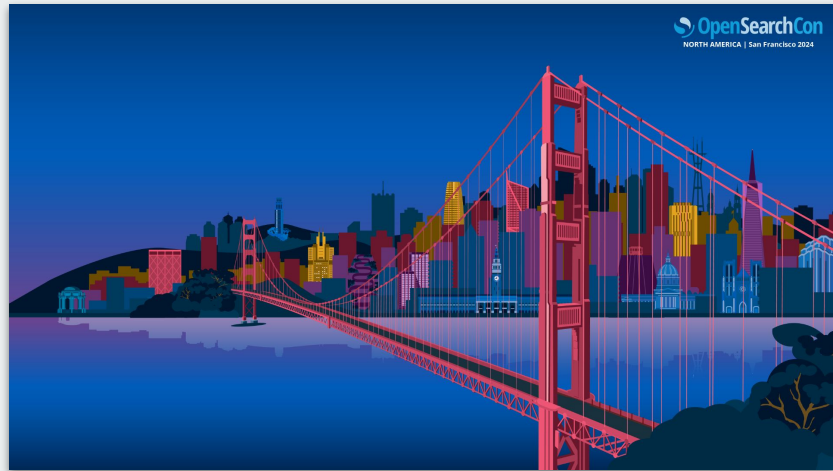


Vega Integration in OpenSearch Dashboards

Lior Perry and Aparna Sundar
OpenSearch Project



Today, we will cover

- Background and visualizations we can use today
- Problems with existing OpenSearch visual components
- What is Vega?
- What can you do with Vega?
- Let's Dive Deep

Observability

- Understanding a system from the outside
- Asking questions which are arbitrary (unknown in advanced)
- Being able to (efficiently) store data for future investigations
- Using simple and efficient (visual) tools to help incident investigations



Observability

- Modern system are complex by nature (micro-services, highly scalable)
- Telemetry Data volumes are big data by definitions
- Both Structured & Unstructured data-points with Many different protocols
- Multiple data perspectives (aggregative, discrete, continues)
- Multiple dimensionality perspectives (resource, operation, transaction)
- Investigation requires constant pivoting and data projections

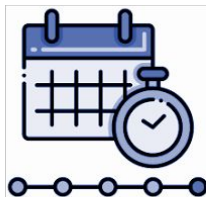
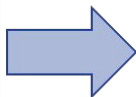


Observability

The On-Call / SRE daily work:

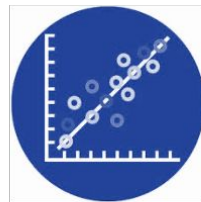
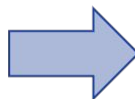


Something is wrong

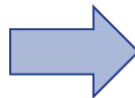


Alert

Incident



Correlate with



File a report

Hypothesis

Visualizations in Dashboards help with

- Real-time insights
- Centralized visibility
- Issue identification
- Proactive monitoring
- Alerting
- End-to-end workflow monitoring
- Help developers with speed of delivery

**Storytelling | Easy of Understanding |
Eliminate Noise | Highlighting Useful
information**



Visualizations you can use today

Quantitative

Numeric and Aggregate



Qualitative

Descriptive and Informative



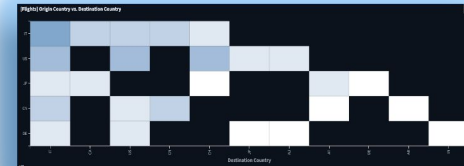
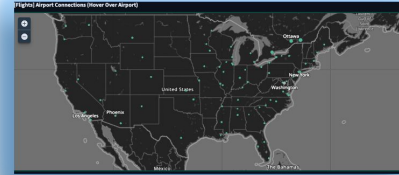
Visualizations you can use today: Qualitative

Descriptive and Contextual

Charts:

- Word cloud
- Heat-map
- Geo-map

Cloudy Clear Rain Sunny
Heavy Fog Damaging Wind Hail
Thunder & Lightning



Visualizations you can use today: Quantitative

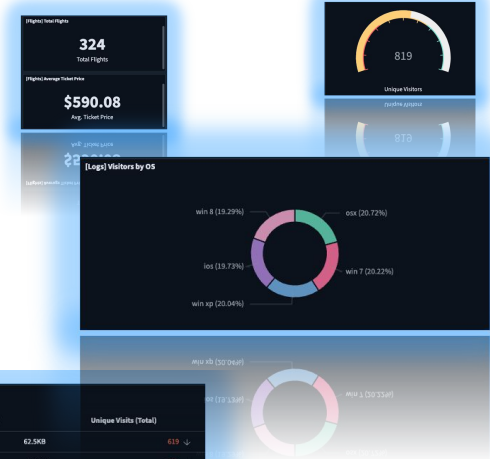
Percentage and Tabular (numeric and nonnumeric)

Charts:

