Cogniyug

A Real time BIG Data Analytics Platform for gaining Actionable Intelligence using Time Series Machine Data

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TechLineage

A famous American author Mark Twain once said, "A favourite theory of mine—to wit, that no occurrence is sole and solitary, but is merely a <mark>repetition</mark> of a thing which has happened before, and perhaps often." At TechLineage, we are truly inspired by this statement. We firmly believe that the business processes, problems or various events in real life repeat themselves. TechLineage is a 'Pattern Mining Company' that focuses on finding these <mark>subtle repetitions</mark> along with other vital statistics so that our customers make most out of their data.

TechLineage is a Tech Start-up with clear focus on 'Machine Data'. With our solid mathematics and computer programming background, we focus on solving real customer problems by writing innovative software with a unique data driven approach. Key strength of TechLineage is to analyze machine data using advanced Artificial Intelligence techniques and provide real time 'actionable intelligence' based on the pure facts derived from the data.

What is Cogniyug?

In simple words, Cogniyug is a BIG Data platform built by TechLineage for making decisions based on facts hidden in your 'machine data'. We believe that your machine data is worth its weight in gold! Hidden in it are interesting facts that no naked eye can see. Cogniyug reveals these facts thereby allowing you to improve the Availability and QoS of your business services. It provides actionable intelligence that enables you to make quick business decisions for maximizing revenue and improving the bottom line.

What is 'Machine Data' and how does Cogniyug use it?

'Machine data' is generated by computing equipments such as Computers, Application running on computers, Databases, Mobile Apps, Network Switches, Routers, Storage devices, etc. or non-computing equipments such as sensors, air conditioners, temperature sensors, fire alarm systems etc in the form of logs. Cogniyug is capable of consuming, storing, indexing and analyzing the data from diverse data sources. With a patent pending algorithm at its core, Cogniyug finds patterns from this Big Data providing actionable insights in real time.

Key capabilities and business benefits of Cogniyug

✓ **Diverse data sources and formats:**

Cogniyug is vendor agnostic. Essentially, it is does not enforce any restriction on the format of the data. It can consume data from any data source, in any format. This makes it flexible and powerful enough to handle vast amount of data from diverse data sources and analyze it together.

✓ **Indexing and searching:**

Lightening fast search helps to find exactly what you are looking for with time relevance.

✓ **Causal Analysis:**

A single-click Root Cause Analysis capability of Cogniyug reduces Mean Time to Resolution (MTTR) from hours to minutes. Complex causes can be analyzed and visualized with confidence measures, support levels and time relevance.

✓ **Predictive Intelligence:**

A solid mathematical model built by Cogniyug predicts key business and infrastructure events with precise accuracy. This helps businesses to seize opportunities to improve top line or minimize losses by taking appropriate preventive measures before hand.

✓ **Find deviations from desired trends:**

Cogniyug spots deviations from desired/normal trends in real time. This helps in preventing undesired consequences or to fine tune the processes.

✓ **Effect Analysis:**

With knowledge of patterns, Cogniyug is capable of ascertaining effects of critical events with a single click of mouse. This empowers you to make informed decisions before making a change.

✓ **Complex Business Intelligence Reports:** Unstructured log data can be used to generate complex Business Intelligence reports for improving operational efficiency, reducing cost etc.

✓ **Anomaly detection**

Cogniyug learns the behaviour of your business processes based on the data you feed and determines the normal behavioural patterns. It starts watching for the expected patterns and spots anomalies in real time. Cogniyug also provides an executive dashboard with instantaneous health status of your business processes based on the data, anomalies seen and other vital statistics that it learns in real time.

✓ **Custom Dashboards**

You may define custom dashboards on your data to visualize real time trends, rates and anomalies. It acts as a real time quick view for understanding the health at glance.

Who needs Cogniyug?

We live in the 'Data Age' and it is imperative to use our own data to our own benefit. Any business generating 'machine data' in the form of logs can benefit immensely if it smartly uses intelligence derived from its own data. Cogniyug provides 'actionable intelligence' in 'real time' unleashing the power of your own machine data.

