"A New-era in Search for Technologically Advanced Life in the Universe"

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The recent surge in discoveries of extrasolar planets has reignited our fascination with the possibility of extraterrestrial life. Significant efforts are underway, employing cutting-edge tools like the James Webb Space Telescope (JWST) and the forthcoming Large Ultraviolet Optical Infrared Surveyor (LUVOIR) to study the atmospheres of exoplanets in search of signs of biological activity, known as 'biosignatures.' However, interpreting such findings remains inherently ambiguous, exemplified by recent disputed claims of phosphine detection on Venus. Expanding upon biosignature searches, the quest for evidence of technologically advanced extraterrestrial life, termed 'technosignatures,' emerges as a natural progression. Currently, with the help of Breakthrough Listen program, more than two dozen observatories around the globe are actively engaged in the search for technosignatures. These efforts span from detecting nano-second duration laser pulses in the near-ultraviolet range to searching for narrowband drifting signals at the lowest end of the electromagnetic spectrum, around 30 MHz, visible from the ground, and everything in between. The range of technosignatures includes both direct, deliberate beacons targeted towards Earth and subtle, indirect evidence of activities by highly technologically advanced extraterrestrial life. In this talk, I will provide a brief overview of these ongoing efforts and discuss how these various strands are converging to impose some of the strictest constraints on the existence of extraterrestrial intelligence. I will address the challenges we are encountering and explore potential solutions emerging from advancements in Machine Learning and Artificial Intelligence, particularly in semi-supervised convolutional neural networks and autoencoders.

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