- Pie
- Table
- Metrics
- Gauge

[Logs] Host, Visits and Bytes Table

Type ↑	Bytes (Total)	Bytes (Last Hour)	Unique Visits (Total)
	3.2MB	62.5KB	619 ↓
gr	1.6MB	1.9KB	281 ↓
css	1.4MB	7.8KB	204 ↓
zip	1.2MB	0B	206 ↓
deb	1.1MB	0B	175 ↓
rpm	465.8KB	8KB	71 ↓
data	607.8KB	8KB	17 ↑
php	7.1MB	0B	118 ↑

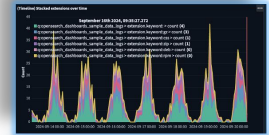
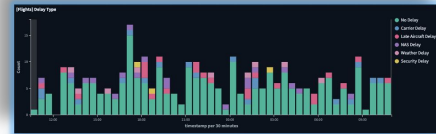


Visualizations you can use today: Quantitative

Numeric and Aggregate

Charts:

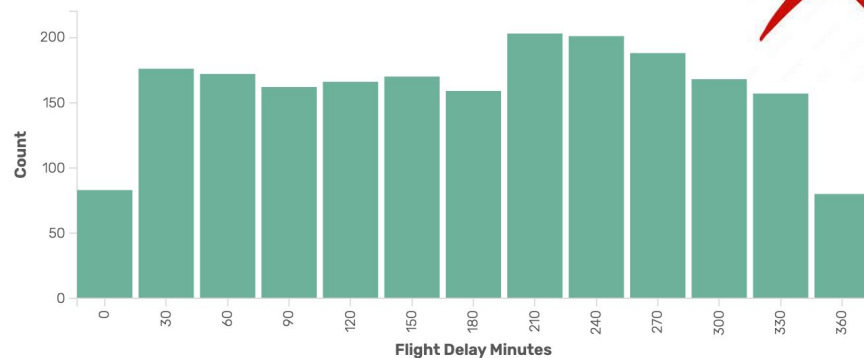
- Linear
- Discrete
- Histograms
- Scatterplots



Problems with existing OpenSearch visual components

1. Single query (limitation of visualizing joints)
2. Static and rigid (single perspective)
3. No animation
4. No connectivity

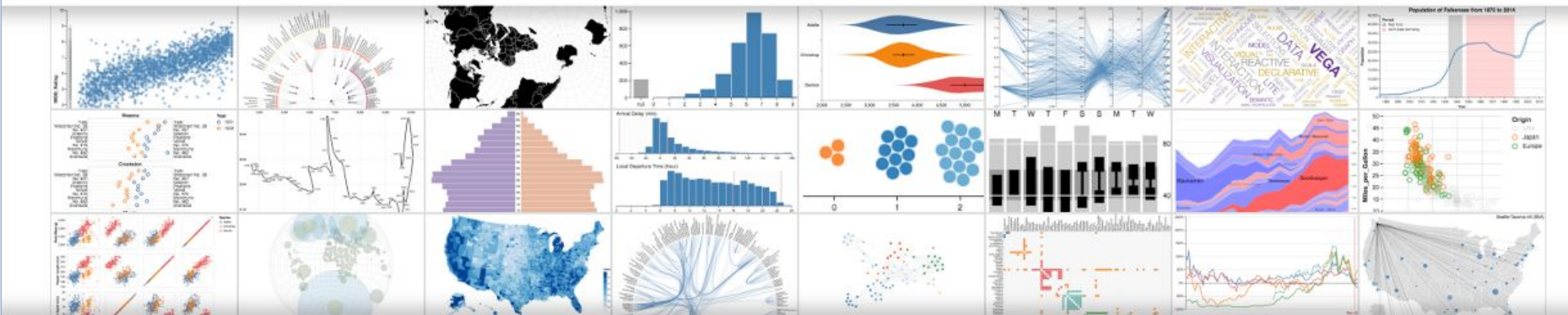
[Flights] Delay Buckets_olly



Problems with our existing visual components

1. Visualizations are hard coded with minimal configuration
2. We need a visual descriptive language

Vega – A Visualization Grammar

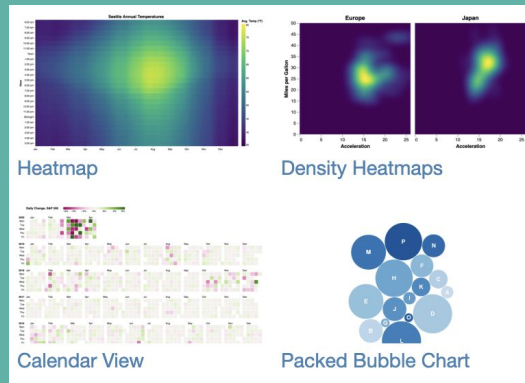


What is Vega?

Vega is a visualization grammar

Grammar Specifications

- Multiple datasets
- Independent data loading
- Enhanced data transformation and manipulations
- Dynamic visual components (scales, marks, legends)
- Dynamic movement and user interactive



What is Vega?

Vega is community driver

Community Driven

- Open source
- Highly adopted (<11k stars)
- Rich library of examples and related project
- Complementing API and SDK libraries (vega-lite, altair)



What can you do with Vega?

Charts | Plots | Distributions | Geo-Maps | Trees | Network Graphs | Gants | and more...

