TrendMiner Live Training Session

Define, Compare, Improve: Golden Batch Profiling in TrendMiner

TrendMiner

Housekeeping

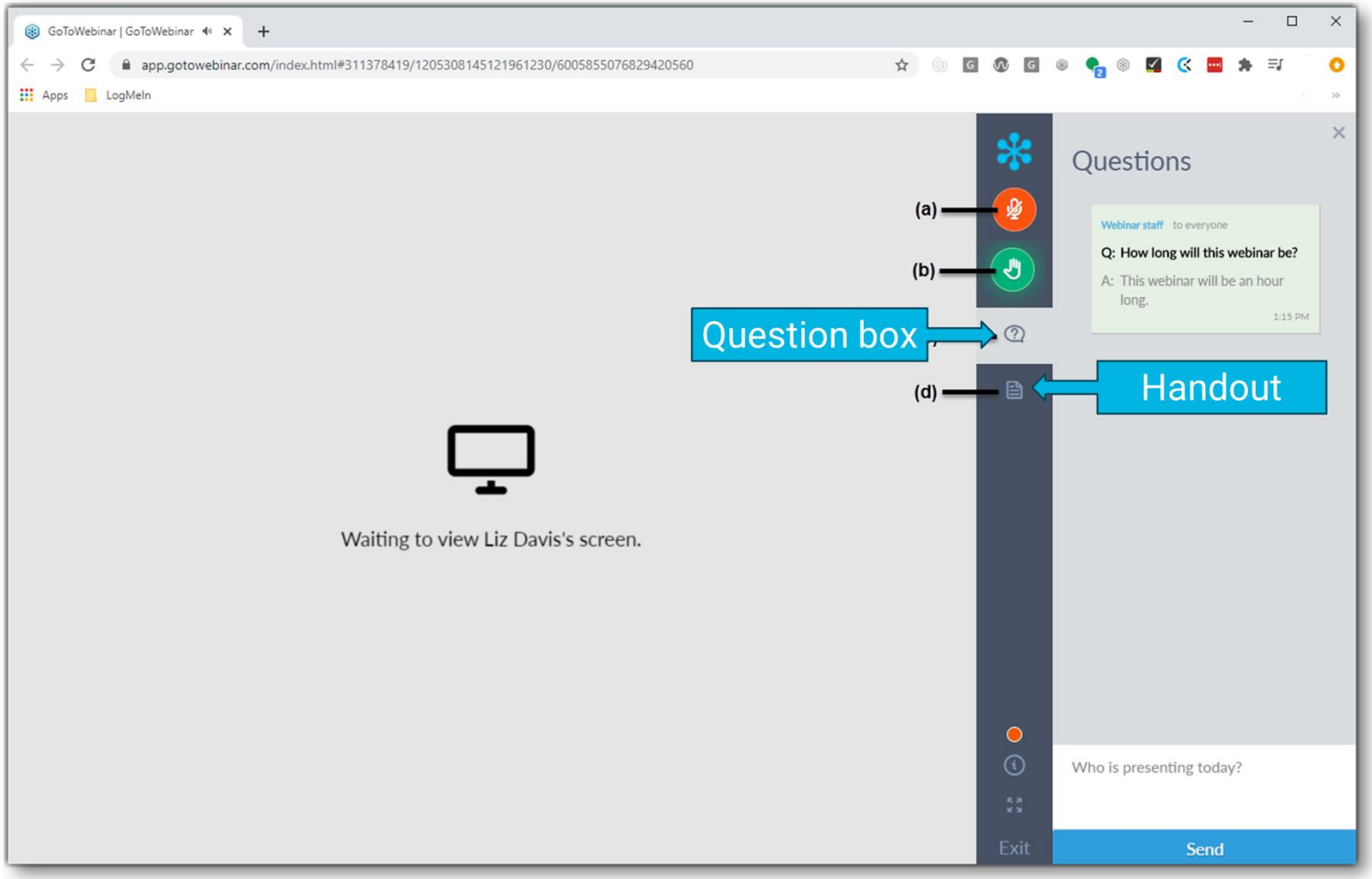
Listen Only Mode

Use Question Box!