What business verticals are currently using Cogniyug?

Cogniyug is being used in IT, Telecom and Retail sectors at the moment. In IT and Telecom it is being used with the main aim to maximize the Availability and improve the QoS the Infrastructure services. In Retail segment it is being used to understand customers' buying patterns, provide real time online recommendations and improve the sales. For deeper understanding, feel free to download the respective case studies from our website www.techlineage.com

What problems are customers solving using Cogniyug?

Key Cogniyug features used by our customers in **Telecom** sector are

- ✓ Root Cause Analysis to understand the reasons behind complex failures (rare as well repetitive)
- ✓ Understand the normal behavioural patterns and spot deviations
- ✓ Predictive Intelligence to predict critical events
- ✓ Generate complex BI reports using the facts in the telecom logs

Key Cogniyug features used by our customers in **IT/ITes** Infrastructure Services are

- ✓ Store and search through mammoth amount of logs generated by IT application
- ✓ Root Cause Analysis to understand the reasons behind complex failures
- ✓ Predictive Intelligence to predict key infrastructure failures

Key Cogniyug features used by our customers in the **Retail** sector are

- ✓ Market Basket Analysis and real time recommendations (With knowledge of patterns Cogniyug can recommend supplementary products as user tries to browse / buy the goodies online)
- ✓ Indentify in real time if an online user has bought weird goods together (If a user buys a camera with an extension wire that no one has bought before, Cogniyug will be able to identify this as a *rare pattern* and raise a flag real time)
- ✓ Help in creating promotional e-mails

Cogniyug for Engineering and Manufacturing

With increasing use of Robotics & Automation in Engineering and Manufacturing sector, it would be ideal to use Cogniyug to detect and prevent anomalies & outages from affecting business. We would be keen to pursue any opportunities in these sectors. If you have 'machine data', write to us on info@techlineage.com for a free PoC.

Cogniyug beyond IT, Telecom and Retail

Use of Cogniyug need not be limited to IT and Telecom Infrastructure services only. We firmly believe that the business processes are highly repetitive in nature. If your business activity is getting logged in any digital format, Cogniyug will be able to spot the hidden patterns in it. Using the knowledge of these patterns Cogniyug can provide actionable intelligence to every business vertical.

For example,

- ✓ If you are a banker and want to understand customer's spending patterns using the debit/credit card data, Cogniyug can be used readily for that.
- ✓ If you are into mobility and location specific services, Cogniyug can help you predict the next probable location of the mobile user.

Possibilities are countless...we encourage you to imagine what you could do with your data.

We would be keen to understand your business case and data. Based on your machine data, we are pretty optimistic that Cogniyug will provide value to your business using your own data.

How does Root Cause Analysis work?

Cogniyug is a pattern mining engine. It recognizes patterns (trends) in your data and identifies patterns from the data using its patent pending algorithm for Temporal Pattern Mining from your log files. (Actually, Cogniyug recognizes bunch of other patterns, but we explain the most useful and commonly observed pattern here)

Let us take an example – please consider the time series event trail as mentioned below:

(A, 1) (C, 2) (Y, 3) (I, 4) (K,5) (G,6) (Y,7) (C,8) (C,9) (U, 10) (V,11) (A,12) (W,13)..(B,101) (P,102) (N,103) (M,104) (L,105) (C,106) (Q,107).....(A,201) (Y,202) (P,203) (Y,204) (K,205) (K,206) (B,207) (K,208) (I,209) (B,210) ..(A,301) (Q,302) (C,303) (D,304) .... (A,401) (Z,402) (C,403) (D,404) ..(B,501) (I,502) (Z,503) (R,504) (A,505) (C,506) (D,507)

For sake of simplicity, we have indicated events with alphabets and timestamp with numbers starting with 1, indicate the seconds elapsed after we started to record the data. Thus,

(A, 1) denotes that event 'A' happened after 1 second,
(C, 2) denotes that event 'C' happened after 2 seconds and so on....
And finally (D, 507) denotes that event 'D' happened after 507 seconds from the time we started recording the events.
Just imagine this to be your log file, or windows event logs or syslogs and you are trying to understand why did event 'D' happen?

