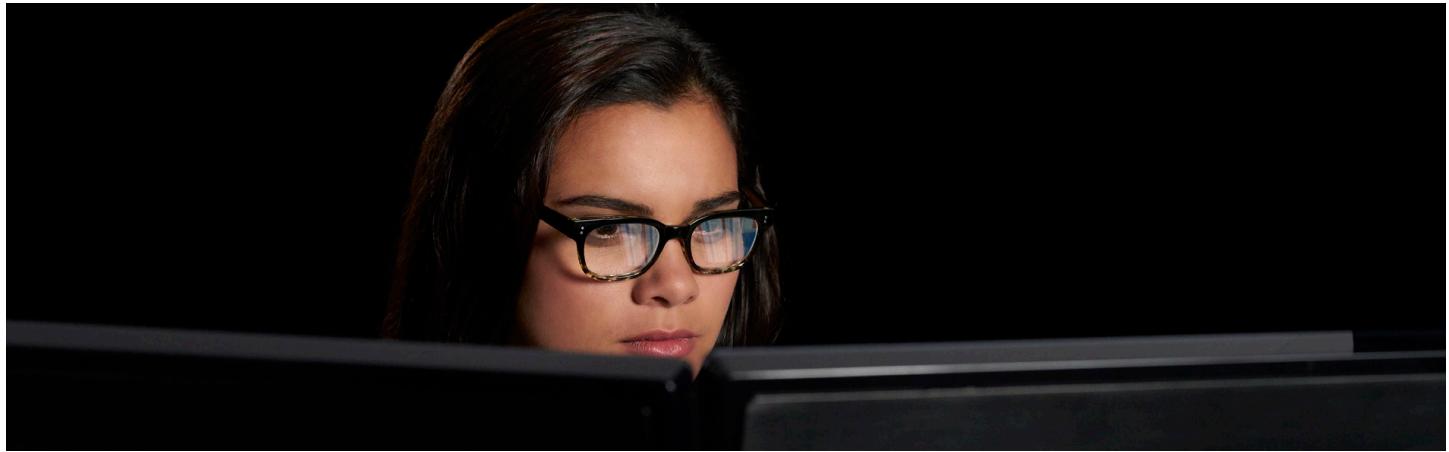


TT[®] SCORE

Trade Surveillance with Machine Learning



THE NEED FOR TRADE SURVEILLANCE

The financial industry has experienced great change and extraordinary challenges in the wake of the 2008 global financial crisis. The last several years in particular have seen unprecedented regulatory reforms across all aspects of the banking and trading industries, both within the United States and worldwide.

One of the biggest challenges that both regulators and compliance staff face is consistently ensuring that the market participants they supervise stay fully compliant with current market regulations. Regulators want to ensure that markets are fair and efficient, and compliance staff understand that the risks of failing to detect disruptive or manipulative trading behavior can be extremely costly.

As a result, rapid and accurate detection of prohibited market practices has become of paramount importance to all business in the financial industry.

TRADITIONAL PARAMETER-BASED SURVEILLANCE TOOLS

Traditional surveillance tools, often developed in house or available through various third-party vendors, are almost exclusively parameter- or rule-based. They function by applying if-then logic overlaid with configurable thresholds over arbitrary windows of time. In theory, the ability to configure these parameters lets users customize the alert

output to their business needs; however, in practice, such configurations are often set to fit the capacity of the department reviewing the alerts, not on the validity of the results. This poses serious risk for compliance staff because the reasoning behind each threshold must stand up to regulatory scrutiny and be defensible in light of the firm's business model and customer base. If the parameters are too tight, there is a risk of missing abusive conduct, and if they are too loose, then the reports are inundated with false positives.

Complicating this parameter-setting further, most every entity that requires surveillance, be it a small prop shop or an exchange, has a variety of trading strategies functioning at any given moment. One strategy might trade 1,000 contracts at a time, while another might never enter an order larger than a single contract. No matter where an account falls in the spectrum of trading volume or style, they all need to be surveilled for the same potential abusive behavior. This is where parameter-based surveillance tools can fall down. When a surveillance tool is comprised of a series of inflexible thresholds for things like volume totals, order size or cancellation rates, its effectiveness often will be limited to a very specific type of activity in products with a specific liquidity profile, leading to false negatives in products outside a specific profile.