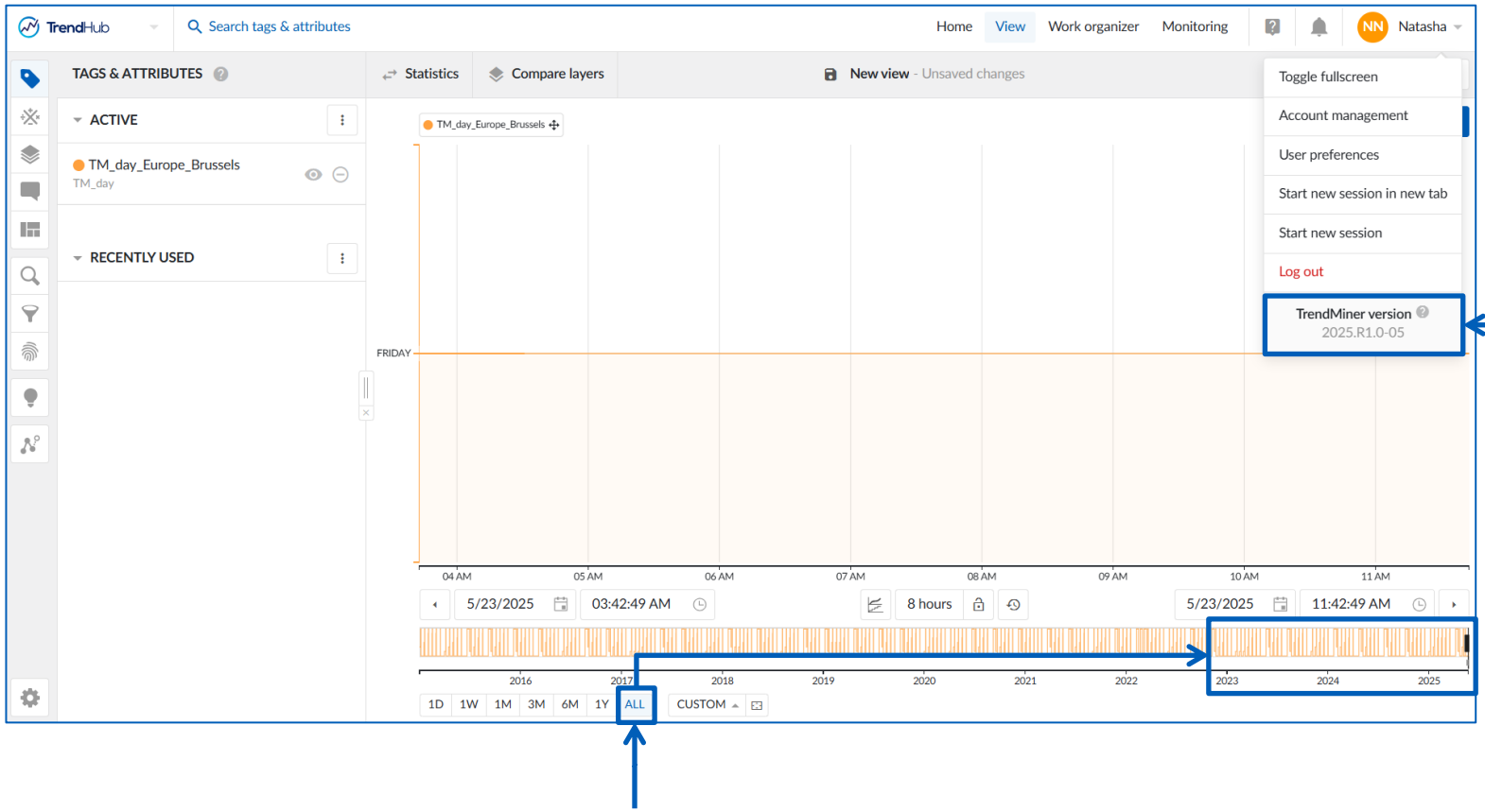
Recording and Handout will be provided!

Online training includes exercises.
You may log in to your own TrendMiner account using Firefox or Chrome if possible.

GoTo Webinar – Question box & handout



Do you need a training account?



1 ✅ 2 ✅ You can complete this training with your own account.

1 Version **2025.R3** or newer

2 After clicking on "ALL", your data will be available until at least 01.01.2024.

❌ If one of the requirements is not met, ask for an account in the question box.

Introduction & Today’s goals

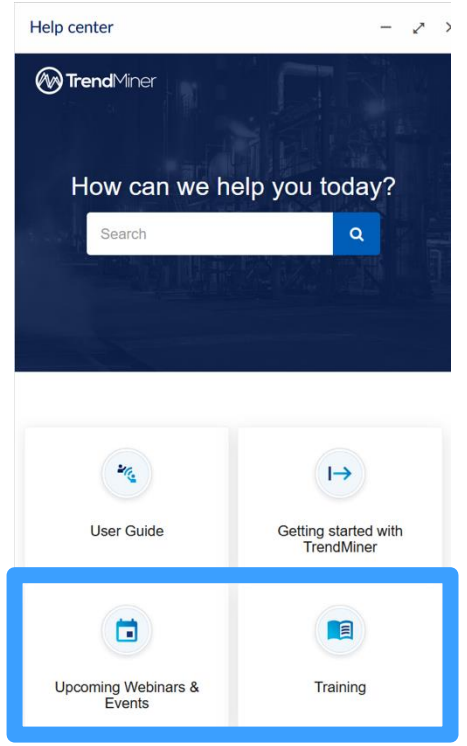
Personal introduction

Kevin Li, Data Analytics Engineer

- Support customers reaching value with self-service analytics
- Tackling more advanced use cases
- Support users in their analytics journey

POLL about the users:

What is your current level of TrendMiner knowledge?



