

# Demonstration of the Unizin Sentiment Visualizer

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## ABSTRACT

While much promise has been demonstrated in the learning analytics field with sentiment analysis, the analyses are typically post hoc. The Unizin Sentiment Visualizer demonstrates that the application of sentiment analysis in real-time provides a powerful new tool to support students in complex learning environments.

## Categories and Subject Descriptors

J.7 Computers in Other Systems (C.3) - *Real time*; K.3.1 Computer Uses in Education - *Computer-assisted instruction (CAI)*; I.2.7 Natural Language Processing - *Text analysis*

## General Terms

Algorithms, Measurement

## Keywords

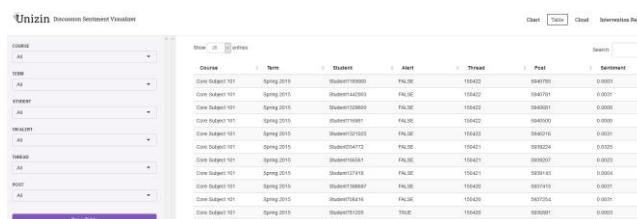
Unizin, learning analytics, student, intervention, sentiment analysis, discussion, natural language processing, text mining, real time, real-time

## 1. INTRODUCTION

As Simon Knight and Karen Littleton recently explained in the Journal of Learning Analytics [1], there is strong demand for discourse analysis.

In this demonstration, Unizin will show an application where the Canvas Live Events feed by Instructure is ingested, and content from student contributions to discussion forums is scored for sentiment, frustration, grammatical uncertainty (as a subset of linguistic modality), and inquisition. The Live Events feed [2], is compliant with the Caliper Analytics framework, as maintained by the IMS Global Learning Consortium [3].

Charted results are available as a selectable data table. Selectable fields include Course, Term, Student, Alert Status, Thread, and Post.



Course	Term	Student	Alert	Thread	Post	Sentiment
Core Subject 101	Spring 2015	Student100000	FALSE	100422	004700	0.0001
Core Subject 101	Spring 2015	Student100001	FALSE	100422	004701	0.0001
Core Subject 101	Spring 2015	Student100002	FALSE	100422	004702	0.0001
Core Subject 101	Spring 2015	Student100003	FALSE	100422	004703	0.0001
Core Subject 101	Spring 2015	Student100004	FALSE	100422	004704	0.0001
Core Subject 101	Spring 2015	Student100005	FALSE	100422	004705	0.0001
Core Subject 101	Spring 2015	Student100006	FALSE	100422	004706	0.0001
Core Subject 101	Spring 2015	Student100007	FALSE	100422	004707	0.0001
Core Subject 101	Spring 2015	Student100008	FALSE	100422	004708	0.0001
Core Subject 101	Spring 2015	Student100009	FALSE	100422	004709	0.0001
Core Subject 101	Spring 2015	Student100010	FALSE	100422	004710	0.0001
Core Subject 101	Spring 2015	Student100011	FALSE	100422	004711	0.0001
Core Subject 101	Spring 2015	Student100012	FALSE	100422	004712	0.0001
Core Subject 101	Spring 2015	Student100013	FALSE	100422	004713	0.0001
Core Subject 101	Spring 2015	Student100014	FALSE	100422	004714	0.0001
Core Subject 101	Spring 2015	Student100015	FALSE	100422	004715	0.0001
Core Subject 101	Spring 2015	Student100016	FALSE	100422	004716	0.0001
Core Subject 101	Spring 2015	Student100017	FALSE	100422	004717	0.0001
Core Subject 101	Spring 2015	Student100018	FALSE	100422	004718	0.0001
Core Subject 101	Spring 2015	Student100019	FALSE	100422	004719	0.0001
Core Subject 101	Spring 2015	Student100020	FALSE	100422	004720	0.0001
Core Subject 101	Spring 2015	Student100021	FALSE	100422	004721	0.0001
Core Subject 101	Spring 2015	Student100022	FALSE	100422	004722	0.0001
Core Subject 101	Spring 2015	Student100023	FALSE	100422	004723	0.0001
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Core Subject 101	Spring 2015	Student100098	FALSE	100422	004798	0.0001
Core Subject 101	Spring 2015	Student100099	FALSE	100422	004799	0.0001
Core Subject 101	Spring 2015	Student100100	FALSE	100422	004800	0.0001

Figure 1. Data Table with User Selection Menu

The results will also be displayed in an interactive scatterplot, where each dot represents the average sentiment of a student's contributions to any given discussion thread. Students in potential need of intervention will be detected and highlighted in an alternative color. The detection threshold can be customized, and is shown as one standard deviation of negative sentiment below the average sentiment of the entire class for the same thread.

A tooltip (Figure 1) will appear when the cursor hovers over a dot, displaying the identifiers for both the student and the thread, as well as a sentiment reading (Figure 2). While this demonstration employs anonymized synthetic data for FERPA compliance, the instructor would see student names.

