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HOW TO BUILD UP SOCIAL NETWORKING SERVICE ACTORS' TOLERANCE FOR HARMFUL CONTENT

The ever-increasing number of potential threats to sybersecurity together with problematic determination of relevance, truth and value of web-deployable information stipulate the public opinion molding by spreading false, misleading or incorrect information [1–2]. The impact comes out in the chaos-ridden actions of social networking services (SNS) actors and their interactions under certain conditions will unlock synergies. The on-time determination of the nature and intention of synergies in SNS alongside with timely identification, prediction and due response is a great matter of individual, social and national information security.

The comprehensive case study proves that SNS belong to nonlinear dynamic systems [1–2]. Those systems demonstrate unpredictability and uncontrolled behavior. That is why the study of SNS actors' interaction control requires basic concepts of the chaotic dynamics theory. The most efficient techniques to develop actors' desired behavior in a system are proven to base on a self-organization process. The study rests on the concept of SNS actors' interaction synergetic control [2]. A live issue is to design synergetic control that could solve the problem of controlling SNS actor's demand for the content by making SNS actors organize to develop their tolerance for harmful content.

Let us formally describe the interaction between the actors of a certain SNS with a system of nonlinear differential equations [2]

$$\begin{cases} \dfrac{dx(t)}{dt} = ax - xy - bx^2; \\ \dfrac{dy(t)}{dt} = -cy + xy + u(x,y), \end{cases} \tag{1}$$

where $x(t)$ is the process describing the SNS actors' demand for the content adapted for a target group; $y(t)$ is the process describing the content supply; a is the fluctuation index for the SNS actors' demand for the content; b is the modification index for SNS actors' struggle for reposting the identical content; c is the fluctuation index for the content supply to the SNS actors; $u(x,y)$ is the SNS actors' interaction synergetic feedback control.

Let us design a control action $u(x,y)$ and specify the order parameter $\psi_u(x,y)=0$ to attain transition of the virtual community to the desired state through synergies. To do this one has to introduce into the system structure certain invariants also known as attractors factoring in the nature of SNS actors' interaction [2]. Then the macrovariable $\psi_u(x,y)=0$ takes the form of

$$\psi_\upsilon(x,y)=y-\varepsilon_1 x-\varepsilon_2 x^2, \quad (2)$$

where ε_1, ε_2 are the SNS actors' demand and rivalry control coefficients respectively.

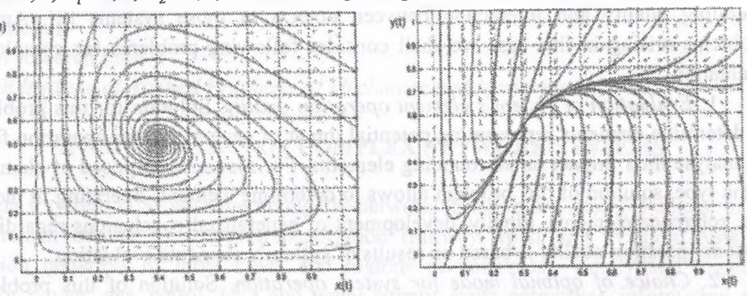
To maintain those processes for a time T_υ the selected macrovariable (2) must meet the condition

$$T_\upsilon \frac{d\psi_\upsilon(t)}{dt}+\psi_\upsilon(t)=0. \quad (3)$$

The substitution of the macrovariable (2) into the equation (3) in the initial set of differential equations (1) produces synergetic control

$$u(x,y)=cy-xy+\left(ax-xy-bx^2\right)\left(\varepsilon_1+2\varepsilon_2 x\right)-\frac{1}{T_\upsilon}\left(y-\varepsilon_1 x-\varepsilon_2 x^2\right). \quad (4)$$

Let the parameters of the nonlinear differential equations system (1) get the value of $a=0,7$, $b=0,5$, $\varepsilon_1=1,5$, $\varepsilon_2=1,1$, $T=1$ and Fig. 1 represents the model.



a) b)

Fig. 1. Phase portrait of the system: a) in a chaotic state; b) in a controlled state

Under the synthesized control the system (1) transits to a desired state in a synergy splash point $x_\upsilon=0,3$ and $y_\upsilon=0,55$ which is a focal point and responds to the order parameter. So the SNS actors' demand for harmful content decreases in the synergy splash point as the consequence of the synergetic control feedback. The synergy splash point is the system's attractor to reduce the nonlinear differential equation system's degrees of freedom thus simplifying administration of the SNS actors' interactions. The transition to a desired state of cybersecurity in a virtual community occurs under synergetic control due to good interaction administration.

References

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