The mission of the IEEE Control Systems Society (CSS) Technical Committee on Intelligent Control (TCIC) is to foster a community of members who advance science and technology and provide forums for the theoretical and practical considerations of intelligent control techniques and their application to devices and systems. Historically, one of the major activities by the TCIC was to host the IEEE International Symposium on Intelligent Control (ISIC) as an outlet for the intelligent control community. The ISIC was initiated in 1985 around the dawn of what is now considered modern adaptive and intelligent control methods. The ISIC provided a unique opportunity for researchers and practitioners from different areas to discuss innovative control algorithms, also developed by emulating certain characteristics of intelligent biological systems, and recent advancements in computing technology, that may open avenues for significant technological advances.

The period from the mid-1980's through the early part of the new millennia was a period where rapid advancements were being made in numerous areas of intelligent control. During this period fundamental contributions to our understanding of Lyapunov-based adaptive control methods were developed for nonlinear systems such as gradient and least-squares adaptive update laws and modular and composite adaptive control. Neural networks and fuzzy logic were transformed from computational tools used for pattern matching based on a finite set of training data to powerful function approximation tools that used backpropagation with adaptation through online state feedback. Iterative (ILC) and repetitive learning control (RLC) methods were developed and matured, and various methods were developed for improved transient performance during adaptation and simultaneous parameter identification.

Although new and impactful developments in these mainstream areas continue to be investigated today, the foundational learning and adaptation pillars had been largely established around or shortly after the turn of the millennia. Due largely to the communities of people engaged with the TCIC, adaptive and learning control results became mainstream research areas with ubiquitous application. Mainstream conferences across several societies include various sessions on adaptive control, ILC/RLC, neural networks, fuzzy logic, and applications of such tools. Moreover, complementary advances in these areas have developed in societies such as the IEEE Computational Intelligence Society (CIS) which have also contributed to the maturation of neural networks, fuzzy logic, and genetic algorithms without a specific focus on dynamic systems, feedback, and control. The development of such complementary communities influenced both the TCIC and ISIC.

In 2007, ISIC combined with other conferences as part of the IEEE Muti-conference on Systems and Control (MSC). Incorporation of the ISIC within the MSC highlighted the fact that learning and adaptive control tools are now an integral cross-cutting component in the control systems community. For example, multiple back-to-back sessions focused on neural networks and their application would include papers/sessions from all three sub-conferences of the MSC. The successful adoption and immersion of intelligent control tools within mainstream literature, contributed to the decision to terminate the thirty year consecutive run of the ISIC to coincide with the final MSC in 2016. These events led to questions whether the TCIC had also run its course.

However, a resurgence in interest and activities in intelligent control have occurred over the last several years in what some members have coined Intelligent Control 2.0.

The significant resurgence of intelligent control activities is being driven by new theoretical challenges and their potential impacts on society. For example, deep learning methods (like their neural network/fuzzy logic predecessors) are still largely limited to pattern matching results where weighted connections are adjusted offline from a finite training set, generally through heuristic algorithms. New opportunities exist to understand how the multiple layers of weight updates can be updated online through state feedback dictated from a stability analysis that provide insights into convergence and stability. New insights from data-based learning (e.g., concurrent learning, experience replay) and state extrapolation (i.e., simulation of experience) are shedding new insights into less stringent (finite and on-line verifiable) excitation conditions for simultaneous control and parameter identification. Actor-critic-based reinforcement learning and Q-learning methods are emerging as methods to yield approximate optimal control in the presence of uncertainty. Foundational pillars have been established by the switched and hybrid systems control communities that open new opportunities for adaptive systems in the presence of intermittent feedback/communication/sensing. Formal methods have also been established as a means to provide some verifiable task completion, but new questions arise when considering the integration of formal and learning methods.

Answers to such new theoretical domains can have an impact in a wide range of new applications. Cyber effects can be injected in control systems as an apparent change in the dynamics/sensing/control influence, where emerging methods in system identification can potentially lead to new cyber defense or forensic tools. Government and industrial sectors are heavily investing in a variety of applications where (semi-)autonomous systems are tasked with operating in complex environments (e.g., automated driving, military applications) where sensing/feedback may be uncertain, denied/intermittent, or attacked/spoofed. Numerous questions for intelligent control arise in such applications, especially when incorporated with a human operator. Such applications have resulted in large scale investments in programs generally described as "autonomy", where the (surface level) impression is that progress will result from advancements in artificial intelligence (AI). The TCIC has a long history of building bridges between the rigorous mathematical approaches of the control systems community with the insights from computational intelligence/AI to yield intelligent control systems with predictable behaviors.

Intelligent control is well poised to answer many of the open challenges facing autonomous systems. As a result, the TCIC has expanded its roster to approximately one hundred members, where much of the growth is due to young professionals including assistant and associate professor level faculty members and numerous students. As a result, the TCIC has been active in promoting invited sessions, workshops, and special issues in journals in recent years (e.g., "Approximate/Adaptive Dynamic Programming for Control of Cyber-physical Systems," "Recent Advances and Future Directions on Adaptation and Control," "Autonomy and Machine Intelligence in Complex Systems," "Intelligent Control in Discrete-time for Autonomous Systems," "Deep Reinforcement Learning and Adaptive Dynamic Programming,"), along with disseminating recent advances through various invited lectures, IEEE Distinguished Lectures, and

Semi- and Plenary talks. Researchers interested in further information about intelligent control, or who would like to join the TCIC, are welcome to contact the TCIC chair. The TC website can be found at http://www.ieeecss.org/technical-activities/intelligent-control, which provides a listing of the TCIC members and their activities.

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