The Internet and Memetics

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Abstract

The functioning and usage of the Internet are examined in terms of memes and memetics. It is shown that memetic systems can be distinguished at various levels of Internet operation, and that these systems become increasingly simple as they move further from the user level. In this way, memetics provides a unified framework for examining the overall behaviour of the Internet and its users.

1. Introduction

Memetics provides a powerful new way to think about things such as, for example, creativity (Gabora, 1997). The aim of this paper is to use memetics as the basis for obtaining a better understanding of the Internet both in its operation and in the way it is used. A primary purpose of a network such as the Internet is to support communication. In this role, and especially as a carrier of e-mail messages, it serves to disperse memes, spreading them across the network rapidly and accurately. Recently, the principal use of the Internet has moved from e-mail to the World Wide Web. While e-mail is still widely used, the move to the World Wide Web has caused a shift in emphasis from carrying messages to the storage of interconnected documents (Heylighen, 1996). The results of this change are, among others, to ensure the longevity of memes and to link together related memes. The consequence of the availability of both e-mail and the World Wide Web is that the Internet is, for its users, an ideal medium for the spread, replication and storage of memes.

The Internet, like all computer networks, is designed and constructed in a layered fashion, with layers of software added to the basic hardware. The layering facilitates the synthesis of a complex and complicated system but it has always been difficult to describe the operation of the layers in a consistent way so that the activities in one layer could be related directly to those in another. More importantly, the basic rationale for layering is to facilitate meta-system construction, but it has never been entirely clear that this has been achieved in any coherent way. In any event, if a major purpose of the network is to communicate and store memes, one would expect to find memetic ideas present in its design and implementation, even though its designers may not have called on them explicitly.

In fact, as this paper shows in a limited way, the functioning of the various layers can be interpreted memetically. Such an interpretation is of value not only in linking the purpose and operation of the network but also in showing the extent to which the memetic processes the network is intended to support map onto the memetic processes carried out by the underlying layers. A clear and direct mapping will indicate a well designed network, whereas the absence of any direct mapping will not only indicate shortcomings and inefficiencies in the way that the network operates but also help to identify their

causes. This paper, then, is an attempt to expose the memetic systems and processes occurring at different levels of Internet operation. It also shows how the processes in adjacent layers relate to one another which, in turn, exposes the meta-system transitions.

2. Memetics at the operational level

We begin by considering the World Wide Web. Here, a system of connections, or links, is maintained in a data space so that the space can be navigated. But this data space, as with everything else on the Internet, is supported by the underlying network, and the connections of the network do not correspond directly to the connections of the data space. To ensure that the users of the virtual world provided by the data space are unaware of the underlying network, any connection that is to be followed in the data space must automatically be mapped onto a route in the network. This means that routing is an aspect of network operation that is vital to the success of the World Wide Web, just as it is for other Internet services.

Routing is, in essence, achieved with routing tables. Each node of the network has a routing table that determines from the destination of a message how that message should be forwarded from that node. A message is delivered to its destination after being forwarded in this way by a series of nodes. Internet routing, however, not only provides routes, but also provides them in a way that adapts to the state of the network (Parker, 1994). The aim of this adaptive routing is to provide all the users of the network with the best possible common level of service regardless of the pattern of traffic carried by the network. The adaptation is controlled by network management centres that collect status information from network nodes, use this information to construct a representation of the state of the network and then send out messages to change the routing tables as necessary.

This way of achieving adaptive routing can be interpreted as a memetic system. The messages carrying the changes to the routing tables can be seen as memes, since they are, in essence, information patterns. The patterns can be interpreted by nodes in such a way as to bring about the required changes to the routing tables and so to the behaviour of the network. They spread across the network by being transmitted, and can be replicated as necessary, for example, if the same changes are needed at different nodes. A network management centre causes the memes to be modified in accordance with its representation of the state of the network. The aim of the modification is to cause the overall network to remain fit for its purpose despite its changing environment. The system can be redescribed in terms of a society. Nodes can be seen as the members of a 'network society'. Their capability is rather limited in that, as far as routing is concerned, they merely forward the messages that come to them. All the same, they co-operate with each other in an altruistic way to support routes across the network. In fact, a node will have no sense of the overall route of a message, merely passing it on to the next hop of its journey. Further, it will have no knowledge of messages in other parts of the network, and yet the other messages will be delivered to the same performance specification as the ones it handles. The purpose of the memes is to ensure that the routing tables are maintained in such a way that the 'network society' meets its goal no matter how the state of the network changes. The claim that this is a memetic system, must be accompanied by the rider that it is rather a limited one. The memes do not mutate or recombine, but are modified by a central controller in response to its perception of what is necessary. In the terminology used by Wilkins (1998), the memes are instructed.

3. Memetics at the service level

Agent technology is becoming ever more widely used on the Internet as a means of supporting services, notably search engines and 'push' services.

An agent can be defined as a message that can be sent into the network to perform some task and to return with the result. So, to give an example, Jango (to be found at http://www.jango.com/) is the name of an agent that can search on-line Internet stores for product availability and price information. Clearly, this agent must be able to locate sites of on-line stores, determine the products available at each site, and find their prices. In other words, it must have access to a program that tells it how to perform the task required of it. As an information pattern that can be replicated and spread across a network, an agent is a meme. Since it carries a program for performing a task, it provides a way of disseminating this program and, when there are different agents for the same task, they provide a basis for the selection of the best way of performing that task. Now consider the situation when several agents arrive at a node to carry out their various tasks. They could simply queue to carry out their tasks in succession so that eventually all the tasks would be done. It would, however, make better use of the scarce resource at their disposal if they co-operated with each other by, for example, sharing common tasks and ordering the tasks to facilitate the execution of the overall set of tasks. In this case, the set of agents can be seen as a meme complex and, when they co-operate, they will, if not exactly recombine, at least re-program one another. In terms of a society, the agents can be seen as the members, each having a single, possibly complex, capability, namely to perform the task required of them. The overall aim of the society is to perform the set of tasks contributed by its members.

