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Ayurveda for agents: an attempt to bring the sciences of natural and artificial intelligence closer together

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Abstract

This paper advocates a new science of intelligence, one that is holistic, multi-disciplinary, oriented to crucial values as health and well-being and able to contribute to the solution of real-world problems. As a starting point we study the interplay between two research disciplines that until now have been hardly related to each other: Ayurveda and multi-agent systems. We consider some possible results of the cross fertilisation like for instance the application of ayurvedic knowledge to improve the skills of practical reasoning agents.

1 Vision

Artificial, human and natural intelligence have the potential to solve the many problems the world is facing today and will be facing in the future. For this potentiality to become full reality, it is my vision for the next 25 years that we find new ways to enable artefacts, humans and nature to cooperate in harmony with each other.

For the scientific community, this requires the development of a new science of intelligence. A science that

1. is holistic in nature by taking the whole into account rather than only specific parts
2. is multi- rather than mono-disciplinary by unifying and integrating artificial and natural intelligence including all aspects of human intelligence (e.g. intellectual, emotional and physical)
3. is not value-neutral but oriented to crucial values such as health and well-being
4. is theoretical and practical with tools and techniques to contribute to solving real-world problems

2 A new science of intelligence

From the natural intelligence perspective, a promising starting point is the science of ayurveda (Svoboda, 1980). This is a holistic, multidisciplinary and practical science of life oriented to increasing health and well-being. It has been developed in India over a period of 5000 years and was until recently almost unknown to the Western world.

From the artificial intelligence perspective, a promising starting point is the science of multi-agent and human-agent systems (Wooldridge, 2009). This research studies the interaction and collaboration between artificial and human intelligence. It is a practical science with many potential applications, including the domain of health and well-being.

The question, then, is how to build bridges between these sciences? Is there a common foundation? In this paper, we will make an initial humble attempt.

3 Foundations of intelligence

What is intelligence? According to ayurveda, intelligence is *that which brings things into balance*.

Ayurveda takes as its starting point the three principles that are most fundamental to life, which are named as vata, pitta and kapha.

- Vata is the force that moves. It brings things into motion like wind does.
- Pitta is the force that transforms. It changes things like fire does.
- Kapha is the force that stabilizes. It holds things together like mud does.

These forces cannot be seen, only their effects. They act on everything, are ever present and always changing. Nature, humans and artefacts have to adapt to these forces to stay in balance in order to survive and be healthy. Balance is brought about by intelligence.

An example: consider the preparation of zucchini soup. During the preparation, the soup is continously subject to the forces of vata, pitta and kapha. The cook, either human or an artefact, should act intelligently in order to keep things in balance and prepare a tasty soup.

For if vata is too strong, the soup will not stay in the pan but will be all over the kitchen. If vata is too weak, the soup will have all water on top and all zucchini below. In order to achieve balance, the cook should stir in the first case more slowly, and in the second case faster.

If pitta is too strong, the soup will be burnt to black. If pitta is too weak, it will be raw. For balance, the cook should lower the temperature in the first case and raise it in the second.

If kapha is too strong, the soup will become zucchini cake. If kapha is too weak, it will be zucchini water. An intelligent cook determines the right amount of ingredients: in the first case, add more water; in the second case, add more zucchini.

So, from an ayurvedic point of view, the preparation of zucchini soup has three parameters and intelligence has to find appropriate values for them, continously monitor the process, and if needed, make the necessary adjustments in order to achieve and maintain balance.

4 Ayurvedic intelligent agents

In multi-agent and human-agent systems, we find the same forces at work. We consider the case of practical reasoning agents (Wooldridge, 2009: Ch. 4).

An example: Juan is looking for a partner. He fancies two girls. In order to make a choice, he divides his time between both of them. Then he meets a third girl he also likes. How should he divide his time now?

An ayurvedic perspective on practical reasoning:

- Vata, the force that moves, brings new observations and beliefs.
- Pitta, the force that transforms, computes and executes plans and actions.
- Kapha, the force that stabilizes, filters options and makes decisions.

In order to balance vata, Juan has to find the appropriate level of openness to new possible partners. To balance pitta, he has to increase or decrease the time and energy he spends on dating each of the girls he likes. To balance kapha, he needs to adjust his preferences and intentions.

The same for intelligent agents: an ayurvedic architecture of practical reasoning agents should include an intelligent component that balances the reasoning process by maintaining appropriate values for the level of observing, planning and deliberation.

If the vata force is too strong, the practical reasoning agent will suffer from an information overload. If vata is too weak, its beliefs about the world will not be up to date. If pitta is too strong, the computed plans will become way too detailed, making clear comparisons and decision-making impossible. If pitta is too weak, the agent will have no idea about what to do. Finally, a surplus of kapha will make the agent critique everything or become blindly committed while a shortage of kapha will make the agent accept everything or revisit and change its preferences and intentions all the time.

5 Integration of intelligences

Can we develop intelligent agents that apply the knowledge of ayurveda to assist humans in their daily activities? Depending on conditions such as the time of year, time of day and type of person, they suggest which food to eat, music to play, physical exercises to do and so on in order to bring balance, harmony and health.

A final example: the application of ayurvedic knowledge to task scheduling and work-flow management enabling researchers to work on their core activity every day from 10:00 to 14:00 hours, the hours in which according to their biorhythms the pitta force is predominant and demanding intellectual work can be done. In addition, the intelligent agent chooses appropriate harmonizing background music and gives suggestions for lunch food and physical activity, allowing the researchers to perform at their peak and be healthy.

So is my wish for the next 25 years.

References

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