Unless we look at the above event trail very carefully, it is difficult to realize that there is an interesting trail of events as far as occurrence of event 'D' is concerned. On detailed examination, the above time series reveals patterns of events happening in 'close proximity of 4 seconds' in the above time series event sequence as highlighted below:

(A, 1) (C, 2) (Y, 3) (I, 4) (K,5) (G,6) (Y,7) (C,8) (C,9) (U, 10) (V,11) (A,12) (W,13)..(B,101) (P,102) (N,103) (M,104) (L,105) (C,106) (Q,107).....(A,201) (Y,202) (P,203) (Y,204) (K,205) (K,206) (B,207) (K,208) (I,209) (B,210) ..**(A,301)** (Q,302) **(C,303) (D,304)**.................**(A,401)** (Z,402) **(C,403) (D,404)** ..(B,501) (I,502) (Z,503) (R,504) **(A,505) (C,506) (D,507)**

We clearly see a co-relation between events A, C, D in the above time series sequence. In other words
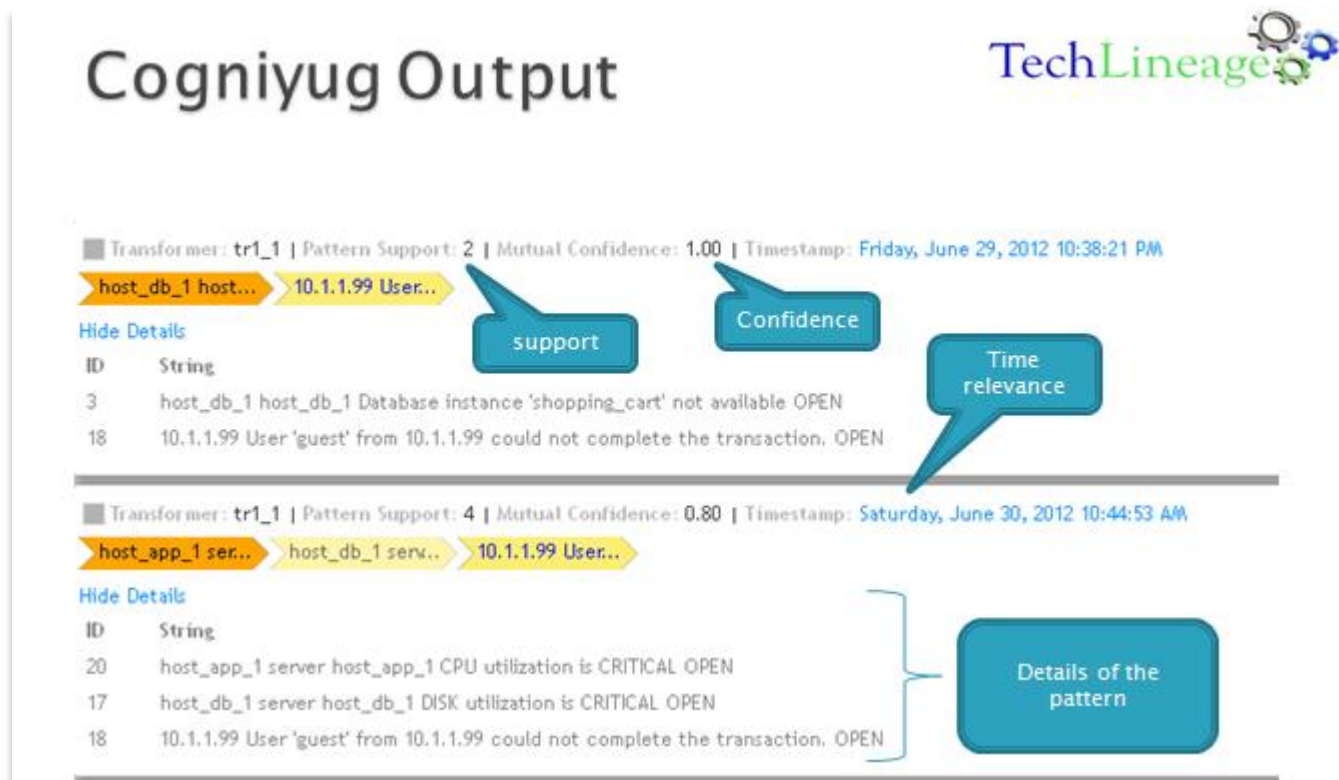
A-->C-->D is a pattern such that when event 'A' and event 'C' happen together with a close proximity of 4 seconds, they cause event 'D' to happen.

