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AN INVESTIGATION OF THE FEELINGS PRESENT IN BOTH HUMAN AND MACHINE INTELLIGENCE

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Abstract:

Humans are distinct from animals in both intelligence and emotional complexity. Emotion is a component of a person's behaviour, and certain feelings may influence a person's performance; in certain cases, emotions can even prohibit a person from creating an intelligent result. Because of this, in order for a computer to successfully imitate human behaviour, it not only has to be able to think and reason, but it also needs to be able to display feelings. This article provides a comprehensive analysis of current studies that demonstrate the significance of emotional intelligence to overall human intelligence. This paper also presents the research that has been carried out into the incorporation of emotions to intelligent systems, how a computer can show affections, and how to create intelligent agents that show emotions to other agents that communicate with them in the same environment. This research was carried out by the authors of this paper.

Keywords: *Emotions; Expert systems; Humanbehaviour; Intelligence; Personality traits.*

Introduction:

Because a human being is not only clever but also emotional, it is important to take emotion into account whenever we attempt to mimic how a person would respond when presented with a new circumstance. Emotions play a significant part in the human decision-making process; hence, they should be included into the line of reasoning whenever we attempt to model human emotions, especially in situations in which these reactions may have an effect on the behaviour of other individuals (for example, within work teams, in training and education activities, etc.).

Recent advances in distributed Artificial Intelligence methods have led to the development of multi-agents systems (MAS), in which each agent is an intelligent system that is tasked with resolving a particular issue. To accomplish their shared objectives, all of these actors coordinate their efforts, share information and information with one another, cooperate together, and bargain with one another. Therefore, one way to look at the software agents is as a platform that is highly suitable for doing research on and

simulations of human organisations (Prietula, Carley, & Gasser, 1998) and human teams (Tambe, 1997; Tambe, Pynadath, Chauvat, Abhimanyu, &Kaminka, 2000). In recent years, MAS have been utilised to simulate human societies for the purpose of conducting research on macro-societies (collective behaviour), such as that conducted by Conte, Gilbert, and Sichman (1998) and Conte and Paolucci (2001), and microsocieties (individual human behaviour within a society), such as that conducted by Dal Forno and Merlone (2001, 2002). In this technique, social science, psychological, and cognitive science ideas are integrated into a multi-agent setting. It is a multi-disciplinary approach. The purpose of this article is to discuss current developments in the field of imbuing intelligent entities with feelings in order to make them seem more human.

The emotional human being is discussed in the first section of this article, which is the first of the two major sections that make up this piece. The purpose of this first section is to get an understanding of the significant part that feelings play in human behaviour, how feelings and intelligence originated at the same time as intellect did, and how feelings and intelligence are intertwined. The second part of this paper is devoted to a review of some research work that has been done in the inclusion of emotions into intelligent systems, such as computing applications that aim to emulate human beings (Rousseau & Hayes-Roth, 1997b), models to simulate emotions in decision-making (Canamero, 2003), and some other relevant works. Once the importance of the emotions in human being performance has been identified, the third part of this paper is dedicated to the review of some research work that has been done

Emotional Human Being:

It is necessary to examine the development of the brain in order to comprehend the connections that exist between one's feelings and level of intellect. In his book titled "Emotional Intelligence," published in 1995, Daniel Goleman provides an excellent overview of the morphological and physiological changes that have occurred during the history of the human brain and nervous system. Goleman gives a detailed account of the history of feelings and how the development of intellect has occurred concurrently with the expansion of feelings. According to Goleman, the thalamus, which is located over the upper portion of the spinal column, is the most basic section of the human brain. This is the portion of the brain that humans share with other vertebrate creatures. This primitive part of the brain is responsible for fundamental critical physiological activities including breathing, automatic motions like walking, and responses like blinking an eye (to move away from fire). This rudimentary brain is incapable of thinking or learning; rather, it might be

seen as a collection of regulators that are pre-programmed to keep the body functioning and alive. The age of reptiles is when this brain's more primitive beginnings may be traced back to.

