

# 6a.022.UL - Mitigating Concept Drift for Time-Varying Domains Through Adaptive Learning

## Year 6 - Deep Dive Video

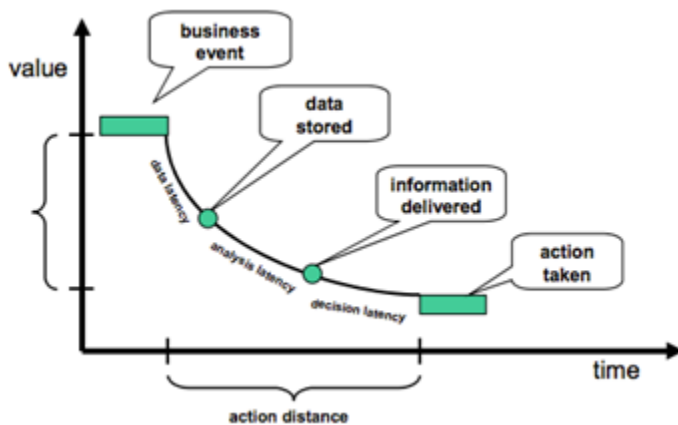
[6a.022.UL\\_Deep Dive Video \(14:54 minutes\)](#)

### Project Description

Adaptive techniques for concept drift detection are a necessary topic of exploration, as it is guaranteed that as time passes, underlying conditions will shift. As these shifts occur, they can cause major impacts on predictions for the future both short and long term. Some examples of drifting conditions are:

1. People seeking to hoodwink anomaly detection systems in order to commit fraud.
2. People deliberately exploiting discovered knowledge for hostile purposes, i.e. discoveries found via hotspot analysis and association mining.
3. A sudden increase/decrease in the number of patients in hospitals in a specific region
4. A sudden increase/decrease in the spending of clients in a specific area or type of purchase item

Typically, changes to underlying conditions are rarely advertised and it is unknown when the impact of such changes will be felt. One of the more difficult portions of this research is determining when and how to update knowledge, in a computationally inexpensive manner. This is due to the "expiration date" that exists on all learned data.



**Figure 1: The Drop in Value of Information Over Time Due to Latency.**

As seen in Figure 1, time passes, thereby decreasing the value of the information until we arrive at its "expiration date". If you wanted to predict the weather for next week, you would like to have the information before next week. Delivering the predictions later next week would render half of the information useless. Delivering the information the week after or later would be completely useless and a waste of weeks of processing time.

Utilizing our knowledge of these shortcomings, we developed the four main goals of our project:

1. To expand upon our previous results in spatio-temporal analysis (hotspot detection and prediction, anomaly detection).
2. To expand upon our previous results in stream mining using real world datasets provided by our IAB partners for prediction.
3. To expand upon our previous results in association mining by developing innovative methods to detect when previously discovered rules and anomalies are no longer valid (concept drift)
4. To adapt our learning procedure so that emerging trend can be discovered and applied for the benefit of our IAB partners.

### Project Team

### Attention Project Pls

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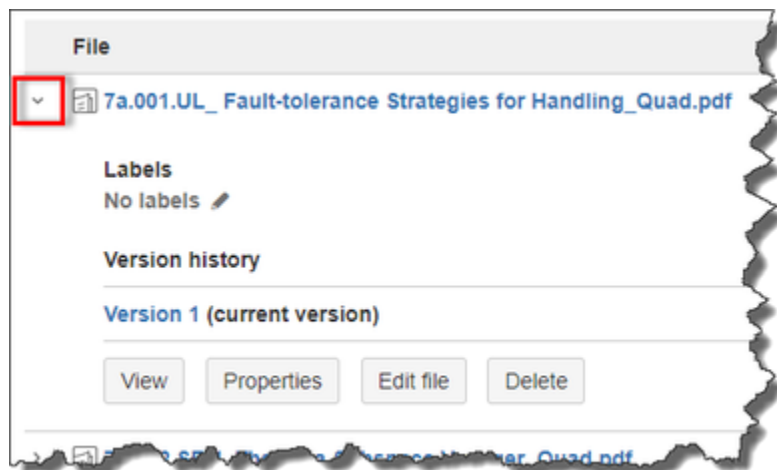
### Project Deliverables

	Deliverable
1.	Algorithm and prototypical system for the prediction of emerging and declining trends in spatio-temporal data.
2.	Algorithm and prototypical system for the discovery of concept drift in order to update the prediction model using adaptive learning.
3.	Algorithm and prototypical system for a prediction outlook of trends across time, based upon given IAB data and/or in-house datasets.
4.	Project report and case studies using our current datasets and any suggested by the IAB.

### Project Documents

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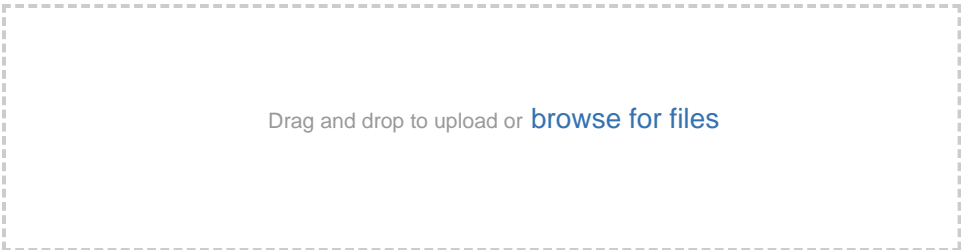


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