The inflexible thresholds in traditional surveillance tools cause false negatives in other ways as well. For example, very few spoofing schemes are perfect. Most schemes are riddled with noise, unintended or opportunistic fills, late cancels, varying

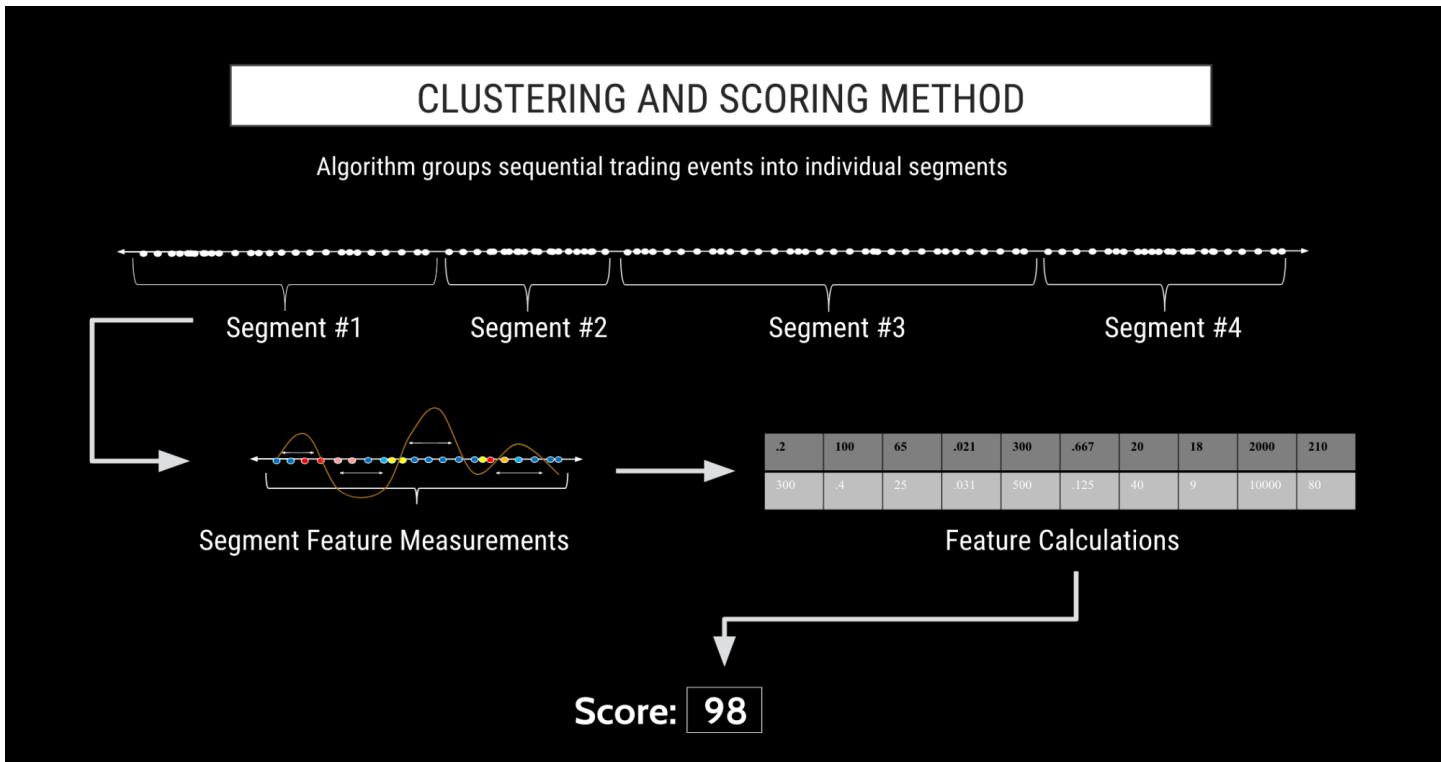


Figure A

order sizes and general randomness outside of the trader's control. Invariably, spoofing activity that would appear obvious even to an untrained eye will not be flagged due to some element of the activity not meeting an arbitrary threshold, such as the spoof order was only partially cancelled, or fills occurred on both sides of the market even if one side received the bulk of the beneficial executions. Any small deviation from the pre-set spoofing thresholds can break the continuous chain of precise events required to generate a parameter-based alert.