Today’s goals

1. **Exercise 1 – Identify ideal profile based on multiple calculations**
   - Find BETA batches and add multiple calculations
   - Select the results containing calculations within the desired range

2. **Exercise 2 – Detect and track deviations from the ideal profile**
   - Create fingerprint and enable a monitor to detect deviations

3. **Exercise 3 – Analyze deviating process values**
   - Visually compare bad production periods with golden fingerprint
   - Diagnose menu – Fingerprint deviation

Exercise 1 – Identify ideal profile based on multiple calculations

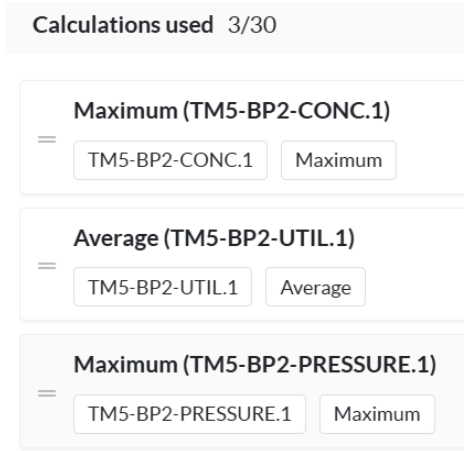
Identify ideal profile based on multiple calculations

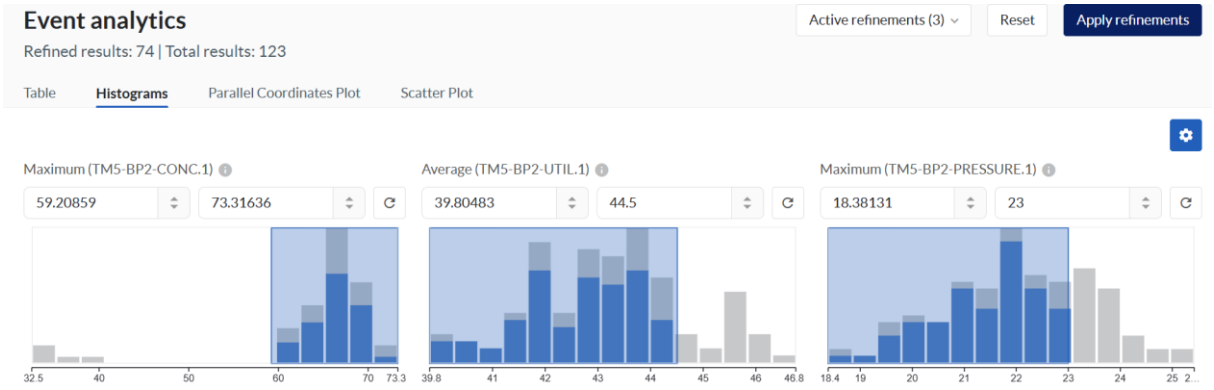
Background:

- A batch process produces multiple products, with "BETA" being the most frequent and most problematic — making it the key bottleneck. To achieve process stability, an ideal profile must be defined that ensures good product quality, controlled utility consumption, and compliance with safety conditions.

Goals:

- Identify BETA batches that meet all of the following criteria:
  1. High maximum concentration (quality parameter)
  2. Average utility consumption below 44.5
  3. Maximum pressure below 23 (safety condition)





Identify ideal profile based on multiple calculations

Steps

1.	Load tags	TM5-BP2-PRODUCT.1 // TM5-BP2-CONC.1 // TM5-BP2-PRESSURE.1 // TM5-BP2-TEMP.1 // TM5-BP2-UTIL.1		
2.	Set context & focus chart	01/01/2024 | 12:00:00 AM – 02/11/2024 | 12:00:00 AM		
3.	Save view	As “Main variables”		
4.	Initiate a value-based search	“TM5-BP2-PROD.1 ”	=	“BETA“
		Min. duration	1 hour	
5.	Add calculations & Event Analytics (refine results)	Maximum concentration	Select high concentration results on right side of histogram	
		Average utilities consumption	≤ 44.5	
		Maximum pressure	≤ 23	
6.	Save search	As “BETA runs”		

Identify ideal profile based on multiple calculations

Event Analytics

Pro tip

Helpful links on the topic of Event Analytics:

- TrendMiner User Guide: Event Analytics
- [Recording] Event Analytics in Action: Gain Deeper Process Insights
- Getting to the Bottom of Bad Batches: Event Analytics for Root Cause Detection
- Optimizing Continuous Processes with Event Analytics: Splitting Data into Manageable Hourly Intervals

