Cut your EDA time into 5 minutes with Exploratory DataXray Analysis (EDXA)

Posted on January 5, 2023 by **Business Science** in **R bloggers** | 0 Comments

Do you know how long EDA (exploratory data analysis) used to take me? Not hours, not days... A full week! Listen, you don't know how good you have it. With this new R package I'm about to show you (plus one BONUS hack), you'll cut your EDA time into 5 minutes. Here's how.

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Today I'm going to show you how to use `dataxray`. Here's what you're learning today:

- Tutorial: How to use `dataxray` to effortlessly produce and evaluate statistical summaries on your new datasets
- **Bonus: The *next step* in my EDA process (that uncovers hidden insights that I use to give quick wins to business leadership)**

R-Tips Weekly

This article is part of R-Tips Weekly, a weekly video tutorial that shows you step-by-step how to do common R coding tasks. Pretty cool, right?

Here are the links to get set up. 👇

- Get the Code
- YouTube Tutorial

This Tutorial is Available in Video

I have a companion video tutorial that shows even more secrets (plus mistakes to avoid). And, I'm finding that a lot of my students prefer the dialogue that goes along with coding. So check out this video to see me running the code in this tutorial. 👇

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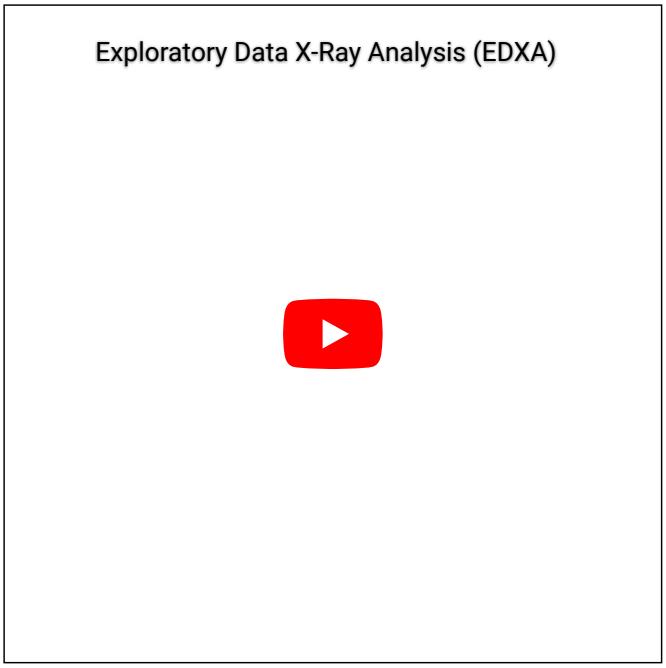
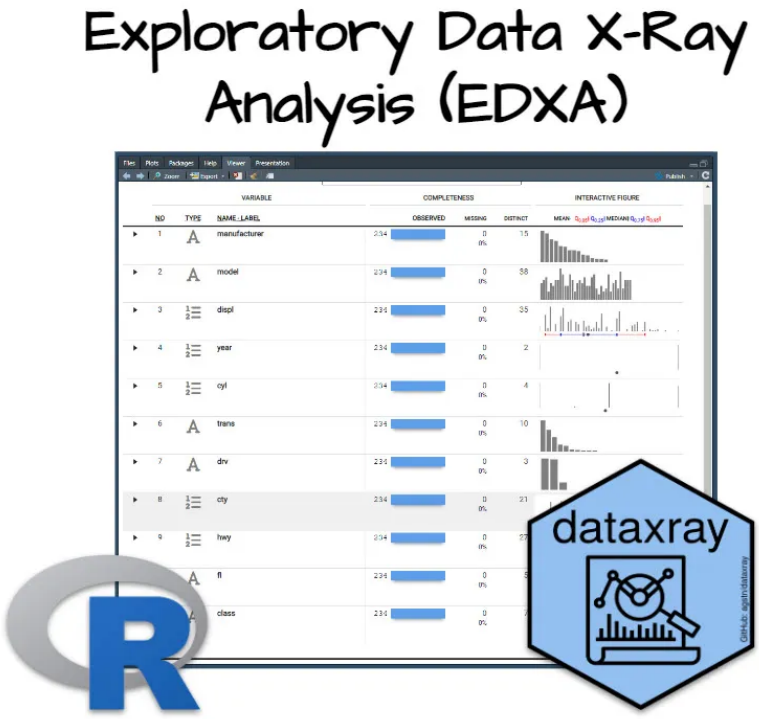


What Is Exploratory Data Analysis?