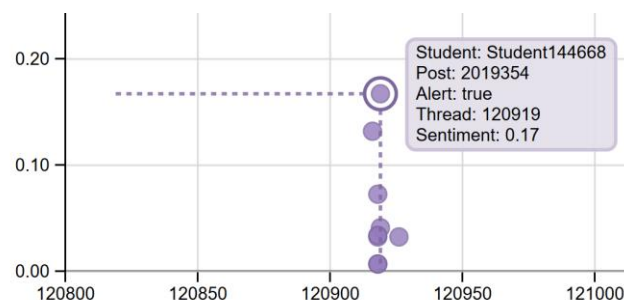
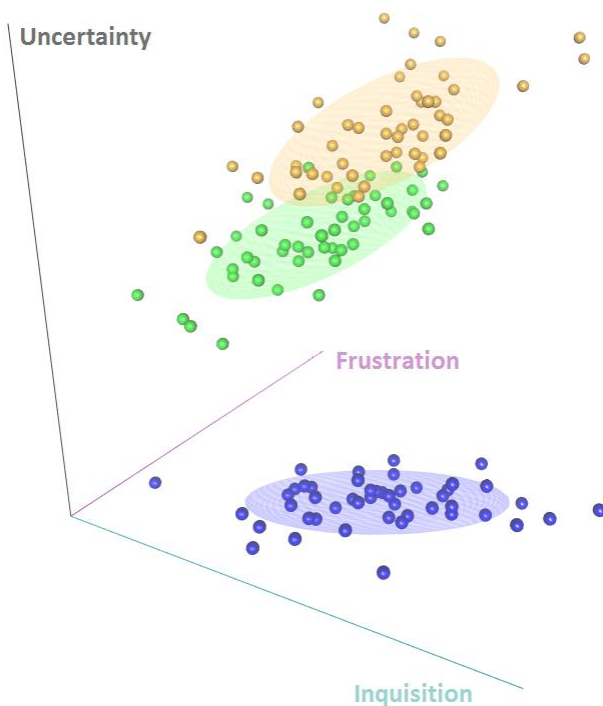


Figure 2. Tooltip on Sentiment Analysis Datum Representing the Average Sentiment Expressed by an Individual Student throughout a Discussion Thread, Plotted Relative to the Average Sentiment for the Entire Class

The results for frustration, uncertainty, and inquisition will be displayed in a three-dimensional dot cloud as depicted in Figure 3. The instructor will be able to zoom and spin perspective around this dot cloud. The detection threshold can be those outliers falling beyond the farthest boundary of the concentration zone of a cluster (shown as shaded in Figure 3) or a trigger limit on the Euclidean distance of each dot from origin.



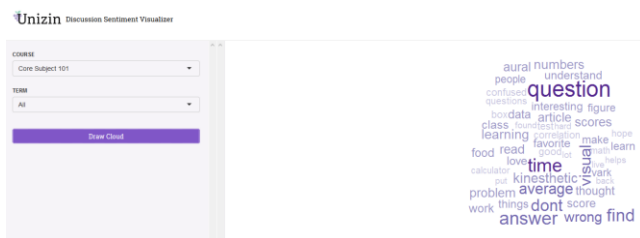
**Figure 3. Interactive 3D Clustering of Student Discussion Contributions by Uncertainty, Frustration, and Inquisition**

Reports of those students contributing to the current thread and in potential need of intervention are interactively prepared on a different tab, showing the text in question for review. Among others, the application finds cases where students are pleading for help (Figure 3). This report can be printed directly from the browser, so that the instructor may have the report in hand while heading into the classroom.

Sentiment	Text
0.0003	I had trouble on activity 10b question number 4. I already submitted my quiz but would like to learn the correct answer if anyone could help me out with this one.

**Figure 3. The Application Detects a Student Pleading for Help with a Printable Intervention Report**

Finally, while word clouds are not empirical visualizations, they are popular because some instructors believe they can get an overall sense of the class. Here, the instructor can specify a word cloud to represent some or all of the discussion posts.



**Figure 4. Word Cloud**

Over time, the data available within the application will include enough history to compare charts and word clouds across terms and/or instructors.

While this application is intended to demonstrate the power of real-time learning analytics, Unizin hopes that mapping the intervention alerts will also be useful in informing early warning systems, and thusly contribute to student retention. Lessons we learn from this endeavor may eventually contribute to an empirical base of knowledge within the real time analytics space that drives alerts for other administrative efficiencies.

## 2. WHO WE ARE

Unizin [4] is a consortium of like-minded land grant institutions in higher education facilitating the transition toward collaborative digital education. Our mission is to improve the learning experience by providing an environment built on collaboration, data, standards, and scale.

Our offerings include Engage, an eText reader platform and collaborative learning tool for the delivery of digital learning materials, including Open Educational Resources, faculty-authored course packs, and publisher content.

## 3. ACKNOWLEDGMENTS

In keeping with this year's conference theme of a "convergence of communities", the author thanks:

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IMS Global Learning Consortium, maintainers of the Caliper Analytics framework.

Ms. Kimberly Arnold, Senior Evaluation Consultant, University of Wisconsin – Madison, for her editorial support.

## 4. REFERENCES

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- [4] Unizin Educational Consortium. DOI = <http://unizin.org/>
- [5] Promotional Video for Unizin Sentiment Visualizer. DOI changes as application develops. E-mail author for current DOI.