Cogniyug quickly identifies such patterns and reports them with statistical details such as 'Confidence', 'Support Levels' and 'Time Relevance' as explained below:

✓ **Confidence**: This indicates the confidence of the conclusion.

In the above example, we can say that pattern A->C (event 'A' followed by event 'C' in close proximity of 4 seconds) has happened 4 times and pattern A->C->D has happened 3 times. So the confidence measure of A->C to be a cause of D is 3/4 = 75%.

✓ **Support**: This indicates the number of times the pattern has occurred in overall database
✓ **Time Relevance**: Indicates the exact occurrences of the patterns
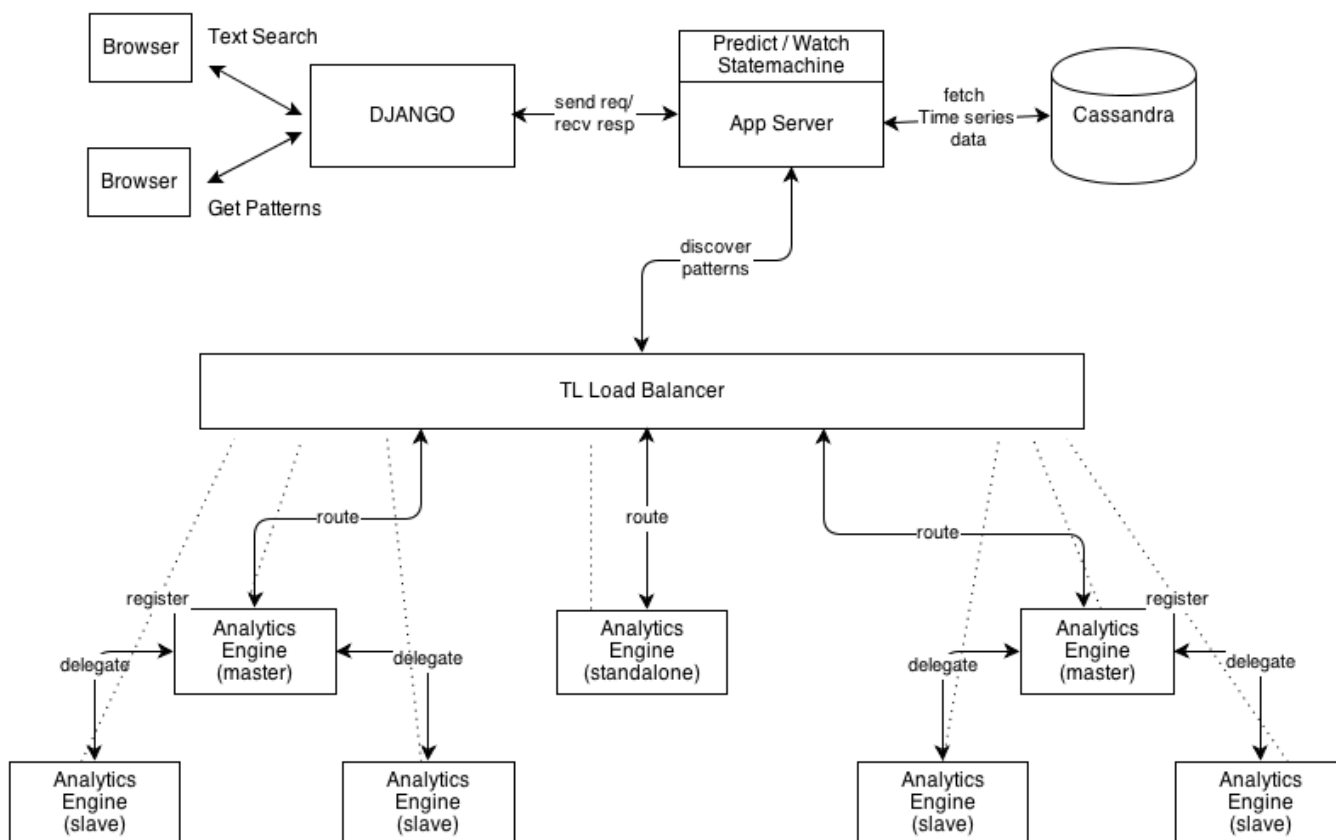