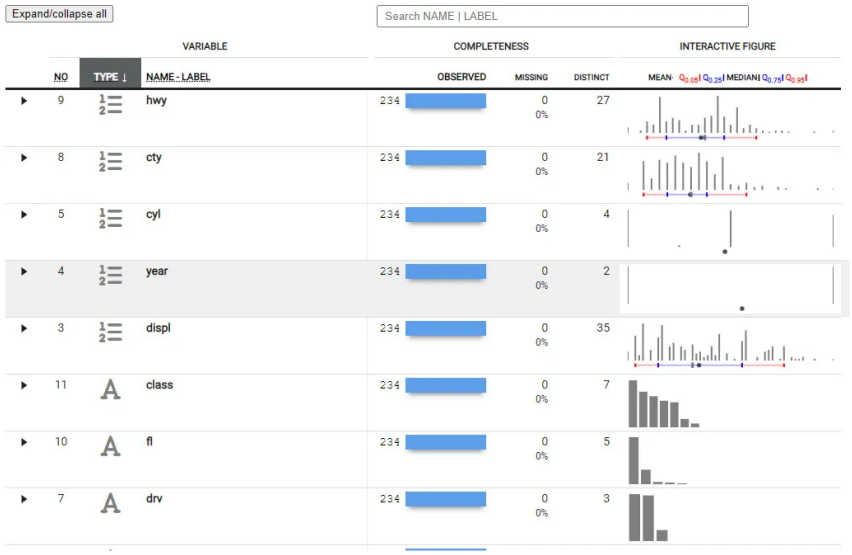
Exploratory Data Analysis (EDA) is how data scientists and data analysts find meaningful information in the form of relationships in the data. EDA is absolutely critical as a first step before machine learning and to **explain business insights** to non-technical stakeholders like executives and business leadership.



What do I make in this R-Tip?

I'm so excited right now. If you follow me, you probably know one of my favorite R packages is the `skimr` library for **quick exploratory statistical summaries** (the first thing I run when I get a new dataset). Well, I just stumbled upon *the interactive version* of skimr. And it's insane!

I'm referring to `dataxray`, a new R package that provides quick statistical summaries in an interactive table inside of the Rstudio Viewer Pane. Here's the interactive `dataxray` table you're going to make in this tutorial from R. 👇



Dataxray Interactive Exploratory Summaries

Thank You to the Developer.

Before we do our deep-dive into `dataxray`, I want to take a brief moment to thank the developer, Agustin Calatroni, Senior Director of Biostatistics at Rho, Inc. Please connect and follow Augustin. His work is on GitHub here.

Agustin Calatroni · 2nd
Senior Director, Biostatistics at Rho, Inc
San Diego, California, United States · Contact info
308 connections
Rho Rho

My 3-Step Exploratory Data Analysis Process

It can be confusing to know which EDA R packages to use. To help, I've recently covered my top R packages for exploratory data analysis here. In short, here's my process:

1. **DataExplorer (and Skimr):** For collecting a report on the dataset that I'm unfamiliar with. I focus on which feature I'm interested in (called a "target") and the surrounding data to identify any data issues. I cover my DataExplorer process here. And, I show off how I use skimr here.
2. **Correlation Funnel:** I then use this to get a quick understanding (full disclosure – I am the creator of this package, but make no mistake it's probably the most powerful package for getting quick insights in your arsenal). I cover how I use Correlation Funnel here.
3. **Explore:** If I want to further understand complex relationships, I'll use the explore package's shiny app to expose bivariate relationships and drill in. I explain how to use explore here.

With all these great EDA packages, why use `dataxray`?