A MACHINE LEARNING APPROACH TO TRADE SURVEILLANCE

Machine learning is a field of artificial intelligence (AI) that involves the training of algorithms that don't follow strict "if-then" logic or decision trees. Rather, the machine learning algorithms make use of "features." These features allow for the algorithm to automatically aggregate clusters of activity based upon behavioral intent and score them based upon their similarity to trading patterns from known regulatory cases. See Figure A.

The features are applied such that every trade and transaction is surveilled, not just the worst offenders. In addition, regulators and compliance staff no longer have the burden of configuring

parameter thresholds upon initial installation or the ongoing maintenance of those thresholds.

APPLICATION OF MACHINE LEARNING TRAINING DATA

We have collected training data from numerous sources (most notably from regulatory cases) that is used to train the neural cortices (the "models") of our machine learning detection system. The training data provides the seed patterns that each model utilizes to identify similar disruptive or manipulative trading behavior.

When regulatory data is unavailable for a particular type of manipulative or disruptive trading activity, we train the models utilizing customized training data developed by several domain experts with backgrounds in both the business and regulatory sides of the financial industry.

CLUSTERING ALGORITHM

TT Score's advanced clustering algorithm segments a trader's activity into "clusters" based upon factors such as time, trader, financial instrument and proximity of other order actions. Each cluster is essentially a slice of time of a trader's audit trail where

the algorithm has determined that the activity contained in the cluster is likely related to a specific action or series of actions by the trader. Clusters can vary in length from a fraction of a second to a few minutes long. Every action by a trader is contained in a cluster, and there is no limit to how many workflow events can be contained in a single cluster.

In order for machine learning to work, a rich set of data points is necessary to measure and compare the various features between the trader's activity and the activity that is known to have caused prior regulatory attention. Clusters are rich with this measurable information, as they contain every order action in sequence by the trader for the length of the cluster.

The clusters may be thought of as "packets of intent" because each cluster contains a group of order actions (e.g., placing, modifying or cancelling orders) that are likely related due to the proximity of the trader's workflow events. And because the cluster contains all the events for the entire clustered period rather than the select order events that would trigger a legacy alert, the full context of the potentially abusive behavior is captured, analyzed and visualized to allow for a more thorough review.

Furthermore, because the clustering approach does not rely on arbitrary windows of time, the clustering method is effective regardless of the frequency of the workflow events. The clustering algorithm will dynamically change the time break required to end a cluster based on the time intervals between trades over time. This allows for effective clustering for both high-frequency trading (HFT) occurring milliseconds apart and manual trading.

TT SCORE MODEL FUNCTIONALITY

The training data, order transaction data and clusters all feed the models. Each model focuses on a particular category of disruptive or manipulative trading activity. For example, the Spoofing Similarity model focuses on simple spoofing behavior as well as other forms of spoofing, including layering, collapsing of layers, flipping and vacuuming. Other models focus on abusive messaging, momentum ignition, pinging, wash trading and more.

SIMILARITY SCORES

One of the biggest challenges that regulators and compliance staff face is determining where to focus their attention to ensure that they are achieving their mandate of effective supervision.

Traditional parameter-based surveillance tools generate enormous amounts of unprioritized alerts where only a fraction might be considered true positives. Analysts need to sift through hundreds, if not thousands, of alerts, spending equal time on each until the handful of relevant results are eventually found.

The concept of a "similarity score" addresses this problem by scoring each alert based on the degree of mathematical similarity to past regulatory actions. This risk-based approach allows regulators and compliance staff to allocate their time and resources where they are needed most.

A similarity score is generated for each cluster on a scale of 0 to 100. A score of 100 indicates a very high degree of similarity to patterns that have drawn regulatory attention in the past, while a score of 0 indicates a very low degree of similarity. In this manner, TT Score provides specific guidance to users as to which clusters have the highest risk of drawing future regulatory attention and therefore are the most important for immediate review.