Exercise 2 – Detect and track deviations from the ideal profile

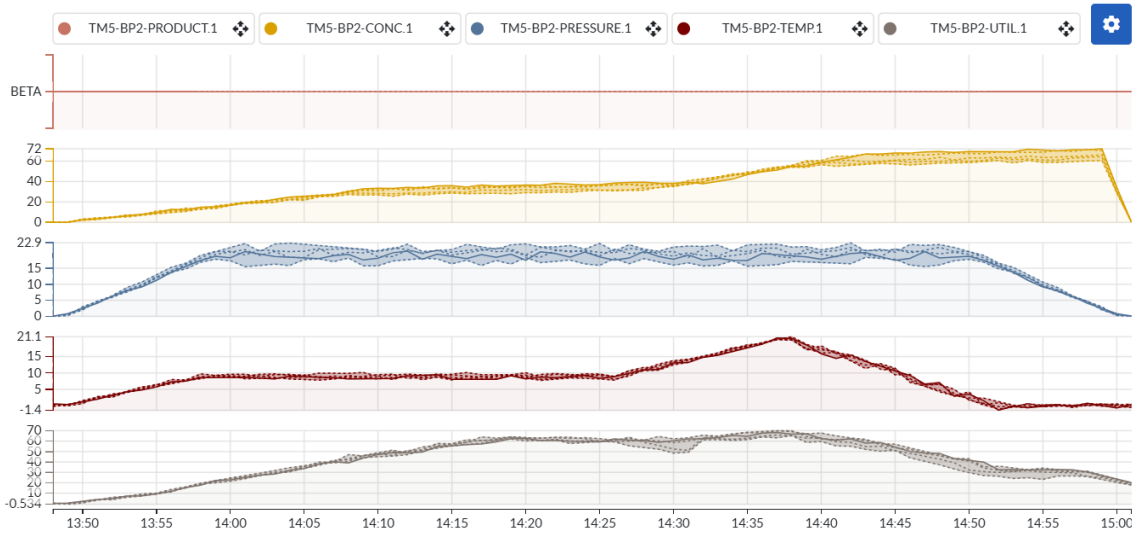
Detect and track deviations from the ideal profile

Background:

- With the ideal batches identified, the next step is to build a golden profile and establish an automated system to flag unexpected deviations — making them visible for further analysis before they impact production.

Goals:

- Create a golden profile based on the selected batches, capturing the minimum and maximum optimal values per calculation.
- Enable a monitor to automatically detect and alert when deviations occur.



Detect and track deviations from the ideal profile

Steps

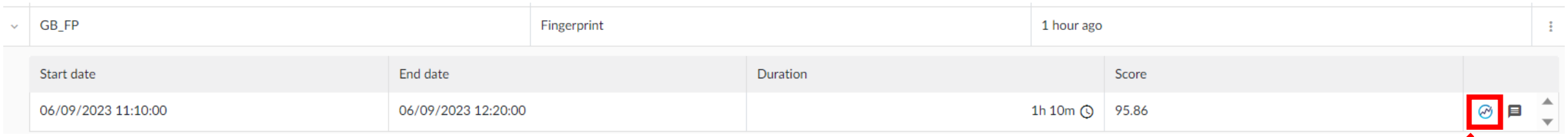
1.	Continue from	Exercise 1	
2.	Apply refinements and sort results by calculation	First result → “Add as base layer“	Rest of them → “Add layer“ Note: pick the min and max of each calculation
3.	Create the fingerprint	Go to fingerprint menu	Save fingerprint as “Ideal BETA profile“
4.	Enable a monitor	Select the saved fingerprint → Detect deviations → On start of “BETA runs” → 95% threshold	
		Create context items → Component “TM5-BP2-PRODUCT.1” // Type “Anomaly” OR Send email message	

Detect and track deviations from the ideal profile

Fingerprint monitor

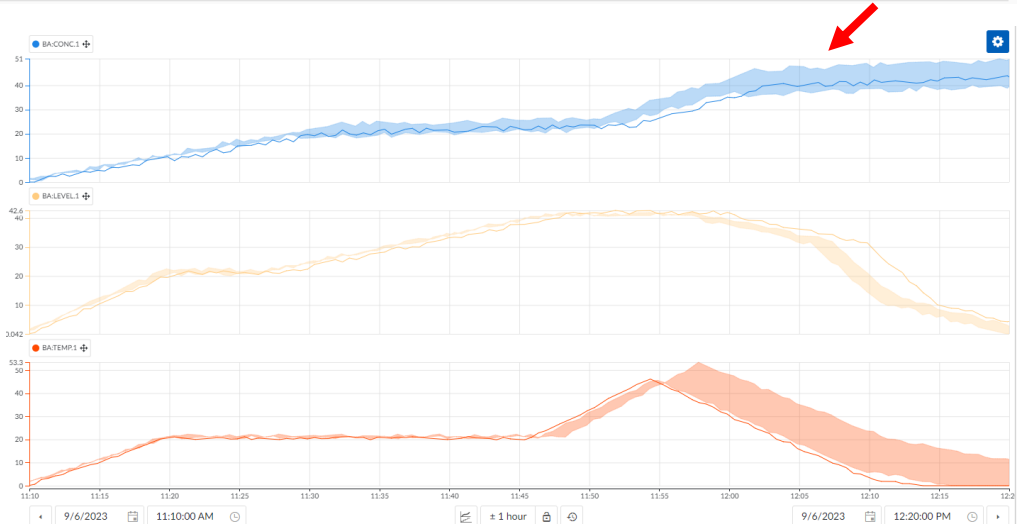
Pro tip

A faster way to compare the Fingerprint to the batch and see % of deviations



Monitoring menu

- List of the last 50 deviations
- Deviation score
- TM icon to directly compare FP and batch



