Title: The Bloomsburg Weather Viewer: A resource for integrating webcam and local weather station data into the introductory meteorology classroom

Abstract: This paper presents an overview of the Bloomsburg Weather Viewer, a Java-based program that is designed to make more effective use of weather webcam imagery, local weather station data and online weather resources in introductory meteorology coursework. The development of the weather viewer began in the spring of 2007, soon after the geography and geosciences department at Bloomsburg University installed a new webcam and digital weather station to replace the department's dated observation equipment. It is common for institutions that teach introductory weather courses to install similar instrumentation to monitor local weather patterns. The technologies provide opportunities to actively involve students in the collection and dissemination of data. They also provide instructors with the ability to archive local data, reference historical events, and promote discussions of local weather patterns in the classroom. One factor that limits the educational value of these technologies, however, is that they are typically designed for commercial applications or hobbyists, and not for classroom use. The Bloomsburg Weather Viewer was developed to facilitate the use of these resources for educators and introductory-level students.

The weather viewer consists of a data collection and storage system, and a user interface. The data collection system acquires imagery from weather webcams and internet weather sites (e.g. radar) and stores the images as time-lapse videos. The system also collects and stores local weather station data. The collection and storage system communicate with an application client that can be loaded onto any personal computer (Figure 1). The data resources are displayed in a customized interface that consists of three main windows that display webcam imagery, online map/diagram imagery, and plots of weather station variables. The program allows the user to search the storage system for past weather and view the data streams in a synchronous manner. In addition, the program consists of additional educational resources (e.g. daily weather diary) to support the analysis of the data streams.

The weather viewer was designed with four objectives in mind. The first was to improve student access to the raw data produced by an institution's webcam and digital weather station. The objective was to develop an interface that freed the instructor from having to serve as a mediator between the technology and the student. The second objective was to develop a system that would allow students to actively search for historic data and study changes in local weather conditions over time. This is noteworthy because most institutions simply post webcam imagery and weather station data online in real-time. The third objective was to design an interface that would present webcam, weather station and common online map resources (e.g. radar and satellite) simultaneously in a single viewer. The goal was to develop an interface that would add value to each resource by allowing students to actively explore how changes in local weather conditions relate to large scale weather patterns. The final goal was to develop a core program that could be expanded over time to include instructional modules, or locally derived datasets from other institutions. The long-term goal is to create a network of institutions that collect and disseminate locally derived webcam and weather station data for educational purposes.

Following the projects inception in 2007, students and faculty in the computer science and geography and geosciences departments at Bloomsburg University have been working to develop a prototype of the weather viewer. The prototype has been developed as a class project by students in a senior-level programming course (56.480: Object-Oriented Software Engineering) offered every spring in the computer science department at Bloomsburg University.

A preliminary version of the prototype was completed in the spring of 2009. Over the last two years the prototype has been tested and refined based on the feedback provided by students the introductory meteorology courses offered at Bloomsburg University. This paper introduces the prototype, reviews its current and potential applications in the introductory meteorology classroom, and discusses long-term objectives for developing the technology and disseminating it to the meteorological community.

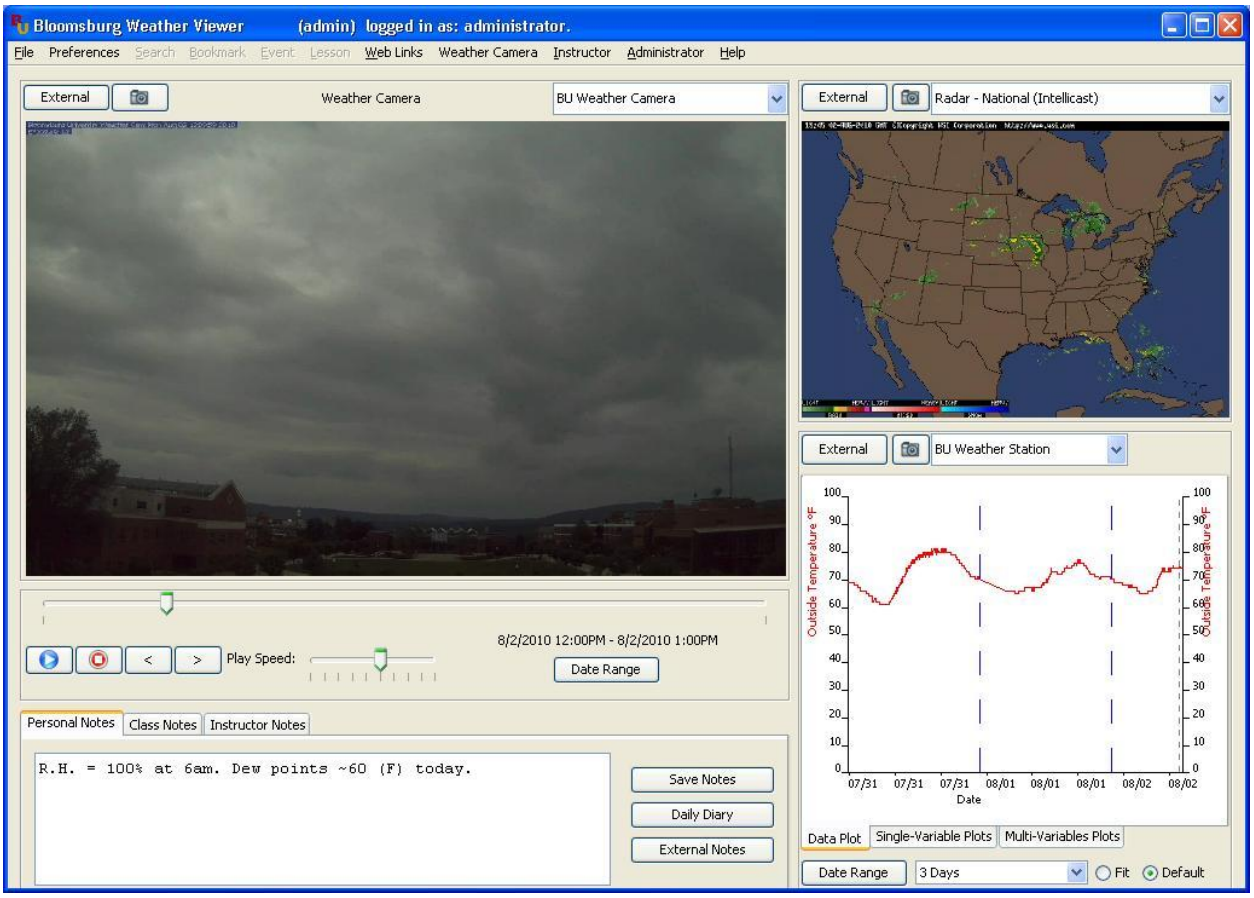

Figure 1 – Bloomsburg Weather Viewer main application client.