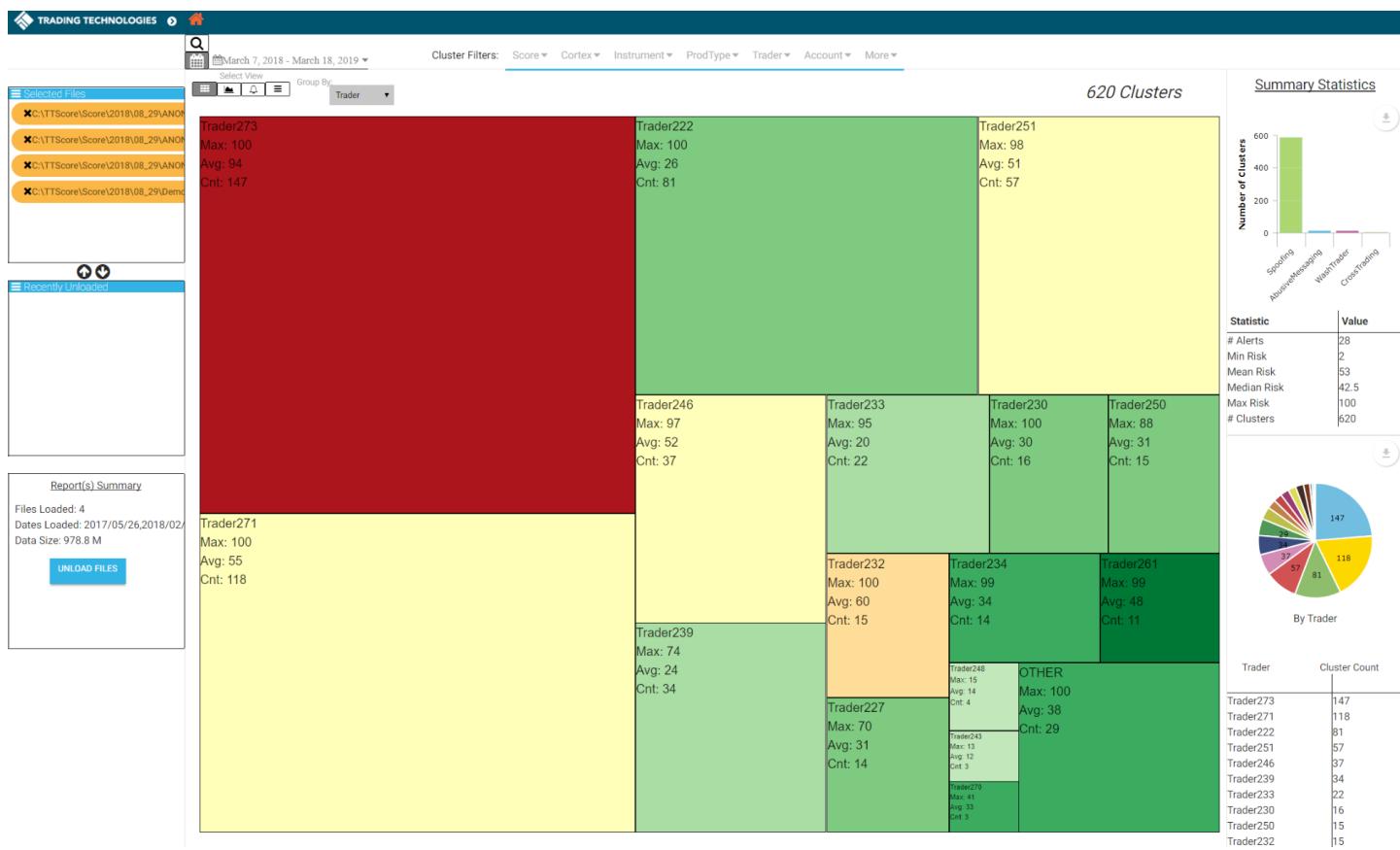
DATA WITH VISUALS IS MORE EFFECTIVE

TT Score facilitates the prioritization and analysis of post-processed trading data via a unique user interface specifically designed to handle big data with regulatory compliance in mind. There are numerous unique visualizations that assist users in understanding where the risks are in their data, how the risks are distributed and how the risks are changing over time. This provides regulators and compliance staff with the ability to "see around corners" and take proactive steps to prevent disruptive or manipulative trading activity before it becomes a problem.

Tools such as Heatmap, Scorecard and Market Ladder Replay display instantaneous summaries of the vital statistics for each cluster and provide users with the ability to analyze each cluster in the context of the market conditions at the time the activity occurred. These research tools combine to provide regulators and compliance staff with the tools necessary to quantify a trader's intent and understand the impact that the trader's activity had on the market. This method provides users with a straightforward visual representation of how regulatory risk is being reduced within an organization, as opposed to simply looking at how many alerts are being cleared on a periodic basis.