Exercise 3 – Analyze deviating process values

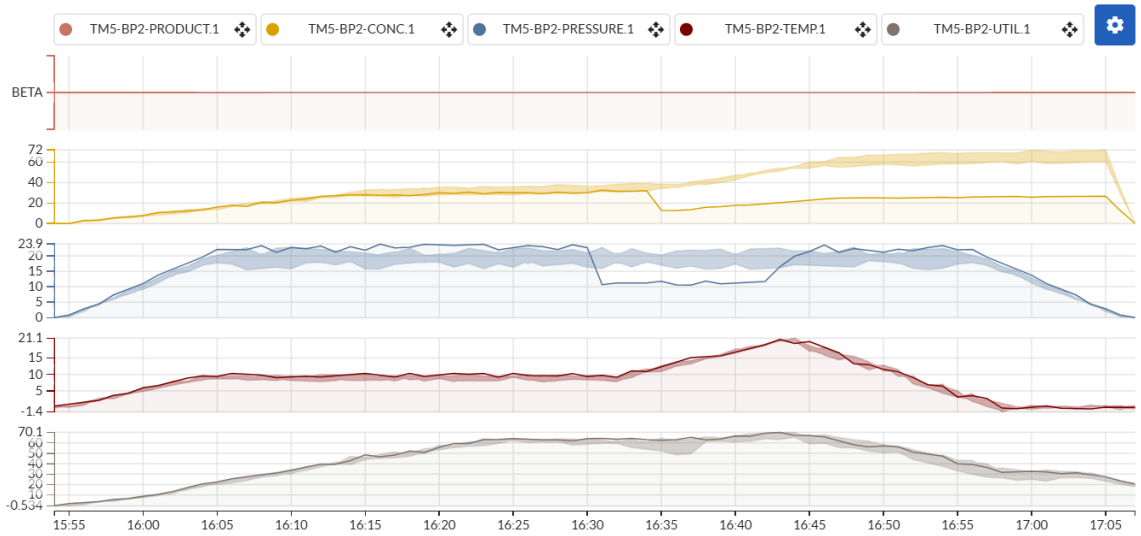
Analyze deviating process values

Background:

- Concentration drops have been reported, negatively affecting product quality. Other process parameters may be deviating as well, requiring a closer look to diagnose the root cause.

Goals:

- Visually compare affected production periods against the golden fingerprint.
- Identify all deviating process parameters using the Diagnose menu.



Analyze deviating process values

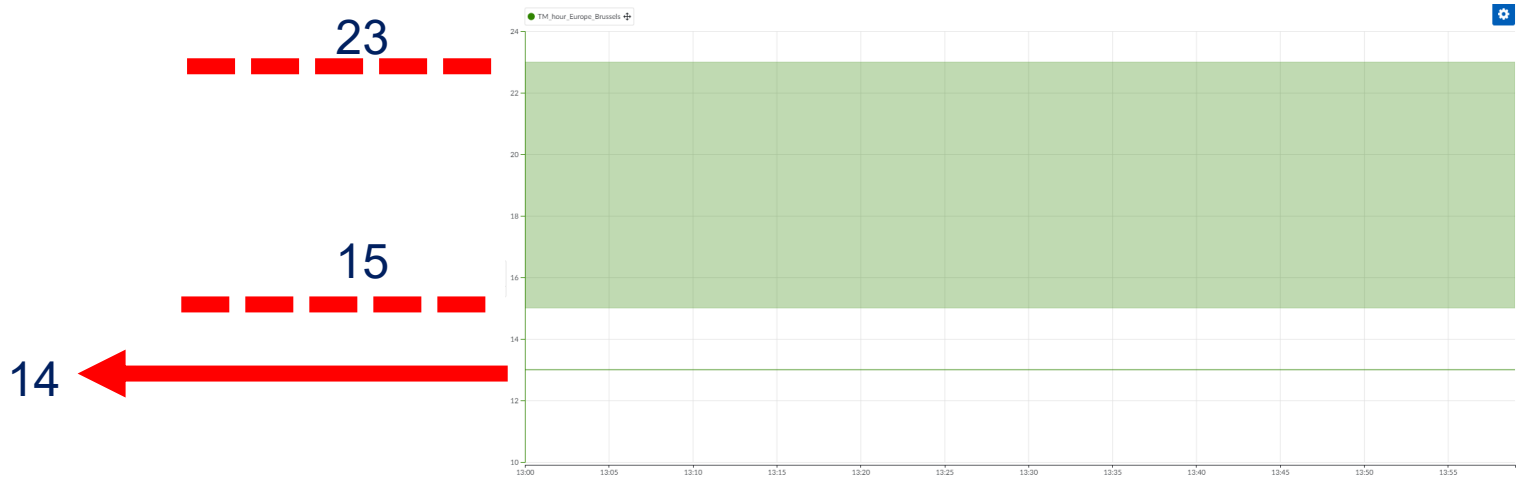
Steps

1.	Continue from	Exercise 2		
2.	Delete layers	Clear all layers in the layer menu		
3.	Add bad quality batch as layer	Reset refinements and sort by "max concentration" calculation	Add lowest max concentration as base layer	
4.	Overlay ideal profile (Fingerprint)	In the Fingerprint menu, select "Move to start of focus chart"		
5.	Diagnose fingerprint deviations	Diagnose menu	Fingerprint deviations	Set threshold to 90%

Analyze deviating process values

How does the Fingerprint threshold work?