The architecture of the neocortex of the mammalian brain underwent a fresh drastic change around one hundred million years ago. This change was thought to have been responsible for the appearance of intelligence (the region of the brain that understands, feels and co-ordinates movements). All human characteristics are linked to the neocortex of the Homo sapiens species. The development of an emotional life in Human Sapiens, such as love, was made possible by the neocortex. However, it was the neocortex that enabled Homo sapiens to build emotional bonds such as maternal love and the maternal compromise to bring up her offspring for an extended length of time. The limbic systems caused him to sense pleasure and sexual desire. Reptiles and other animals without a neocortex do not have the maternal instinct, hence their young are left to fend for themselves; in certain cases, the animals' own moms will even consume them. A large neocortex is associated with a greater number of neurone connections and, as a result, a wider range of responses to an external stimuli. When faced with a potentially dangerous circumstance, a rabbit would flee, but humans have the ability to choose from a broad range of responses because to their developed neocortex. Because the ramifications of the limbic system are so extensive in human beings, the emotional brain is responsible for a substantial part of the function of the human neurological system. The reasoning part of the brain evolved and developed from the area of the brain that processes emotions, and these two parts of the brain are really physically connected by hundreds of neural networks. According to Goleman, the emotional area of the brain has direct control over the functioning of the remainder of the brain. Similarly, LeDoux (1996) demonstrates in his book "The Emotional Brain" that the size of the mammalian brain has been expanding all throughout the course of evolution. However, this rise in brain size has not been consistent across all mammals. While the size of the cerebral cortex, which Goleman refers to as the neocortex, has significantly expanded over the course of the same length of time, the size of the limbic system has hardly altered over the course of hundreds of years. According to LeDoux, the greatest distinguishing characteristic of the development of the human brain is this growth of the cerebral cortex.

Rationality of Emotions:

In the past, for a significant number of years, the predominant theory said that feelings are an unfavourable byproduct of the human reasoning mind. As a result, the theory held that the less emotional a person was, the more intellectual and

sensible he would be. Damasio (1994), who stated that reason was strongly related with emotion, was one of the first researchers to go against this idea. He suggested that this connection existed. In his book titled "Descartes Error, Emotion, Reason and the Human Brain," Damasio presented the primary findings from his extensive research. Damasio revealed the findings of the studies he did in this book by investigating the behaviour of patients who had suffered brain injury. Phineas Gages was a guy who was involved in a significant accident in the year 1848, and as a direct result of this event, a portion of the prefrontal brain cortices in his brain were damaged. Damasio examined this case in his book, and it was an intriguing one to read about. He was not injured physically and was able to survive the accident; nonetheless, the event had a significant negative impact on his social life. After the accident, he was unable of socially behaving in front of other people; as a result, he was impolite and behaved like a kid, and as a direct consequence of these behaviours, he was unable to hold his work. Elliot, one of Dr. Damasio's patients, provides an additional compelling illustration of the significance of feelings. Elliot underwent a procedure to remove a brain tumour that was located right below the brow. The tumour was removed satisfactorily. However, after surgery, he experiences a shift in his demeanour. Although Elliot's IQ tests failed to reveal any issues with his mental capacity, the intelligent attorney continued to squander his time on trivial matters, making it seem as if he had lost the ability to prioritise different tasks. Damasio made the observation that despite the fact that Elliot's memory, attention, logical ability, and other cognitive faculties were unimpaired, he was unable to feel anything in relation to the things that were taking place to him. Due to the fact that Elliot was an objective observer of his life, he was able to discuss the most traumatic experiences of his life without experiencing any emotions. Damasio believed that Elliot's behaviour was a direct result of the brain surgery that he had performed, and he was correct in this assumption. During the procedure, certain connections between the emotional brain and the cerebral cortex were severed. Since of this, Elliot's thinking brain functioned normally, but he was unable to make choices because he was unable to assign values to the many options so that he could rank them and choose one of them. The failure of the reasoning process was due to the fact that there were no sensations present.

Emotions in the Working Environment:

Emotions are a natural part of being human; as a result, our emotions shape the way we behave in our daily lives, and as a result, our work is impacted by our emotions. Goleman (1999), in his book titled "Working with Emotional Intelligence," cited several psychological

studies conducted by large companies on their employees to demonstrate the significance of a person's emotional quotient. These studies were carried out with the purpose of enhancing the performance of the employees (EQ). It is possible to identify a person's cognitive skills for a certain work by looking at their IQ, but it is also necessary to look at a person's emotional intelligence in order to decide whether or not that person would be successful in that position. Several studies have shown that a person's IQ alone cannot explain their level of productivity in a quarter of the instances, and even more in-depth research has shown that this correlation is even weaker in ten percent of the situations (Hunter & Schmidt, 1984).

