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| **Challenges** | **Contributions** | **Future research directions and remedies** |
| Complexity | [69] | * How to solve the complexity issue in IoT? * The complex network-based approaches are soultions. |
| Connectivity | [71] | * How to connect a large number of objects in IoT-based technologies? * The usage of social relations and exploring AI and machine learning. |
| IoT and SIoT standards | [72] | * There is a lack of IoT and SIoT standards. * The development of new standards combining complex networks is a good research direction. |
| Complex data | [73] | * How to handle diverse data types in IoT? * The use of AI and Machine learning is helpful to overcome this issue. |
| Noisy data | [75] | * How to clean noisy big data? * Develop more advanced AI-based methods. |
| Self-organized structures | [78] | * How to handle self-organization and autonomous IoT infrastructure? * Develop novel methods using learning systems and automated reasoning. |
| Trust, security, and privacy | [80] | * What entities are available in the IoT-based technologies? * How is the trust management process more efficient and accurate? * Are any efficient trust models available in the IoT? * What models and tools are available for security and privacy? |
| Energy Management | [83] | * What are possible solutions for efficient energy management in IoT-based technologies? |