In addition, Cogniyug also identifies other useful statistics such as

✓ Periodicity/frequency
✓ Density
✓ Peaks, etc.

## How does Cogniyug mine patterns from large data sets?

Cogniyug can mine patterns in a highly distributed manner. Following diagram shows how pattern mining happens inside Cogniyug:

Cogniyug's Pattern Mining Grid uses a Hadoop-like Architecture that allows any number of nodes to be added to meet the desired load and performance criteria.

How does Cogniyug predict and how accurate are Cogniyug predictions?

Cogniyug predictions are based on the knowledge of patterns. Cogniyug identifies "all" patterns with high confidence and starts watching for them. Predictions are fired when predefined confidence thresholds are met and hence Cogniyug predictions are as accurate as the confidence measures. User may adjust the confidence thresholds to avoid false positives, define complex actions to be executed on predictions, check reports about the accuracy of predictions...and many other customizations. You may monitor the progress of the predictions in real time using prediction dashboards in Cogniyug UI.
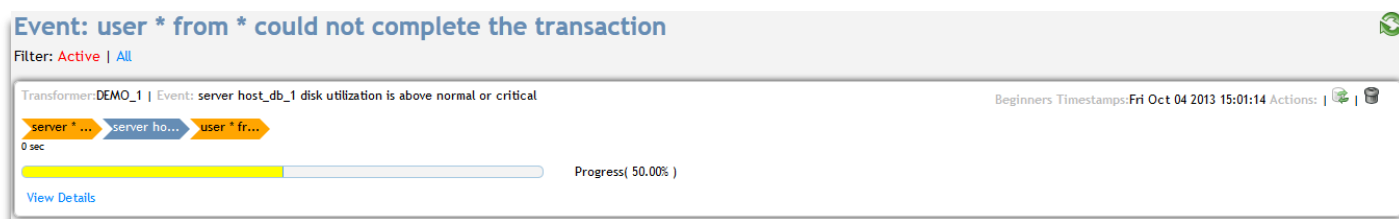
In the above example, event 'D' will be predicted with 75% accuracy if A and C happen in close enough proximity to each other.