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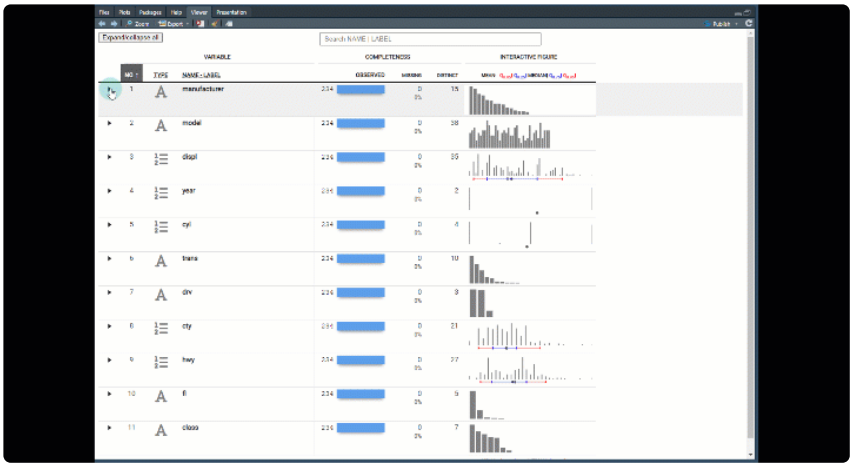
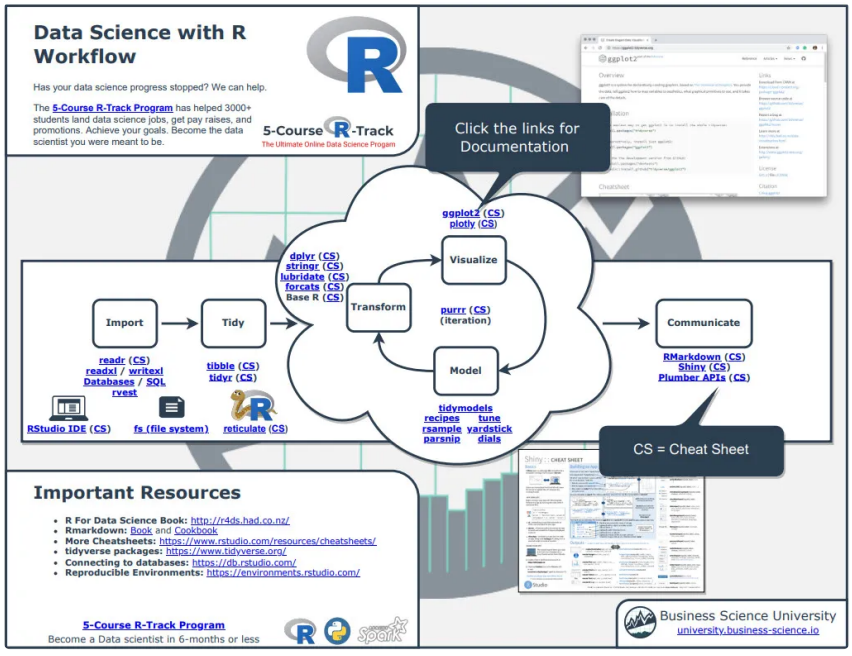
What I like about `dataxray` is its emphasis on an **interactive exploration** of the exploratory summaries. This goes beyond what `skimr` offers (the gold standard) by adding an interactive exploration element to feature summaries. So if you like interactivity, then try `dataxray`.



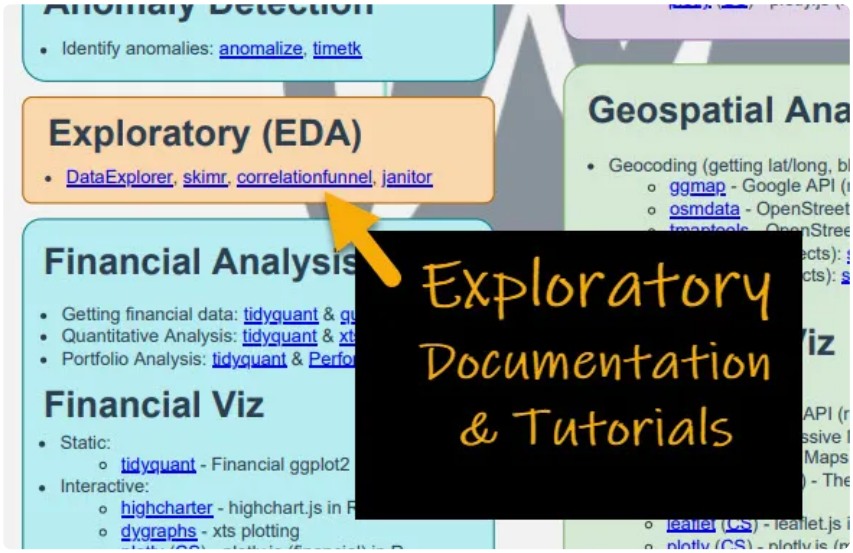
I'm going to give you a free gift right now to help with (and after you are done with) this tutorial...

Free Gift: Cheat Sheet for my Top 100 R Packages (EDA included)

Even I forget which R packages to use from time to time. And this cheat sheet saves me so much time. Instead of googling to filter through 20,000 R packages to find a needle in a haystack. I keep my cheat sheet handy so I know which to use and when to use them. Seriously. This cheat sheet is my bible.



Once you download it, head over to page 3 and you'll see several R packages I use frequently just for Exploratory Data Analysis.



