

Artificial Intelligence and Governance in Relevance to Satellites in Space

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Abstract : With the increasing number of satellites and space debris, space traffic management (STM) becomes crucial. AI can aid in STM by predicting and preventing potential collisions, optimizing satellite trajectories, and managing orbital slots. Governance frameworks need to address the integration of AI algorithms in STM to ensure safe and sustainable satellite activities. AI and governance play significant roles in the context of satellite activities in space. Artificial intelligence (AI) technologies, such as machine learning and computer vision, can be utilized to process vast amounts of data received from satellites. AI algorithms can analyse satellite imagery, detect patterns, and extract valuable information for applications like weather forecasting, urban planning, agriculture, disaster management, and environmental monitoring. AI can assist in automating and optimizing satellite operations. Autonomous decision-making systems can be developed using AI to handle routine tasks like orbit control, collision avoidance, and antenna pointing. These systems can improve efficiency, reduce human error, and enable real-time responsiveness in satellite operations. AI technologies can be leveraged to enhance the security of satellite systems. AI algorithms can analyze satellite telemetry data to detect anomalies, identify potential cyber threats, and mitigate vulnerabilities. Governance frameworks should encompass regulations and standards for securing satellite systems against cyberattacks and ensuring data privacy. AI can optimize resource allocation and utilization in satellite constellations. By analyzing user demands, traffic patterns, and satellite performance data, AI algorithms can dynamically adjust the deployment and routing of satellites to maximize coverage and minimize latency. Governance frameworks need to address fair and efficient resource allocation among satellite operators to avoid monopolistic practices. Satellite activities involve multiple countries and organizations. Governance frameworks should encourage international cooperation, information sharing, and standardization to address common challenges, ensure interoperability, and prevent conflicts. AI can facilitate cross-border collaborations by providing data analytics and decision support tools for shared satellite missions and data sharing initiatives. AI and governance are critical aspects of satellite activities in space. They enable efficient and secure operations, ensure responsible and ethical use of AI technologies, and promote international cooperation for the benefit of all stakeholders involved in the satellite industry.

Keywords : satellite, space debris, traffic, threats, cyber security.

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