The purpose of these examinations was to determine each student's character. We looked at things like emotional stability, maturity, and sociability while conducting our research. In 1994, when these 80 former students were in their sixties, they underwent another round of testing. The success or failure of each individual's professional endeavour was evaluated by taking into consideration the references of specialists in their respective professions. The results of the experiment demonstrated that a person's emotional intelligence (EQ) is far more crucial to their professional performance than their intelligence rating (IQ).

Emotions and Artificial Intelligence:

One of the primary objectives in the field of artificial intelligence has always been the development of software systems that are capable of carrying out difficult tasks through the production of intelligent responses; that is, intelligent systems that behave and reason in the same manner as humans within a particular domain. After going through the relevance of emotions in human logical thought in the previous parts, we need include an emotional component into an intelligent system in order to give it a more human quality. This will help the system behave more like a person. There are currently hundreds of intelligent systems used in a very broad range of sectors (robotics, diagnostics, vision, learning, business, etc.), and some of them are extremely spectacular. For instance, have a look at Deep Blue, which was able to win a chess competition against Kasparov. It was only very lately that intelligent systems that are able to exhibit emotions began to appear.

Nevertheless, do we truly need emotionally intelligent software systems that include a component of empathy into their responses? We are of the opinion that it is not always necessary; rather, it The sort of issue that the system is attempting to solve J. Martinez-Miranda and A. Aldea / Computers in Human Behavior 21 (2005) 323–341 329 is a factor that must be taken into consideration. The outcome may be

catastrophic if emotions like as worry, fear, and tension were included into intelligent systems that deal with difficult and crucial jobs (for example, air traffic control or the identification of faults in an electrical power plant). On the other hand, if these emotions are included in systems that aim to simulate the human behaviour in certain circumstances (for example, human–computer interfaces, educational software, entertainment software, and so on), the system will be more user-friendly and its responses will be more similar to how humans behave in those circumstances. This section presents the results of research carried out in this field. Following the presentation of systems that attempt to imitate human affection, emotion, and psychological aspects, we will then survey work that has been done in the inclusion of affections and emotions into agents that live in a society. Ultimately, our goal is to create artificial beings with the same level of consciousness as humans. Additionally taken into account are social factors.

Conclusion:

The significance of emotions and the crucial part they play in the logical thought processes of humans has been brought to light in this article. In the modern period, there has been some research conducted in this field that demonstrates how sentiments and thoughts may have an impact on human decision-making and general human behaviour, both in the context of day-to-day life and in the context of the workplace. This article also demonstrates what psychologist Daniel Goleman refers to as the "fundamental emotions." In a manner analogous to how the primary colours serve as the foundation for the whole range of conceivable colours, the fundamental emotions serve as the building blocks upon which all of the other types of emotions are constructed. Work was done on the integration of an emotional component in an intelligent system, with the consideration that emotions play an important role in the logical thought processes of humans. This work was studied. These days, there are hundreds of different kinds of intelligent systems used in a broad range of industries (robotics, diagnosis, vision, learning, business, etc.). It was only very lately that intelligent systems that are able to exhibit emotions began to appear. The research on the artificial creation of emotions has been discussed; nonetheless, there is a significant amount of work that has to be done in order to produce an artificial system that replicates the precise interaction between human emotions and human behaviour. In this study, we evaluated the work that has been done on affective computing, as well as some innovative approaches to the building of emotional agents. Interaction between humans and computers, games and other forms of entertainment, and the modelling of human decision-making are among the

primary applications of research conducted in this field. Finally, we are able to reach the conclusion that the emotional artificial models that were examined are, for the most part, unique to the field for which the system was built. According to what was stated in Picard (1997), prior to developing an application in which emotions and affections play an important role, some questions need to be answered. Some of these questions include: Do we really need an application where emotions are relevant? Which emotions are relevant, and how can we recognise, express, and model them? What is the strategy required to respond to those emotions? If we are able to determine the answers to these questions, then it is possible that we will have to design a system that takes into consideration a person's feelings, personality characteristics, and moods.

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