

The Beginner's Guide to Dimensionality Reduction

Explore the methods that data scientists use to visualize high-dimensional data.

By: Matthew Conlen and Fred Hohman

Workshop on Visualization for AI Explainability
October 22, 2018

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By: [Matthew Conlen](#) and [Fred Hohman](#)

July 16, 2018

Dimensionality reduction is a powerful technique used by data scientists to look for hidden structure in data. The method is useful in a number of domains, for example document categorization, protein disorder prediction, and machine learning model debugging^[2].

The results of a dimensionality reduction algorithm can be visualized to reveal patterns and clusters of similar or dissimilar data. Even though the data is displayed in only two or three dimensions, structures present in higher dimensions are maintained, at least roughly^[7].

The technique is available in many applications, for example Google's [Embedding Projector](#)^[10] let's you view high-dimensional datasets embedded in two or three dimensions under a variety of different projections.

This guide will teach you how to think about these embeddings, and provide a comparison of some of the most popular dimensionality reduction algorithms used today.



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Matthew Conlen ✓
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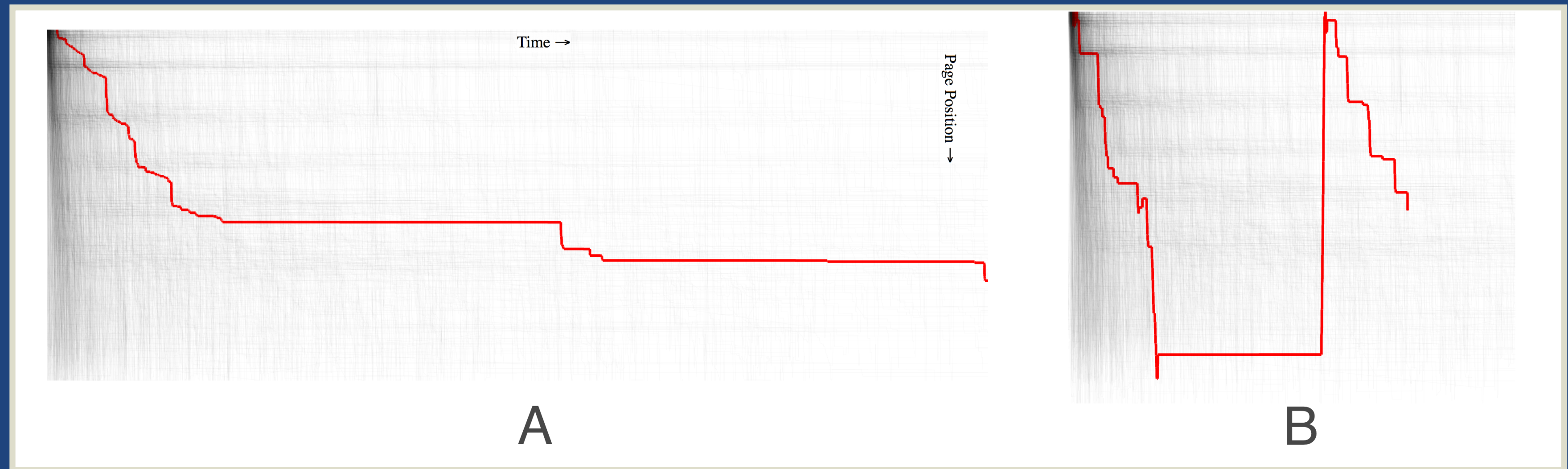
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↓ Just note that this is the very "dangerous" side to data science, where only the output of various methods are described, and not the underlying methods themselves!