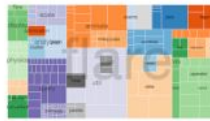
Tree Diagrams



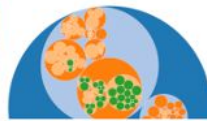
Tree Layout



Radial Tree Layout



Treemap

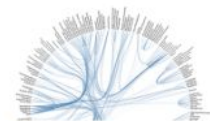


Circle Packing



Sunburst

Network Diagrams



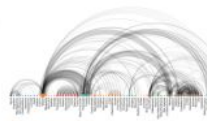
Edge Bundling



Force Directed Layout



Reorderable Matrix



Arc Diagram



Airport Connections

EXAMPLE

<https://vega.github.io/vega-embed/>

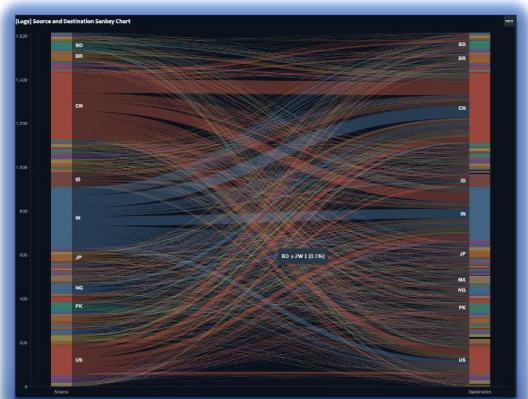


Vega Visualization Editor & OpenSearch Catalog

<https://vega.github.io/editor>



Useful editor to experiment



<https://github.com/opensearch-project/opensearch-catalog/tree/main/visualizations>



Benefits of Vega + OpenSearch Visualization

- OpenSearch DSL query interoperability
 - OpenSearch Dashboard filter context propagation
 - Dashboard in transitioning to Vega
 - Supporting a dedicated visualization catalog
-

<https://github.com/opensearch-project/OpenSearch-Dashboards/issues/7607>

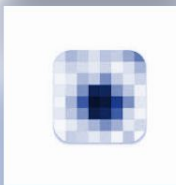
<https://github.com/opensearch-project/OpenSearch-Dashboards/pull/7288>

<https://github.com/opensearch-project/OpenSearch-Dashboards/issues/7067>



OpenSearch Vega Visualization Catalog


- OpenSearch has a Vega-visualization catalog (domain specific)
- This catalog is focused on Observability OTEL schema
- Assisting specific use cases common to Observability




Questions

<https://opensearch.org/blog/Improving-Dashboards-usability-with-Vega/>



Platform ▾Blog ▾Community ▾Documentation ▾

Download OpenSearch 2.17



Blog

Improving ease of use in OpenSearch Dashboards with Vega visualizations

Thu, May 30, 2024 · Aparna Sundar, Lior Perry

Improving ease of use in OpenSearch Dashboards with Vega visualizations

When we offer users a clunky dashboard interface, we increase usability pain points and user frustration. Improving the usability of software requires a sharp focus on user experience. Moreover, a poor interface restricts customizability, a prized requirement by high-code users. There are, however, ways to work around these hurdles in order to give users, especially those dependent on a UX to understand data (low-code users who are very sophisticated in comprehending data), an easy dashboard experience.

Take [Vega](#), for example. Vega is a powerful language for creating custom visualizations, and its integration with OpenSearch Dashboards enables users to craft complex and highly customized charts and graphs that go beyond standard visualizations. It allows users to create dashboards with enhanced aesthetics and visuals with a granular level of control. This flexibility is particularly useful for visualizing intricate datasets or when enhanced visualization formats are required. The beauty of data is that it lends itself to multiple modes of understanding. Users grasp data conceptually without any sensory assistance.

At the same time, users can understand data using basic human senses. An example of this is seeing two apples (visual perception), tasting a tart orange or a salty pretzel (taste perception), listening to A0 versus C8 notes (auditory perception), touching your pet or a rock (touch perception), or smelling your shoe or the fragrance of lavender (smell perception). As humans, we are programmed to perceive, and this helps us to understand the world. When we have confidence in what it is that we perceive, we feel confident in what we think we understand. When we are confident in what we know, we have high certainty in what we communicate to others. This helps us make better decisions. More importantly, it helps us communicate more crisply and with more certainty. In the context of dashboards, a more in-depth understanding of data is a powerful persuasion tool. Noted above are constructs that help with data comprehension. When the coefficient of correlation is high between two variables, we have high certainty in the relationship between the two variables. We can communicate this better by showing a scatter plot with a tighter spread. Communicating visually helps us navigate information quicker.

Aparna Sundar



Aparna Sundar is a Lead UX Researcher at OpenSearch Project. She has over 20 years of experience in the field of research and design and actively publishes in the cognitive science domain.

 [asundartweets](#)

 [apasun](#)

 [aparnasundar](#)

Lior Perry



Lior Perry is an AWS senior software development engineer focusing on OpenSearch. Lior has contributed to the open-source community for years and is leading the Observability domain bringing vast experience and domain knowledge.

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