

# Preface

An *Interactive Intelligent System* (IIS) is an intelligent system that interacts with the users, or audience at large, which is designed to interact more with the user rather than with computer systems. The system utilizes the capabilities to perceive, interpret, learn, plan, decide, as well as use natural language and also reason, which has been already developed by field of artificial intelligence. Many of these techniques have been matured enough by now for specific functions such as “pattern recognition” or “Internet searching”. It is difficult to understand interactive intelligent systems without examining the intelligent capabilities of machines as well as human interface.

There are very less number of interactive intelligent systems used presently. One of them is “PlateMate”, a crowdsourcing nutrition analysis software, which allows users to take photos of their meals and receive estimates of food intake and composition from the photograph of foods. Accuracy of the prediction is depended on the information of the users for food logging via self-reporting, expert observation, and or algorithmic analysis. PlateMate crowdsources nutritional analysis from photographs using Amazon Mechanical Turk, automatically coordinating untrained workers to estimate a meal’s calories, fat, carbohydrates, and protein.

Let us consider another example, a system that learns how to assist users in performing particular types of tasks, e.g., “SIRI”. It is a computer program that works as an intelligent personal assistant and knowledge navigator of Apple IOS operating systems. It uses a natural language user interface to answer questions, make recommendations, and perform actions by delegating requests to a set of Web services. The software adapts to the user’s individual language usage and individual searches with continuing use, and returns results that are individualized. In this case, while the system is learning, the users will in general also be learning: about the task itself, about the system and its learning, about how to act in such a way that the system learns more effectively.

The research on interactive intelligent systems has so far focused either on the realization of the systems’ capabilities or on the cognitive processes and/or behavior of their users. The technical design which focuses only on the machine learning of the system or on that of the user interface has never understood the important

opportunities for making the interaction among different learning agents of various applications. Design of interactive intelligent systems are fundamentally hard, because they require intelligent technology that is well suited for people's abilities, limitations, and preferences.

Interactive intelligent systems also require different kinds of interactions which can give the user a predictable and reliable experience despite the fact that the underlying technology is inherently proactive, unpredictable, and occasionally wrong. There are cases of such types of failure in the past, such as the accident occurred in Williston, Florida, on May 7, 2016, when the driver, Joshua Brown, 40, of Ohio put his Model S of Tesla into autopilot mode, which was controlling the driving of car on the highway. The autopilot mode of Tesla failed to distinguish a large white 18-wheel truck and trailer crossing the highway, against a bright spring sky. Thus, design of successful intelligent interactive systems requires intimate knowledge and ability to innovate in two disparate areas: human-computer interaction and artificial intelligence or machine learning.

There are various general issues and challenges in the area of *interactive intelligent systems*. The first issue is that in which way artificial agent and human intelligence can work together for better performance. In other words, how does intelligent processing yield the greatest benefits for interactive systems in comparison to other forms of computation? How do they allocate various processing between the human and the intelligent system, so as to enhance the performance for a mixed-initiative intelligent system.

The second issue is the study of possible negative side effects of the interactive intelligent systems, if it is not designed properly without giving proper attention to the cognitive processes of users. For instance, to study the reasons and situation when the users want to predict, understand, and control an intelligent system and how the designers will be able to provide the requirements of the user to the interactive intelligent systems.

Third issue pertains to the protection of users' privacy and also to restrict the intelligent systems not to know more than the required about the users, when they are interacting with the system.

Last but not least, the issue related to the method and techniques used for various types of interactive intelligent system, ranging from the method of understanding about the users' requirements to the techniques used of evaluating the success of a given combination of intelligent algorithms and interaction design.

Research on interactive intelligent systems is found in a considerable number of diverse research areas, which include autonomous systems, expert systems, mobile systems, recommender systems, knowledge-based and semantic web-based systems, human-computer interaction, virtual communication environments, environment-aware agents, agents for smart environments, intelligent robotics, methods in cognitive systems, mind, brain, and behavior, machine learning, natural language interaction, web intelligence, signal processing, speech technologies, audio and music processing, face and gesture analysis, computer vision and pattern recognition, data-driven social analytics, algorithm design, middleware agents, embedded agents, mobile agents, adaptive and personalized systems, business intelligence,

e-learning, e-commerce and e-governance, and last but not least, decision support systems.

This volume contains 65 contributions from diverse areas of interactive intelligent systems, which has been categorized into five sections, namely: (i) Autonomous Systems; (ii) Internet & Cloud Computing; (iii) Pattern Recognition and Vision Systems; (iv) Mobile Computing and Intelligent Networking; (v) E-Enabled Systems.

- (i) **Autonomous Systems:** This is one of the established areas of interactive intelligence system that typically consists of learning, reasoning, and decision-making which supports the system's primary function. There are 19 contributions composed of various algorithms, models and learning techniques.
- (ii) **Internet and Cloud Computing:** It is one of the essential areas of IIS, which caters to enhance communication between the system and users, in a way which may not be closely related to the system's main function. This is commonly found in the areas of multimodal interaction, natural language processing, embodied conversational agents, computer graphics, and accessible computing. In this section there are 18 contributions related to microblogging, user satisfaction modeling to the design and construction of graphical cloud computing platform.
- (iii) **Pattern Recognition and Vision Systems:** This is one of the primary functions of any interactive intelligent systems. There are 18 contributions in this section covering of the developments in this area of deep learning to binocular stereovision to 3D vision.
- (iv) **Mobile Computing and Intelligent Networking:** This area is one of the leading areas of IIS, which covers ubiquitous or mobile computing and networking. This section contains five contributions.
- (v) **E-Enabled Systems:** This is one of the essential areas of interactive intelligent system, as many interactive systems are now designed through Internet. It covers information navigation and retrieval, designing intelligent learning environments, and model-based user interface design. There are five contributions in this section.

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