Pro tip



- Threshold → How similar the batch needs to be with respect to the fingerprint, not to be considered a deviation

→ 90% threshold → If there's a deviation equal or higher than 10% (Score < 90%) → Deviation detected

- $\text{Deviation} \approx \frac{\text{ABS (Deviated value} - \text{Corresponding FP limit)} * 2}{\text{FP range}}$

$$\text{Deviation} \approx \frac{\text{ABS}\,(14-15)*2}{23-15}$$

$$= \frac{1*2}{8} = 0.25 \rightarrow \text{Score} = 75\%$$

- That calculation is repeated for all the data points, and the average is the final deviation result → Score = 1 - Deviation

TrendMiner solution

Automated fingerprint scoring

- Fingerprint profiles automatically generated from historic on-spec batches
  - Per line
  - Per product
- Score for each parameter added upon completion
- Correlate process deviations to quality losses
  - Deep dive into individual issues within TrendMiner
- Aggregate scores to higher level KPIs
  - E.g. monthly % of non-compliant batch profiles
  - Track compliance improvements over time

BP2_product	BP2_quality	Start date	BP2_UTIL	BP2_TEMP	BP2_SPEED	BP2_PRESSURE	BP2_LEVEL	BP2_CW
KAPPA	8.614207	02/01/2025 21:54:00	97.91193	98.3097	97.18448	84.97279	98.405075	97.86517
KAPPA	10.780528	02/01/2025 20:33:00	99.356445	98.768776	99.75508	98.48721	99.67983	98.97757
KAPPA	10.780528	02/01/2025 19:12:00	98.562706	98.19004	97.97237	97.53879	97.99462	99.30035
KAPPA	9.368264	02/01/2025 17:51:00	98.86967	98.920944	98.537766	98.427795	98.69191	99.29542
KAPPA	10.107449	01/01/2025 21:36:00	99.480515	98.91176	99.55775	97.88502	99.37386	99.21109
KAPPA	10.69101	01/01/2025 20:15:00	99.48911	99.262405	99.308525	98.20474	99.04675	99.20646
KAPPA	10.69101	01/01/2025 18:54:00	98.73811	98.55891	99.47056	98.431725	99.48933	98.40708
KAPPA	10.043003	01/01/2025 17:33:00	99.463936	98.90276	99.154045	98.42608	99.51462	99.417915
GAMMA	10.347335	02/01/2025 15:09:00	99.23702	99.108574	99.742226	98.62533	99.632904	98.77679
GAMMA	9.726413	02/01/2025 13:48:00	99.04497	98.77977	98.88382	98.50804	99.07476	99.55322
GAMMA	10.233311	02/01/2025 12:27:00	99.33919	99.153175	99.684875	98.6295	99.59423	99.324646
GAMMA	7.533343	02/01/2025 11:06:00	97.71419	99.00854	97.19422	85.8128	99.37302	98.48178
GAMMA	7.533343	02/01/2025 09:45:00	99.54022	99.46121	98.943436	87.01271	99.74385	99.33927
GAMMA	9.987611	02/01/2025 08:24:00	99.562416	99.209526	99.771805	97.255775	99.669556	99.2163
GAMMA	9.075665	01/01/2025 14:51:00	98.925934	98.74288	99.293755	98.54892	99.28759	98.92861
GAMMA	9.075665	01/01/2025 13:30:00	99.366585	98.94995	99.34015	98.29311	99.20497	99.4541
GAMMA	10.296471	01/01/2025 12:09:00	98.909454	98.92769	98.2543	98.58672	98.3455	99.29473
GAMMA	10.836048	01/01/2025 10:48:00	99.35561	99.18867	99.39755	98.377556	99.35925	99.172874
GAMMA	9.521204	01/01/2025 09:27:00	99.57998	99.094376	99.872795	98.657845	99.80528	99.17572