And you get the same guidance which is important when you want to work in these fields:

- Machine Learning
- Time Series
- Financial Analysis
- Geospatial Analysis
- Text Analysis and NLP
- Shiny Web App Development

So steal my cheat sheet. It will save you a ton of time.

Tutorial: Interactive exploratory summaries with `dataxray`

Here's how to use `dataxray` to start your exploratory data analysis on the right foot.

Step 1: Load the libraries and data

First, load libraries `tidyverse` , `dataxray` , and (optionally) `correlationfunnel` for the bonus code.

Get the code.

We'll use the `mpg` dataset, which has data on 234 vehicle models.

Step 2: Make the Dataxray Table

Next, just use two functions:

1. `make_xray()` to convert the raw data to preformatted data for the reactable interactive table
2. `view_xray()` to display the interactive exploratory table using the underlying reactable library.

Get the code.

The result is an amazing reactable table that allows us to drill into each feature.

Exploratory Data Analysis Dataxray

Now you can explore each feature (column in your data) to see:

1. **Count and Percent Missing – How many `NA` values**
2. Number of Distinct – How many unique observations
3. **Categorical Data – Bar charts for frequency by category**
4. Numeric Data – Distribution with histogram and quantiles
5. **Expandable Groups – I love this feature. You can expand the groups to find out more information about the features.**
6. Search Features – Use regex to search the name. Great if you have a lot of features (columns).

Bonus: Correlation Funnel

The next step in my 3-step process is to immediately move to business insights. I can't tell you how important it is to get a quick win for your stakeholders. Whether it's your boss, a business executive in the C-suite, or your client if you are a consultant. You need to get insights fast.

So here's how I do it.

Step 1: Run correlation funnel

Here's the code (make sure you have `correlationfunnel` loaded).

Get the code.

The only trick is to pick which target to hone in on.

Here's how.

- **The `binarize()` function bins the data, which converts everything to 1 and 0.**
- The `glimpse()` function is used to see all of the column names, which have been expanded from the binning operation.
- **The `correlate()` function creates the raw insights. The only trick is to pick which target.**
- *How to pick a target?* For numeric features like `hwy`, it gets binned. So I'm going to hone in on the bin `hwy__27_Inf`, which is basically like saying, "I want to know which features in my data are related to greater fuel economy (fuel efficiency)
- **Then run `plot_correlation_funnel()` *a* to expose the key relationships in a visualization.**

Step 2: Review the Correlation Funnel Plot

The resulting visualization looks like this. And you can quickly expose the insights in your data.

I can easily see that:

- **Positive Correlation to Highway Fuel Economy:** If the vehicle has high city fuel economy, low engine displacement (smaller engine size), 4 cylinders, front-wheel drive, is a Volkswagen or Honda, is a Civic or Corolla Model, and is a Compact, Subcompact, or Midsize.
- **Negative Correlation to Highway Fuel Economy:** When engine size is 4.6Liter or lager, 8 cylinder, 4-wheel drive, Dodge or Ford Manufacturers, and SUV and Pickup class

Not bad for 5 minutes of effort.

💡 Conclusions

You learned how to use the `dataxray` library to create an interactive exploratory summary report AND perform exploratory analysis the fast way with `correlationfunnel`. Great work! **But, there's a lot more to becoming a data scientist.**

If you'd like to become a Business Scientist (and have an awesome career, improve your quality of life, enjoy your job, and all the fun that comes along), then I can help with that.

My Struggles with Learning Data Science

It took me a long time to learn how to apply data science to business. And I made a lot of mistakes as I fumbled through learning R.

I specifically had a tough time navigating the ever-increasing landscape of tools and packages, trying to pick between R and Python, and getting lost along the way.

If you feel like this, you're not alone.

In fact, that's the driving reason that I created Business Science and Business Science University (You can read about my personal journey here).

What I found out is that:

1. **Data Science does not have to be difficult, it just has to be taught from a business perspective**
2. **Anyone can learn data science fast provided they are motivated.**

How I can help

If you are interested in learning R and the ecosystem of tools at a deeper level, then I have a streamlined program that will **get you past your struggles** and improve your career in the process.

It's my 5-Course R-Track System. It's an integrated system containing 5 courses that work together on a learning path. Through 8 projects, you learn everything you need to help your organization: from data science foundations, to advanced machine learning, to web applications and deployment.

The result is that **you break through previous struggles**, learning from my experience & our community of 2653 data scientists that are ready to help you succeed.

Ready to take the next step? Then let's get started.

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