Digital ShuTong: Reviving the Ancient Form of Learning Support Agents

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Abstract
Inspired by the practice of studying escort in ancient time, this paper describes an approach to the development of learning support agency. The agency is in fact a team of small agents which embody with clearly defined and domain specific knowledge or skill. The agents are not designed as full blown instructors or tutors but only escorting the students during their study journeys and serve them as their assistants. The students still bear the major responsibility of their own learning but the agency is always at their disposal and can offer help if necessary. Among others, agility is the strongest selling point of this architecture. Whenever a new agent is developed, it simply either joins the team as new member or replaces an old agent that is due to ‘retire’ without bothering the students and instructors.

Design Philosophy
The idea described in this short paper is inspired by the practice of studying escort, namely ShuTong, in ancient China. Every year hundreds of students from around the country travelled a very long distance to the capital for a public examination run by the emperor’s government. Excelling in the examination would bring the top students a promising career and a very prestigious honour to their families or even the entire clan. Throughout their journeys, most students were closely escorted by a male teenage escort – ShuTong who provided all sorts of personal care to their masters. The scope of work covered by the ShuTong was very wide ranging - carrying the luggage, booking motel room, washing the master’s clothing, preparing the meals, ensuring the stationery are ready to use and even fighting off road side thieves, to name a few. The students were still responsible for their own study and the ShuTong’s work was in no way related to the student’s academic pursuit. Nonetheless, the ShuTong’s services to the young masters was very instrumental in bringing success to the students. The underlying rationale of this practice was to relieve the master from doing the daily routines and could concentrate on studying. This practice of learning escort was very successful and practiced in ancient China for many centuries.

In today’s information era, it seems impractical, if not impossible, to replicate the learning escort system because of the heavy cost involved in hiring a person. In the meantime, most students would not like being closely followed by a person. However, digitalising the practice of learning escort in the form of smart agents is an interesting and promising approach, in the author’s view, to the development of learning support tools. As [1] noted, many agent-based learner supporting systems are natural evolution of intelligent tutoring systems, this approach inevitable inherits the legacy of classical tutoring systems architecture which normally includes closely coupled expert model, tutoring model and student model. One major drawback of this approach is the notorious problem of maintaining realistic student models. In the Learning Assistant Agency (or ShuTong) architecture, student modelling was eliminated from the design at the outset. Instead, we concentrate on building smart agents that are small, knowledge-based, domain-specific, learnable and portable. It is our belief that the students have to bear the ultimate responsibility of learning the subject domain. The agents only serve them in the only aspects they were designed such as visualising algorithms or performing complex calculations. As the agents are escorting the students throughout the course, these agents can be called at anywhere and at any time to perform tasks. Ancient escorts reduced the physical loading rested on the students. Digital escorts relieve cognitive loads. One distinguishing feature of the digital escorts is their knowledge-driven task-tackling capability. By watching the escort performing the task, the student could find learning the domain much easier because the escort’s action trace would facilitate the assimilation of difficult concepts.

Architectural Consideration
Figure 1 shows the schematic architecture of the Learning Assistant Agency system. As mentioned, we expect the agency and the entire course environment have high agility so that students on different platforms can all access the materials and agents with ease. That should
explains why we emphasize a loosely coupled small component design.

With this design, different agents can be called upon by the students at any time as long as the student finds their skill/knowledge useful in understanding the concepts described in the course pages. When developing the course pages, on the other hand, the developer can choose to tag the pages with appropriate agents. The agency is deployable in a complex multi-user environments which might involve different hardware and software platforms, from handheld devices to workstations, the agent(s) are loaded to the clients on demand. Also worth mentioning is the agent’s learnability. By observing the clients logging history, individual agents could learn about the learning style of its master and adapt itself to suit his needs.

References