FOCUSING ON RISK: HEATMAP

The Heatmap display allows the user to see which traders or accounts are generating activity that has a high degree of similarity to regulatory cases. The bright red indicates high-risk clusters, and the size of each square indicates the number of clusters. In the following screen, we see that Trader57 is not only generating the most clusters, he also is generating the most clusters with the highest average similarity score. With just a glance, Heatmap allows the user to efficiently allocate time and resources necessary to review the activity that generates the most risk.



VISUALIZING BIG DATA: THE OUTLIER CHART

The Outlier chart displays every entity's percent of high-risk clusters compared to the total clusters on a single screen. This allows for easy detection of problematic trading in big data sets with disparate customer or trader cluster volumes. The user can review thousands of entities over multiple months in one visual and know that a low-volume trader with 10 clusters is not going to be lost among the accounts generating thousands or tens of thousands of clusters. What's more, the user can set their own definition of what constitutes "high risk," with the default high-risk score set at 80.

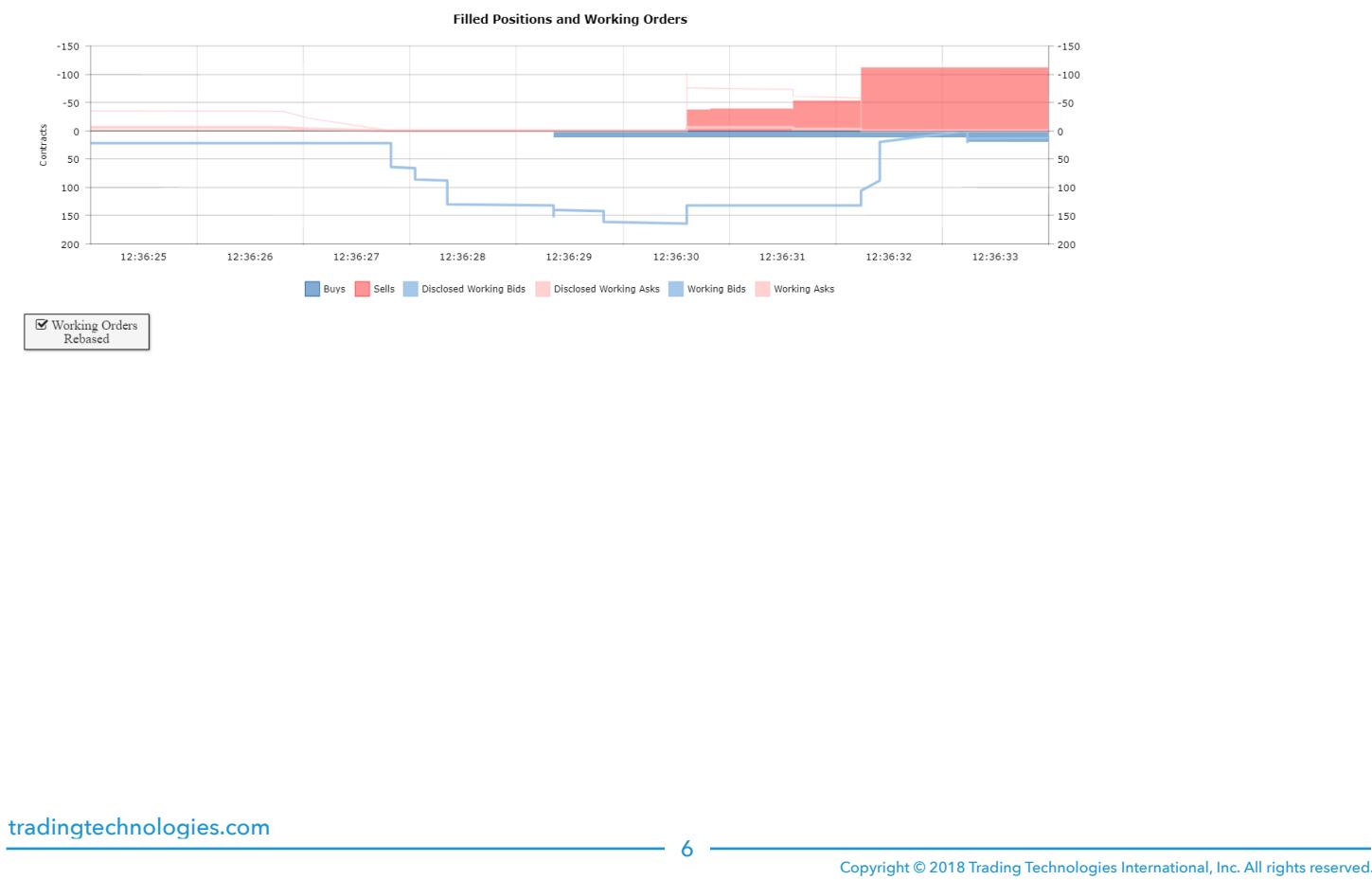


INVESTIGATING TRADING ACTIVITY: SCORECARD

Scorecard provides a summary of the vital statistics of the cluster as well as an initial visualization of the pattern that was formed by the order and fill messages that comprised the cluster. The compliance officer can quickly view what happened for the given cluster of order transactions. The chart at the bottom of Scorecard provides a look at the volume of contracts traded within the cluster as well as how the order and trade activities unfolded over the relevant period of time.

