Building an Online Educational Community for Algorithm Visualization

Clifford A. Shaffer  
Dept. of Computer Science  
Virginia Tech  
shaffer@cs.vt.edu

Thomas L. Naps  
Dept. of Computer Science  
U. of Wisconsin, Oshkosh  
naps@uwosh.edu

Susan H. Rodger  
Dept. of Computer Science  
Duke University  
rodger@cs.duke.edu

Stephen H. Edwards  
Dept. of Computer Science  
Virginia Tech  
edwards@cs.vt.edu

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1. INTRODUCTION

Algorithm visualizations (AVs) are widely viewed as having the potential for improving computer science education, yet the rate of AV use and overall impact has progressed little from the mid 1990s. Surveys of CS faculty [1] show that the impediments to successful use of AVs are related to difficulties in first finding good materials, and then difficulties in effectively deploying them in classes. Fortunately, much progress has been made in recent years. There are many high-quality AVs available (though there are enough poor quality AVs that sorting out the good ones can be time consuming) [2]. There is a growing body of research on how to effectively use AVs in the classroom (though getting up to speed on this information is again time consuming). These impediments could be overcome with adequate dissemination of information about which AVs are of good quality and how they can best be used. From the developers’ side, more information about what makes for an effective AV, as well as information about which topics are of greatest need, could lead to more effective AVs being produced.

Thus, we find that information and dissemination of best practice plays a key role in the successful deployment of AVs into the classroom. Given that much of the needed information has to do with rating of educational material and experiences with use of this material in the field, the most effective way to improve instruction is through an active community of AV users and developers interacting to provide the necessary information.

The purpose of this session is to facilitate ongoing efforts to develop an online educational community to promote the use of AVs in the classroom. A major part of such a community is likely to come through a central online community presence. The NSF-supported AlgoViz project (http://algoviz.org) seeks to provide this presence. Our session will discuss ways that audience members can participate in the online community, and ways to generate ideas for growing the community.

2. OVERALL OBJECTIVE

The objective of the session is to introduce SIGCSE attendees to ideas for building an online educational community whose goal is to increase the use of AVs in the classroom. Techniques for community building, and lowering the barriers to participation, will be an important focus for the discussion. Our analogy is to Amazon.com. While the backbone of Amazon is their catalog and purchasing infrastructure, Amazon is much more than this from a community standpoint. An important component to Amazon’s success is the community-generated ratings and reviews. In the context of digital libraries, a successful online educational community is much more than just a collection of information. It must also include community-added content that raises the value of the information beyond that of a traditional digital library. This includes discussion of best practice, and user evaluation for the items in the library.

Due to the size of its user base, Amazon is successful even with only a small fraction of one percent of its customers provide ratings or reviews. An online educational community for a topic such as AV use has an additional burden, since it must get a much higher percentage of the potential “market” to actively engage, probably between 1 and 10% of the membership, depending on how that is defined. Fortunately, members of that “market” also have a greater incentive to become active participants.

We will describe our own community-building efforts, and ways in which the audience can participate in the AV community at the AlgoViz Portal (referred to as AlgoViz.org). A number of existing mechanisms are available at AlgoViz.org. These include forums, field reports, ratings, catalog submissions, and contributing to the OpenAlgoViz AV software repository. Field reports in particular are the equivalent of
Amazon “reviews” in that they are descriptions of how individual instructors used specific AVs in their courses.

Since a relatively high percentage of the community must actively engage to reach the needed critical mass, our research work focuses on ways to lower the barriers to participation. This includes technology to support easy/automatic login from allied sites (to avoid additional registration or login overhead), a robust notification system to inform users when new information of interest has been provided at the site, and mechanisms to solicit ratings information. Notification systems let users know when something of interest has occurred, motivating them to return to the site and participate. Active solicitation of ratings also encourages users to become active participants.

An important aspect of this special session is letting the community interact in a face-to-face setting with an open discussion. This helps people better know each other. The discussion session also gives the audience a good opportunity to provide the AlgoViz project developers with valuable feedback about the site.

We will conclude by showcasing a small collection of high-quality AVs, the winners of the AlgoViz Awards. The AlgoViz Awards voting began at the end of August, 2009, and will conclude in January 2010. AlgoViz Award winners are selected by the community since all those who register at the AlgoViz Portal are eligible to rate AVs for the competition.

3. OUTLINE OF THE SESSION

The presenters are all members of the AlgoViz Project Steering Committee (made up of roughly twenty active members of the AV research community). They are all well known within the community. Here follows an outline of the major topics for the session.

1. Building an AV community: overview. 10 minutes
   - Goals of the AV community
   - How an online AV community can impact education
   - How to lower barriers to participation: changing the digital library model

2. Overview of algoviz.org and OpenAlgoViz. 15 minutes
   - Collections and resources
   - The role of community-added material, including ratings, reviews, discussions
   - Field reports

3. Open discussion. 30 minutes

4. Announcement of AlgoViz Award winners. 20 minutes, including a brief showcasing of winning AVs.

A key part of the session is the open discussion phase. Attendees will have the opportunity to comment on what impediments they have faced in choosing whether to use AVs in their courses or not, and whether the AlgoViz project does or can address those impediments. This special session is intended not only to “get the word out” about AlgoViz.org. It is also intended to get the community to interact in a physical (as opposed to online) forum, and to provide clear feedback from the community on whether the project is on course.

4. EXPECTATIONS

Attendees should come out of the session knowing about the goals of the AV community and how their participation can help to achieve those goals. They should understand some methods for lowering the barriers to participation, and will have provided feedback to us on how we can increase participation rates. Attendees will get an overview of the AlgoViz project, what the major assets of AlgoViz.org are and how they are of use, and some idea of what makes for a high-quality AV. Attendees will hopefully come out of the session with an interest in contributing, whether through ratings of AVs, sharing their classroom experiences through field reports, or contributing AV source code to the OpenAlgoViz repository. Attendees will also have been exposed to a collection of award-winning AVs, selected by the community.

5. SUITABILITY FOR SPECIAL SESSION

We believe that an online educational community can have a significant impact on CS Education. The key difficulty is jump starting an active community, and that involves outreach and interaction with potential contributors at venues like SIGCSE. A paper presentation does not seem appropriate for this activity, since describing the project and the opportunities for community involvement is not a likely topic for a research paper, especially at this early stage of the project. Even if we were in a position to present a compelling research paper, the standard paper presentation length and format would not be sufficient to accomplish our goals at this stage. In particular, we need a sufficient block of time to inform attendees about the project and what we have to provide, and far more time for their feedback than a paper session provides. Nor is this appropriate for a panel discussion (though we may have several presenters from our Steering Committee involved in the session) since it is not the sort of thing where several people with differing viewpoints stake out a position.

Presentation of the AlgoViz Awards should be an interesting activity in its own right. CS Faculty are likely to be curious about what are considered to be high-quality AVs, and people are generally interested in the outcome of any competition. We will provide a brief showcase of the winning AVs, which should be visually interesting to the audience.

6. REFERENCES