You may also check the True Positives, False Negatives etc for every prediction using the prediction reports
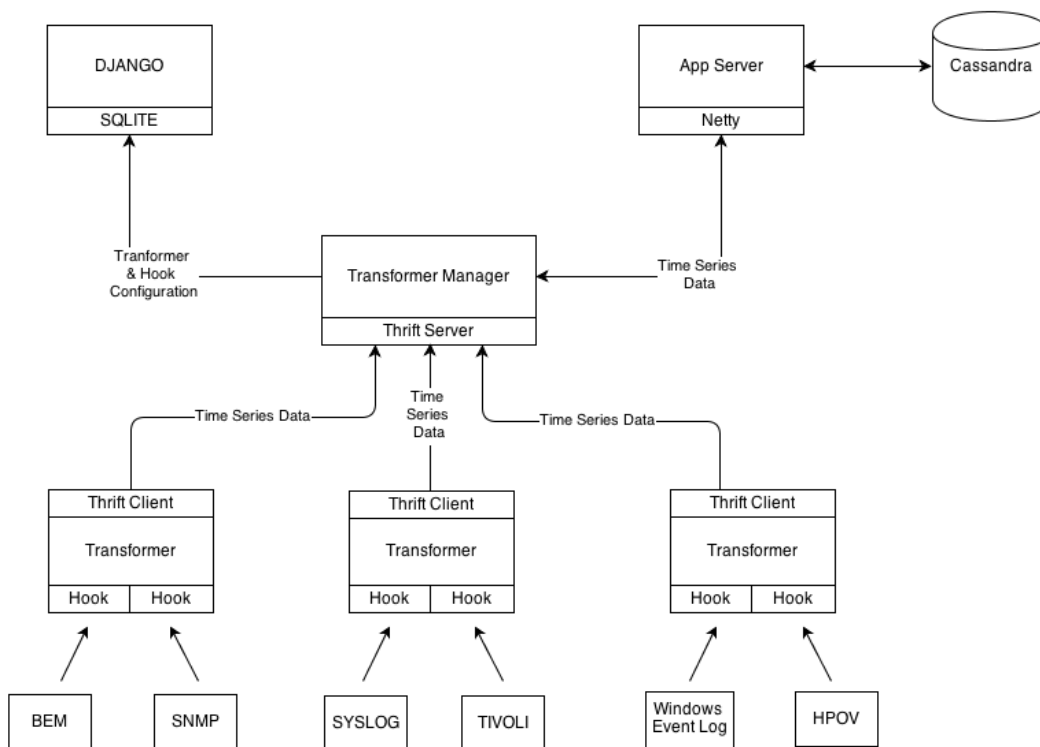

With new data coming in, the old patterns may become irrelevant and new patterns may emerge. Cogniyug is smart enough to identify these dynamic changes and update its prediction model.

How can I import the Data into Cogniyug?

Cogniyug accepts data in the format (which is quite simple) as mentioned below:

timestamp : <metadata> data

As long as the data conforms to Cogniyug Data Format, you can easily import any data into Cogniyug. Cogniyug supports distributed data collection mechanism so that data can be easily imported from any data source. You

may reuse one of the pre-packaged Hook scripts or write your own Hook script/program in any programming or scripting language that you are comfortable with to convert the data from source format to Cogniyug Data format. You may even upload files into Cogniyug using its web UI.

How much data can Cogniyug handle and how does it present it to the user?

Cogniyug is built to handle Big Data. Theoretically it can handle infinite amount of data. It uses state of art Big Data technologies for storing, indexing and searching through the Big Data. It uses a patent pending technology for mining interesting patterns and trends. A slick web-based UI acts as a presentation layer. APIs are also available for advanced users to interact with the platform.

Supported platforms and deployment options

Cogniyug is supported on Linux (x86_64) at the moment.

Cogniyug is built to scale and hence it supports flexible deployment options

- ✓ You may install all the components of Cogniyug on one server
  OR
- ✓ You may install each component on a dedicated server.
  OR
- ✓ For heavy load, you may install multiple instances of the same component of Cogniyug on different dedicated servers Or run multiple instance of the same component of the same server (provided hardware resources are available)

Cogniyug is designed to scale horizontally and it scales linearly with the load.

How do I acquire an evaluation version of Cogniyug and start using it?

Please feel to write to us on info@techlineage.com to avail evaluation license of Cogniyug. We will also assist you to import your data so that you can quickly start to search and analyze it. We will be happy to help you experiment with different capabilities of Cogniyug and discover its immense value.

Is Cogniyug available as a Service?

Cogniyug will be available as a service very soon