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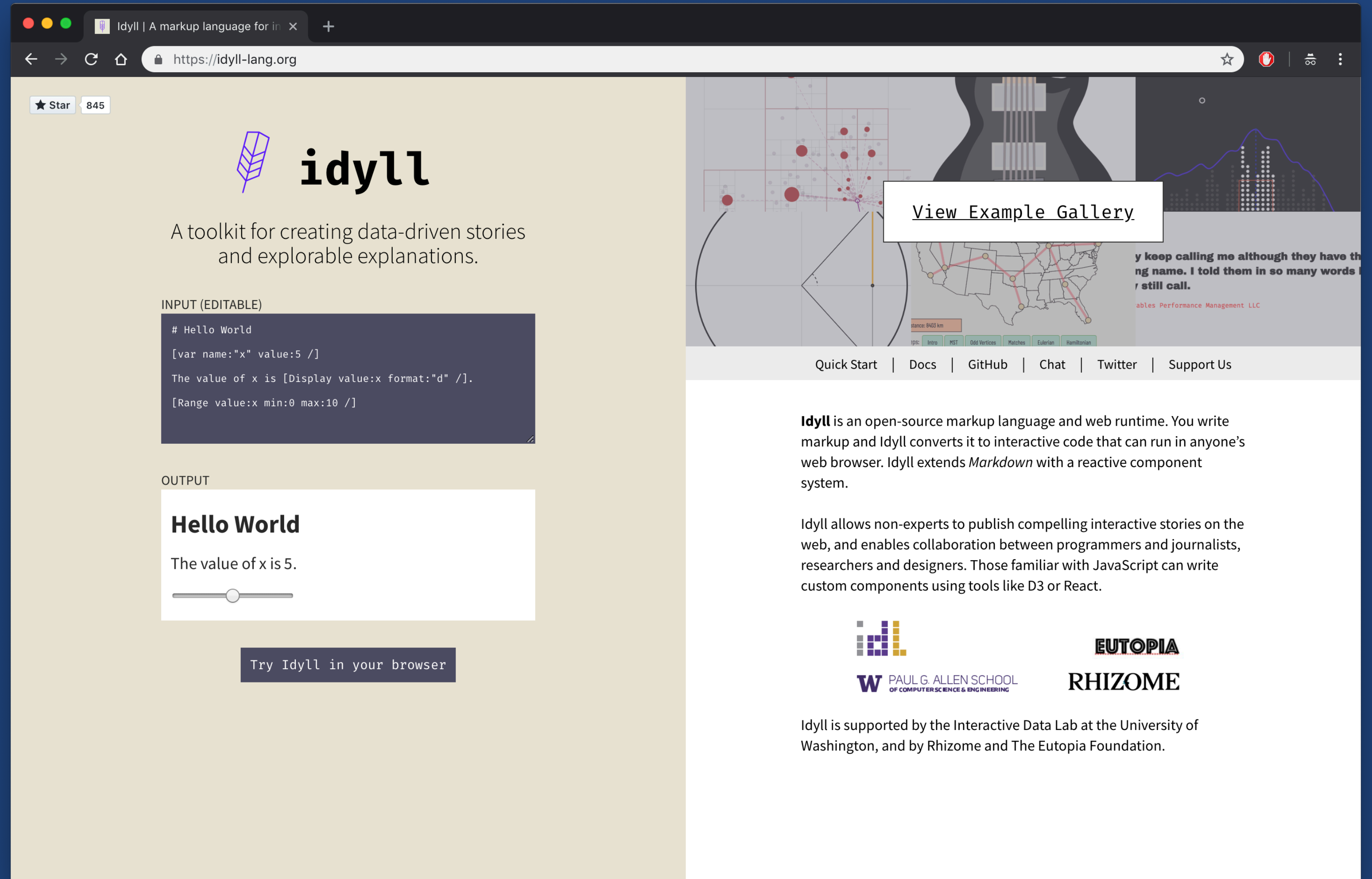
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↓ OP had a good intro to whet the appetite. If you want to learn more about what PCA is and how to implement it (including Python code), [check this out](#).

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How We Made It

Idyll
<https://idyll-lang.org/>



The screenshot shows the Idyll website in a browser. The left side features a live editor with the following content:

★ Star 845

 **idyll**

A toolkit for creating data-driven stories and explorable explanations.

INPUT (EDITABLE)

```
# Hello World  
[var name:"x" value:5 /]  
The value of x is [Display value:x format:"d" /].  
[Range value:x min:0 max:10 /]
```

OUTPUT

Hello World

The value of x is 5.

Try Idyll in your browser

The right side of the screenshot shows a gallery of examples. A callout box highlights a link: [View Example Gallery](#). Below the gallery, there is a navigation menu: Quick Start | Docs | GitHub | Chat | Twitter | Support Us.

Idyll is an open-source markup language and web runtime. You write markup and Idyll converts it to interactive code that can run in anyone's web browser. Idyll extends *Markdown* with a reactive component system.

Idyll allows non-experts to publish compelling interactive stories on the web, and enables collaboration between programmers and journalists, researchers and designers. Those familiar with JavaScript can write custom components using tools like D3 or React.

Idyll is supported by the Interactive Data Lab at the University of Washington, and by Rhizome and The Eutopia Foundation.

Logos for Paul G. Allen School of Computer Science & Engineering, EUTOPIA, and Rhizome are displayed at the bottom.

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Explore the methods that data scientists use to visualize high-dimensional data.

<https://github.com/mathisonian/dimensionality-reduction>



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