability of the rumor-free equilibrium point. Computing basic reproduction numbers, we have analyzed the existence and stability of points of equilibrium. The sensitivity of basic reproduction numbers is also examined. Importance of the fact retrieving drive is highlighted by relating it to the basic reproduction number. Finally, by applying the Adams-Bashforth-Moulton method, we have presented the numerical results by capturing the profile of each of the groups under the influence of fractional derivative and investigated the impact of rumor verification rate and contact rate in controlling and preventing the rumor. With the Caputo fractional operator in the projected model, the current research highlights the significance of the fact retriever and the curb in individual contact and captures the relevant consequences.

کلمات کلیدی:

Rumor spread, Sensitivity analysis, Basic reproduction number

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