 TRADING TECHNOLOGIES >  > (Trader8,99) -> Spoofing

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2px;">0235N9881</td><td style="padding: 2px;">Partial Buy</td><td style="padding: 2px;">1</td><td style="padding: 2px;">82</td><td style="padding: 2px;">350950</td><td style="padding: 2px;">Limit</td><td style="padding: 2px;">Account3</td><td style="padding: 2px;">18:36:29.246</td><td style="padding: 2px;">XGB</td><td style="padding: 2px;">Trader8</td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td></tr> <tr> <td style="padding: 2px;">85984</td><td style="padding: 2px;">2018-Aug-29 12:36:29.348</td><td style="padding: 2px;">0235N9881</td><td style="padding: 2px;">Partial Buy</td><td style="padding: 2px;">2</td><td style="padding: 2px;">83</td><td style="padding: 2px;">350950</td><td style="padding: 2px;">Limit</td><td style="padding: 2px;">Account3</td><td style="padding: 2px;">18:36:29.246</td><td style="padding: 2px;">XGB</td><td style="padding: 2px;">Trader8</td><td style="padding: 2px;"></td><td 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2px;">Limit</td><td style="padding: 2px;">Account3</td><td style="padding: 2px;">18:36:29.246</td><td style="padding: 2px;">XGB</td><td style="padding: 2px;">Trader8</td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td></tr> <tr> <td style="padding: 2px;">85987</td><td style="padding: 2px;">2018-Aug-29 12:36:29.348</td><td style="padding: 2px;">0235N9881</td><td style="padding: 2px;">Partial Buy</td><td style="padding: 2px;">1</td><td style="padding: 2px;">87</td><td style="padding: 2px;">350950</td><td style="padding: 2px;">Limit</td><td style="padding: 2px;">Account3</td><td style="padding: 2px;">18:36:29.246</td><td style="padding: 2px;">XGB</td><td style="padding: 2px;">Trader8</td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td></tr> <tr> <td style="padding: 2px;">85988</td><td style="padding: 2px;">2018-Aug-29 12:36:29.348</td><td style="padding: 2px;">0235N9882</td><td style="padding: 2px;">Add Buy</td><td style="padding: 2px;">3</td><td style="padding: 2px;">88</td><td style="padding: 2px;">350950</td><td style="padding: 2px;">Limit</td><td style="padding: 2px;">GTD</td><td style="padding: 2px;">Account3</td><td style="padding: 2px;">18:36:29.247</td><td style="padding: 2px;">XGB</td><td style="padding: 2px;">Trader8</td><td style="padding: 2px;"></td><td style="padding: 2px;"></td><td style="padding: 2px;"></td></tr> </tbody> </table>	Line #:	Timestamp↑	Order ID↑	Action↑	Side↑	Ord↑	Ice↑	Position↑	Price↑	Type↑	TIF↑	Account↑	Exch Time↑	Exch ID↑	User ID↑	85936	2018-Aug-29 12:36:25.051	0235N9866	Partial Sell	1	77	350950	Limit	Iceberg	Account3	18:36:25.400	XGB	Trader8				85939	2018-Aug-29 12:36:26.817	0235N9867	Cancel Sell	15	3	76	350950	Limit	Iceberg	Account3	18:36:26.823	XGB	Trader8			85942	2018-Aug-29 12:36:27.051	0235N9866	Cancel Sell	96	3	76	350950	Limit	Iceberg	Account3	18:36:26.824	XGB	Trader8			85947	2018-Aug-29 12:36:27.817	0235N9871	Add Buy	18	76	350925	Limit	GTD	Account3	18:36:27.605	XGB	Trader8				85954	2018-Aug-29 12:36:27.817	0235N9874	Add Buy	2	76	350925	Limit	GTD	Account3	18:36:27.792	XGB	Trader8				85948	2018-Aug-29 12:36:27.817	0235N9872	Add Buy	4	76	350925	Limit	GTD	Account3	18:36:27.606	XGB	Trader8				85951	2018-Aug-29 12:36:27.817	0235N9873	Add Buy	20	76	350925	Limit	GTD	Account3	18:36:27.781	XGB	Trader8				85960	2018-Aug-29 12:36:28.051	0235N9875	Add Buy	2	76	350900	Limit	GTD	Account3	18:36:28.550	XGB	Trader8				85957	2018-Aug-29 12:36:28.051	0235N9875	Add Buy	20	76	350900	Limit	GTD	Account3	18:36:28.450	XGB	Trader8				85966	2018-Aug-29 12:36:28.348	0235N9878	Add Buy	2	76	350900	Limit	GTD	Account3	18:36:28.214	XGB	Trader8				85969	2018-Aug-29 12:36:28.348	0235N9879	Add Buy	20	76	350900	Limit	GTD	Account3	18:36:28.325	XGB	Trader8				85972	2018-Aug-29 12:36:28.348	0235N9880	Add Buy	2	76	350900	Limit	GTD	Account3	18:36:28.325	XGB	Trader8				85963	2018-Aug-29 12:36:28.348	0235N9877	Add Buy	20	76	350900	Limit	GTD	Account3	18:36:28.213	XGB	Trader8				85976	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	2	76	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85975	2018-Aug-29 12:36:29.348	0235N9881	Add Buy	19	76	350950	Limit	GTD	Account3	18:36:29.246	XGB	Trader8				85978	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	79	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85979	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	80	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85982	