Wrap-up

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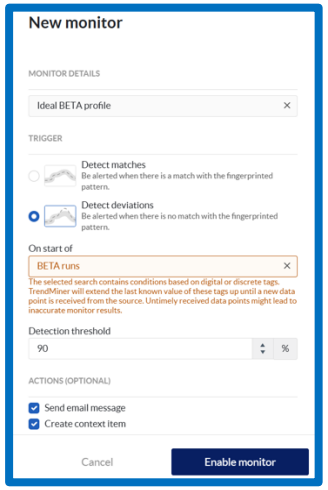
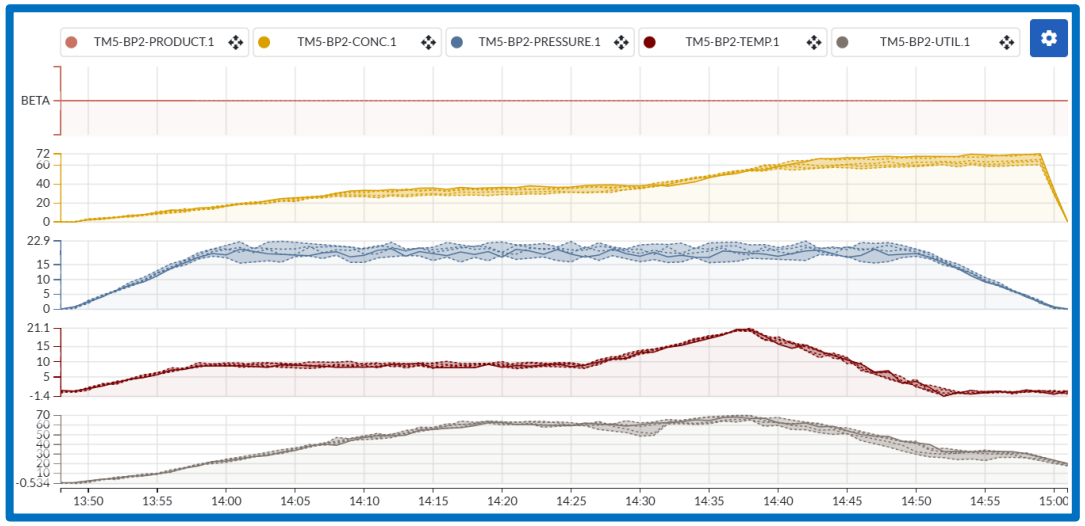
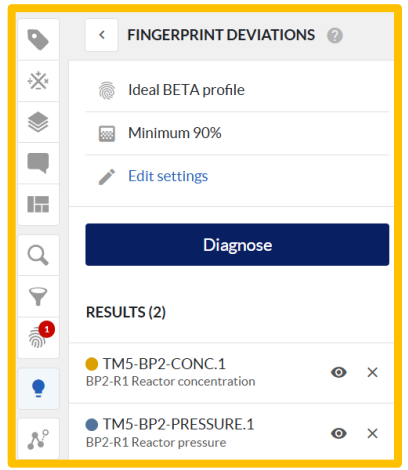






1

- Refine results to get ideal batches based on calculations

2

- Create fingerprint with ideal profile range
- Enable monitor to detect future deviations

3

- Analyze and diagnose fingerprint deviations
- Identify deviating process variables

TRENDLAB 2026

Europe
Eindhoven, NL

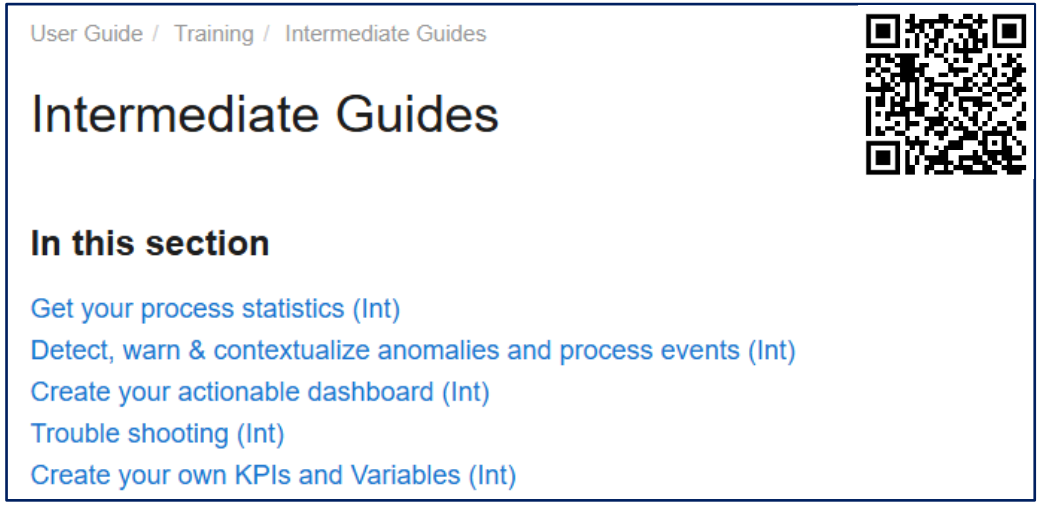
Americas
Houston,USA

Registration Link: https://community.trendminer.com/p/trendlab

Do you want to learn more?

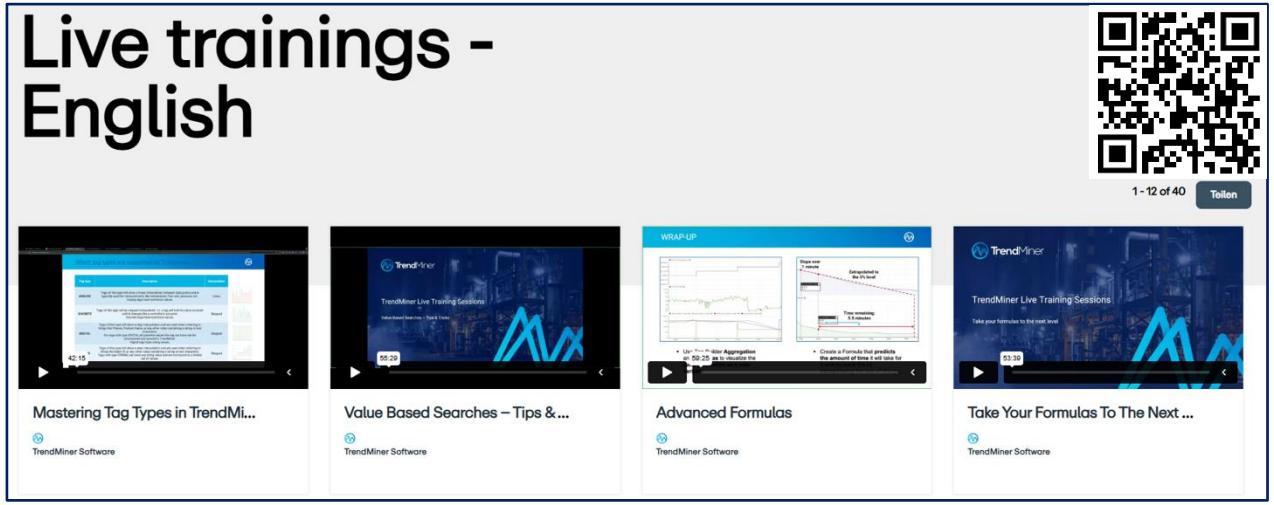
Intermediate Guides & Live Training Webinars

