Examining The Effect of Weather on Student Class Entrance and Exit Patterns

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ABSTRACT

Students enter class at disparate times – some come early, others come right at the wire, and others trickle in late. Using a publicly available web camera, this project sought to determine whether the weather had any effect on student entrance patterns in a specific computer cluster. Number of people in the lab was measured rapidly over the course of the time periods bordering the start and end of class. These patterns were correlated with the weather given by a weather forecast. Inferences were drawn about the effect of weather on attendance patterns. It appears that class attendance is inversely related to weather quality while ratio of early to total attendance is directly related to weather quality.

1. INTRODUCTION

Class starts at a specific hour, but clearly not all of the students come exactly at the scheduled time. Some students tend to come in early while others come in after the scheduled start time. General patterns of student attendance can be observed over a prolonged period of measurement. These patterns can correlate with the general interest level in the professor, the strictness with which the class is run, and other factors that are specific to individual professors and students.

However, keeping all of these factors constant, one starts to wonder what else these patterns might correlate with. Certainly there may be spikes and irregularities as students have more or less other work, students injure themselves at sporting events, or otherwise isolated and intermittent events. In general, the patterns are likely to remain relatively free of such irregularities. One factor that might have a strong and measurable effect on these patterns is weather. It would be edifying to learn whether nice weather is predictive of tardiness and early exit. If this is the case professors might take this into account when planning their lessons and activities. In general, the more information they can have about attendance patterns the more prepared the professors will be.

2. METHODS

Observations were made using a webcam available through Penn State University which focused on a room in the Center for Engineering Design and Entrepreneurship (CEDE) cluster. Because the rest of the room stayed almost completely constant, it was

relatively easy to determine which objects in the room were people. The computers were all the same color as are the chairs. People were discriminable both based on position and on color. There was a specific area that could be checked at each computer for location of a student and the front of the room was also constant and easily specified. Counts were taken at short intervals during the 15 minutes before the start of class, and the 15 minutes after the start of class. Any person in the room was considered to be a member of the class. Certainly it is possible that other students or even non-students may have been present – but there was no systematic way to parse these people out. It was assumed that these events are both rare enough that they did not have significant skewing effects and that they occurred randomly and so did not bias the results. These counts were done manually and were relatively simple as the cluster seats only 36 students. The instructor is easily identified by his position indicated below.
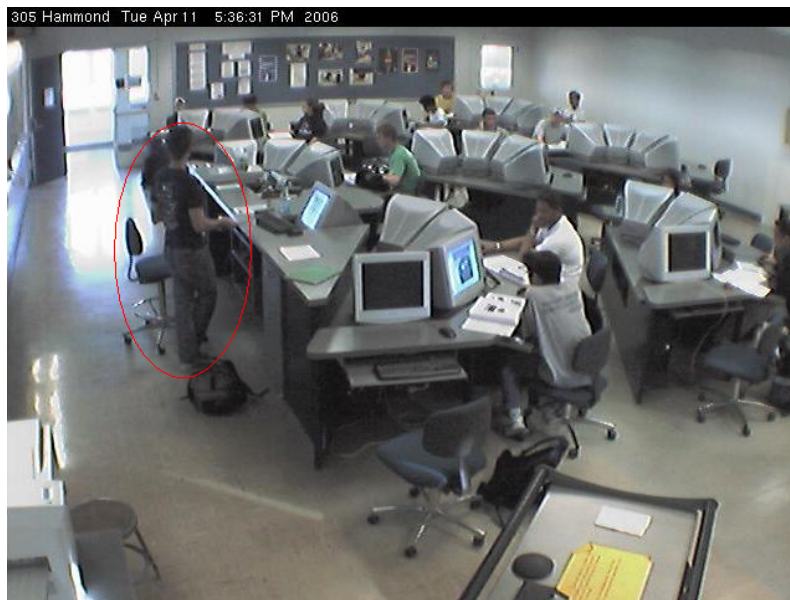

Class in session, 13 students present

Class times were determined using the calendar provided by the Penn State Center for Engineering Design and Entrepreneurship (CEDE) [1]. These reliably provided information about which time of the day to watch the camera. A count was taken every 30 seconds – this is a small enough window that results were as precise as necessary for the results desired. One class was observed repeatedly in an attempt to minimize possible confounding factors. This way class time, instructor, and student roster remained constant. There was opportunity for five observations in the window allotted for this project. Weather information was acquired using The Weather Channel [2].
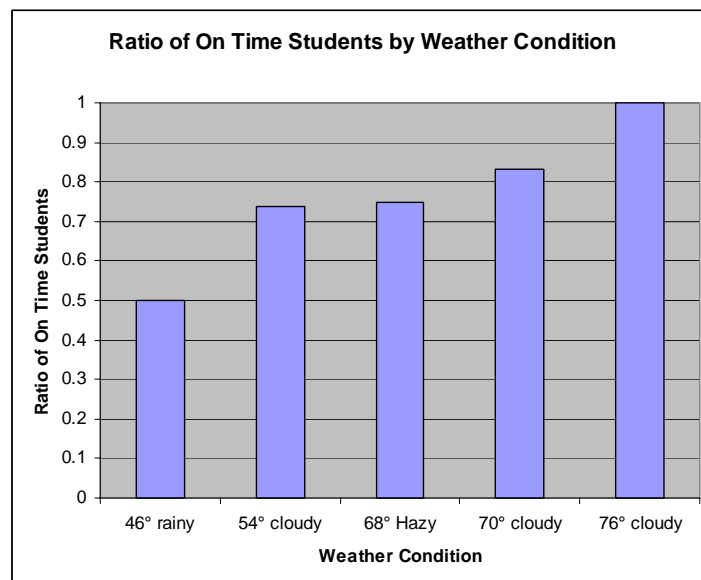
3. Results

