The article introduces a collection of research focused on **computation within dynamical systems**, challenging the dominant paradigm of digital, silicon-based computing. It explores how natural and engineered systems can **store, process, and transform information intrinsically**, drawing from disciplines such as physics, neuroscience, and computer science.

Key Points:

1. **The 2020 Digital Roadblock**:
    - Moore's Law is reaching its limits due to energy, speed, and scalability constraints.
    - Traditional digital approaches are insufficient for future demands.
    - A redefinition of computation—rooted in physical, nonlinear, and often analog systems—is proposed.
2. **Intrinsic vs. Designed Computation**:
    - **Intrinsic computation** refers to how systems naturally store and process information without regard to utility.
    - **Designed computation** involves intentional use of systems for tasks, optimizing for speed, efficiency, and reliability.
    - The interplay between these modes of computation is critical for future technology.
3. **Nonlinear and Physical Intelligence**:
    - Intelligence may not be restricted to biology or logic-based systems.
    - The article questions whether intelligence can arise from abiotic systems via complex dynamical interactions.
4. **Historical Context**:
    - The roots of this discussion trace back to Kolmogorov, Shannon, Wiener, and Turing.
    - Early concepts like entropy and algorithmic complexity laid the groundwork for measuring and understanding computation in chaotic and stochastic systems.

5. **Major Themes in the Focus Issue**:
    - Novel computing substrates (e.g., chaotic logic gates, optical systems).
    - Information dynamics in biological and chemical networks.
    - Causal inference and symbolic dynamics.
    - Quantum and distributed computation models.
6. **Goals and Outlook**:
    - Encourage rigorous, cross-disciplinary exploration of computation in natural systems.
    - Revisit and extend concepts from cybernetics and communication theory.
    - Promote metrics like a “Machine Intelligence Quotient” for evaluating computational capacity of diverse substrates.

Conclusion

This article lays the intellectual foundation for moving “beyond the digital hegemony” by redefining computation in terms of physical, nonlinear dynamics. It encourages a synthesis of theory and experiment, past and future, to unlock new forms of intelligent systems embedded in nature and engineered environments.