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	81	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85983	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	82	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85984	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	2	83	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85985	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	85	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85986	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	86	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85987	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	87	350950	Limit	Account3	18:36:29.246	XGB	Trader8					85988	2018-Aug-29 12:36:29.348	0235N9882	Add Buy	3	88	350950	Limit	GTD	Account3	18:36:29.247	XGB	Trader8			
Line #:	Timestamp↑	Order ID↑	Action↑	Side↑	Ord↑	Ice↑	Position↑	Price↑	Type↑	TIF↑	Account↑	Exch Time↑	Exch ID↑	User ID↑																																																																																																																																																																																																																																																																																																																																																																																																	
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85966	2018-Aug-29 12:36:28.348	0235N9878	Add Buy	2	76	350900	Limit	GTD	Account3	18:36:28.214	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																			
85969	2018-Aug-29 12:36:28.348	0235N9879	Add Buy	20	76	350900	Limit	GTD	Account3	18:36:28.325	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																			
85972	2018-Aug-29 12:36:28.348	0235N9880	Add Buy	2	76	350900	Limit	GTD	Account3	18:36:28.325	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																			
85963	2018-Aug-29 12:36:28.348	0235N9877	Add Buy	20	76	350900	Limit	GTD	Account3	18:36:28.213	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																			
85976	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	2	76	350950	Limit	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																				
85975	2018-Aug-29 12:36:29.348	0235N9881	Add Buy	19	76	350950	Limit	GTD	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																			
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85979	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	80	350950	Limit	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																				
85982	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	81	350950	Limit	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																				
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85984	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	2	83	350950	Limit	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																				
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85986	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	86	350950	Limit	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																				
85987	2018-Aug-29 12:36:29.348	0235N9881	Partial Buy	1	87	350950	Limit	Account3	18:36:29.246	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																				
85988	2018-Aug-29 12:36:29.348	0235N9882	Add Buy	3	88	350950	Limit	GTD	Account3	18:36:29.247	XGB	Trader8																																																																																																																																																																																																																																																																																																																																																																																																			



REPLAYING TRADING ACTIVITY: MARKET LADDER REPLAY AND THE MACRO CHART

Market Ladder Replay is a research tool that provides users with a frame-by-frame replay of the trading activity overlaid with Level 2 market data on a ladder-style interface. The ladder is 10 ticks deep and displays all market data, including the orders for each relevant participant in the order book. Users can stop, start and rewind the activity within a given cluster in order to gain a precise understanding of the sequence of events that occurred in the order book and how the trader's orders impacted the market. Users also have the ability to slow down the activity in order to visualize orders submitted by HFT strategies that occur only milliseconds apart.