Based on five observations, each with a significantly different weather condition, some initial results were recorded. As the weather conditions become more pleasant less students show up in total but those who do come to class tend to show up earlier. A

graphical representation of the data can be seen below. The dark black line in the center separates the students who came early from those who came late.
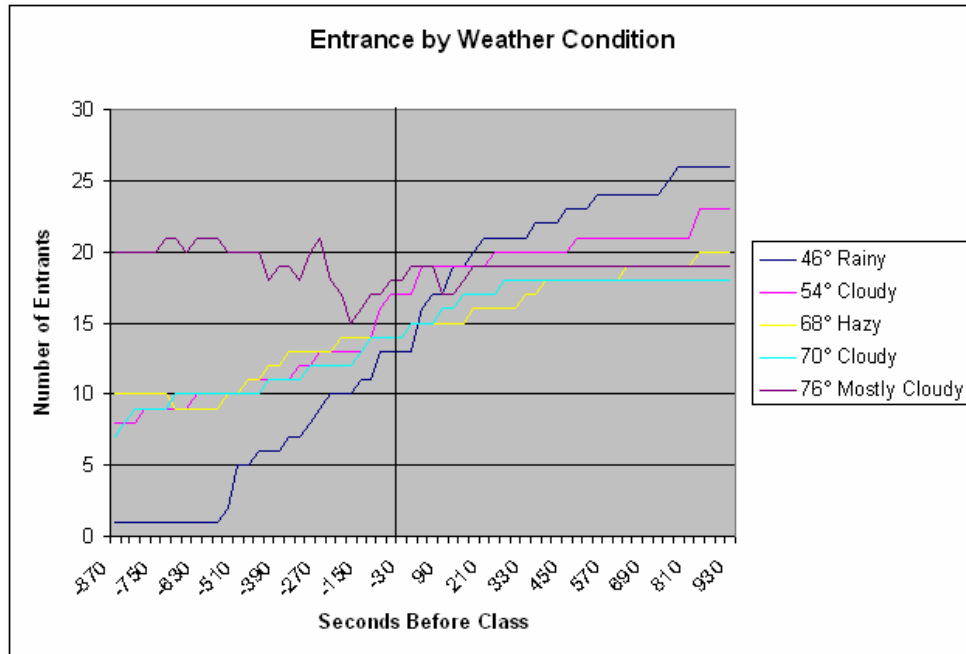
In the most pleasant condition 100% of the students came on time. In the least pleasant condition 50% of the students came to class on time. Intermediate results fall neatly in between as can be seen in the chart below. Analysis of statistical significance should wait until more data points are available, but general trends are also obvious. In the cold and rainy condition significantly more students trickle in more than 5 minutes late while this is much rarer in the other conditions.

4. Discussion

It is unclear exactly why the observed patterns occurred. The first result – that less students come to class when the weather is nice – is both reasonable and easy to explain. On nice days students have better things to do than sit in a computer lab. The other result is more difficult to explain. First, it is certainly possible that is an artifact of the small number of observations; with only one instance of each type of weather it is hard to draw any definite conclusions. A more satisfying explanation may be that when the weather is nice the portion of the student population that comes to class consists mostly of the dedicated students who are the ones who come on time in all conditions. However, when examining the graph it seems that the first students to appear still comes later in the rainy condition, so this hypothesis does not necessarily explain all of the variation visible.

Further investigation and more observation is definitely required to produce more definite results and also an increased level of confidence in them. However, this is a good start and shows that it is possible to examine the phenomenon described using only a webcam. Further experiments would use a greater variety of classrooms, students, professors, and colleges.

5. Resources

[1[1] Local Weather Forecast for State College, PA (16801). The Weather Channel Online. *www.weather.com* <http://www.weather.com/weather/local/16801?lswe=16801&lwsa=WeatherLocalUndeclared&from=whatwhere>

[2] 305 Hammond Building Computer Classroom Schedule. Center for Engineering Design and Entrepreneurship. *305hb: April 2006.* <http://ical.ecsel.psu.edu/305hb/d01/04/2006?display=M&style=B&positioning=A>