Here you can find the Intermediate Guides:



https://userguide.trendminer.com/en/intermediate-guides.html

Here you can find all Live Training Webinars from the past years:



https://vimeo.com/showcase/8476721

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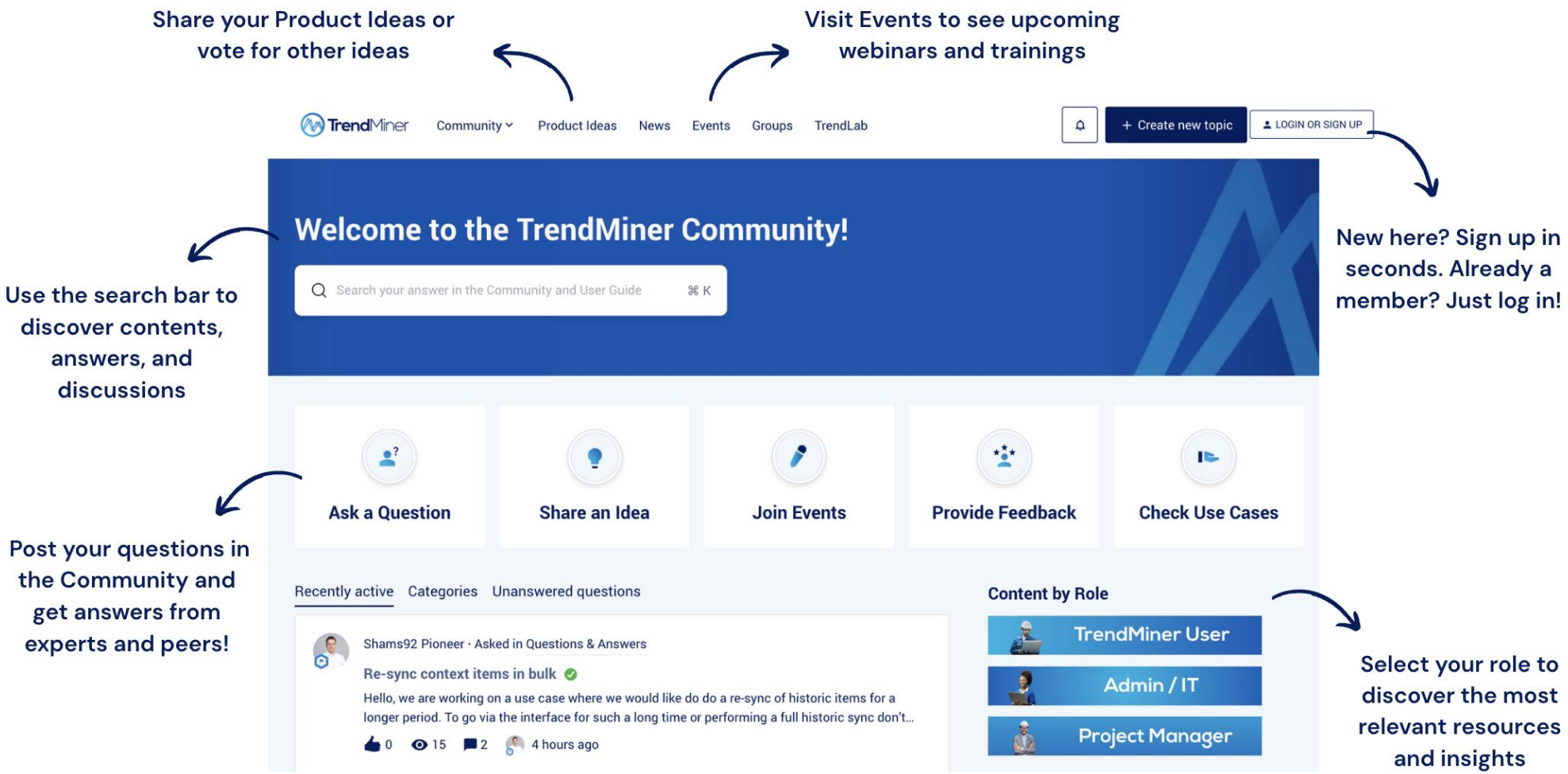

Thank you for your attention

TrendMiner