The question that arises is: How should the agents co-operate? Memes for co-operation are needed! Co-operation can take place in many ways, including those that are benevolent or selfish, disruptive or co-operative, aggressive or submissive. Agents, as representatives of their dispatchers, should presumably co-operate in the same way as would their dispatchers. This makes it hard to envisage a uniform style of co-operation for agents, and an agent that is disposed to co-operate in a particular style must be able to react appropriately to an agent that attempts co-operation in a different fashion. Further, just as norms and laws govern co-operation in the real world, so, in the field of multi-agent systems, it is appreciated that social norms and laws are required for agent co-operation (Conte and Falcone, 1997). To summarise this, we can say that when services are implemented using agent technology, one agent can be seen as a meme, and a group of agents gathered in the same place as a meme complex. In this context, a meme is, again in the terminology used by Wilkins (1998), an interactor. The individual memes of a meme complex interact with each other, modifying themselves as required to achieve the overall aim of the group, which is to achieve their set of tasks in a way that is to the general benefit.

4. Memetics at the user level

The Internet, as mentioned earlier, supports the rapid and accurate world-wide transmission of the memes of its users. This is a supplement to, and not a replacement for, the traditional means of spreading memes. It is also, clearly, a means which makes use of a different medium. To the extent that the characteristics of the medium differ from those of the traditional medium, so the result of dispersing memes is, in turn, different.

It has been argued that the Internet's capability to spread memes across the world both accurately and instantaneously supports a tendency towards homogeneity in world culture (Heylighen, 1996). Memes can appear at much the same time in different parts of the world regardless of geographical and cultural boundaries to exert their effects. It has also been argued that the speed of transmission, and the resulting rapid cascade of memes across the Internet, makes it more difficult to distinguish between the more and less valuable memes (Taylor, 1996). There is a premium on short, catchy memes as opposed to more

complex memes such as lengthy stories. Infectiousness assumes an importance far greater than that of attributes that may well have greater long-term value such as utility and authority.

With these insights, it is possible to sketch the essential differences between virtual and real-world communities. Virtual communities are not structured in the same way as real-world communities. Constraints of geography and status do not come into play: what matters is a common interest. But a diverse collection of people, perhaps drawn from all parts of the world and united by only a common interest, needs to construct its own culture. The network facilitates this with communication and the spread of memes. But, by comparison with the real world, memes are spread rapidly and accurately. This causes virtual communities to develop cultures that are narrow, often extreme and, in consequence, rather precarious (Marshall, 1998). Their precarious nature is re-inforced by the favouring of infectious memes over memes that might bring greater benefits in the long term, in that their adoption can result in a gap between the conceptions of the virtual world and those of the real world that is so great as to become unsustainable (Umpleby, 1996).

The increased use of agents brings another aspect to the situation in that they can be used to control the memes to which their dispatchers are exposed. Agents are a key element in the so-called 'push' technology with which users can specify the sort of information they want to receive, after which the network will 'push' that, and only that, information to them. As with any form of 'narrowcasting' this leads to the reinforcement of existing beliefs and the avoidance of the uncertainty associated with opposing, conflicting or even just different ideas (Salem and Gratz, 1997). This kind of selective attention produces individuals who are unaware of, or even afraid of, other views and of groups holding these views. In turn, this leads to social fragmentation and the production of incompatible social segments.

As a final point, the gulf between those with access to the network and those who do not is amplified by the fact that these groups exchange different memes in different ways. As Internet culture develops and moves farther from real-world culture, it becomes harder, not necessarily to gain access, but to join in effectively once access is gained. Besides this, there is the very real possibility of those with access to the network becoming cut off from their real-world history. They may have no interest in it: those who do may not share the technical and cultural interests of those with access. The consequence can be a separation of those who spend most of their time on the network from their own history, which can only serve to widen further the gulf between those with access and those without.

5. Conclusions

This paper has shown that activities taking place at various levels in the organisation of the Internet can be interpreted in terms of memes and memetics. This provides a unified framework for examining the overall functioning and behaviour of the Internet. Given that the Internet is widely used for the communication of memes, this unified analysis has the real benefit of providing an account of the operation of the network that is coherent with the usage of the network. To the extent that the Internet is an archetypal network, these conclusions apply equally to any computer network.

The levels have been examined, starting from the bottom (hardware) level and working towards the top (user) level, to reveal their embedded memetic systems. The findings of the previous sections show that the simple memetic system supported at the operational level, in which the memes are instructed, is less complex than the system supported at the service level, where the memes are interactors. Again, the system at the service level is less complex than that at the user level which, with certain reservations, is a full-blown memetic system. Thus, the memetic system supported at a particular level is always less

complex, and exerts greater control, than that supported by the level above. This finding is in tune with the rationale for adopting a layered approach to the design of a complex system, which is that the addition of a layer adds further capabilities to the overall system by building on those that already exist. In this way, the network supports the capability that users require by progressively building up this capability in a layered way with clear meta-system transitions. The memetic approach adopted here has made it possible to reveal this consistency of design and operation in a coherent way.

6. References

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