Ladder (Macro View)

Displaying frame 329 of 647
Ladder time 2018-Aug-29 12:36:30.800

Working Bids	Bid Qty.	Price	Asks Qty.	Working Asks
	3512			
	3511.75	99		
	3511.5	145		
	3511.25	115		
	3511	120		
	3510.75	110		
	3510.5	101		
	3510.25	98		
	3510	89		
	3509.75	77		
	3509.5	4		
44	88	3509.25		
88	156	3509		
	127	3508.75		
	141	3508.5		
	113	3508.25		
	87	3508		
	80	3507.75		
	76	3507.5		
	63	3507.25		
	69	3507		
	40			75

Audit Messages

Path: C:\TTScore\Score\2018\08_29\Demo.csv
Instrument: FXCME.CC.H28
Risk Score: 96

Displaying 27-55 orders of 103
Order time 2018-Aug-29 12:36:30.817

Line #	Timestamp	Order ID	Action	Side	Ord#	Ice#	Position	Price	Type	TIF	Account	Exch Time	Exch ID	User ID
85994	2018-Aug-29 12:36:29.817	0235N9884	Add	Buy	3		88	3509.5	Limit	GTD	AccountB2	18:36:29.758	XCME	Trader57
86005	2018-Aug-29 12:36:30.598	0235N9884	Cancel	Buy	3		88	3509.5	Limit	GTD	AccountB2	18:36:30.386	XCME	Trader57
86006	2018-Aug-29 12:36:30.598	0235N9883	Cancel	Buy	19		88	3509.5	Limit	GTD	AccountB2	18:36:30.386	XCME	Trader57
86007	2018-Aug-29 12:36:30.598	0235N9882	Cancel	Buy	3		88	3509.5	Limit	GTD	AccountB2	18:36:30.386	XCME	Trader57
86008	2018-Aug-29 12:36:30.598	0235N9881	Cancel	Buy	19		88	3509.5	Limit	GTD	AccountB2	18:36:30.386	XCME	Trader57
86009	2018-Aug-29 12:36:30.598	0235N9885	Add	Sell	103	3	88	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86012	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		88	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86013	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	4		87	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86014	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	2		83	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86015	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	2		81	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86016	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	7		79	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86017	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		72	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86018	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		71	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86019	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		70	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86020	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		69	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86021	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		68	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86022	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	2		67	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86023	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	2		65	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86024	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		63	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86025	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	2		62	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86026	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		60	3509.5	Limit	Iceberg	AccountB2	18:36:30.386	XCME	Trader57
86027	2018-Aug-29 12:36:30.598	0235N9886	Add	Sell	8	3	59	3509.5	Limit	Iceberg	AccountB2	18:36:30.387	XCME	Trader57
86028	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		59	3509.5	Limit	Iceberg	AccountB2	18:36:30.388	XCME	Trader57
86029	2018-Aug-29 12:36:30.598	0235N9886	Partial	Sell	1		58	3509.5	Limit	Iceberg	AccountB2	18:36:30.466	XCME	Trader57
86030	2018-Aug-29 12:36:30.598	0235N9886	Partial	Sell	2		57	3509.5	Limit	Iceberg	AccountB2	18:36:30.466	XCME	Trader57
86031	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	2		55	3509.5	Limit	Iceberg	AccountB2	18:36:30.466	XCME	Trader57
86032	2018-Aug-29 12:36:30.598	0235N9885	Partial	Sell	1		53	3509.5	Limit	Iceberg	AccountB2	18:36:30.467	XCME	Trader57
86033	2018-Aug-29 12:36:30.817	0235N9886	Partial	Sell	2		52	3509.5	Limit	Iceberg	AccountB2	18:36:30.792	XCME	Trader57

The Macro chart provides the same detail as Market Ladder Replay but visualizes both the Level 2 market and the trader's data for the entire length of the cluster on a single screen. This single-screen view highlights the trader's pattern of executions and working volume at various price levels over time compared to the rest of the market, allowing for a rapid assessment of the trader's pattern of activity and any corresponding market reaction.

