



Employee Attrition Prevention

Select an employee, and learn how best to prevent their attrition.

Denise Mooney, 71.8%



Attrition Risk

71.8%



Prediction

Leave



ML Powered Web Apps

Decision Making at Scale

Sales Executive

JobLevel = 2

YearsSinceLastPromotion <= 1

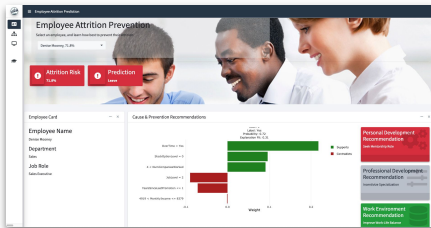
Professional Development
Recommendation

Incentivize Specialization

Matt Dancho

Business Science Workshop at DSGO19





Software Dev

tidyquant

130K+ Downloads

Consultant

Fortune 500

Build Software, Train People, Get ROI

Founder

Business Science

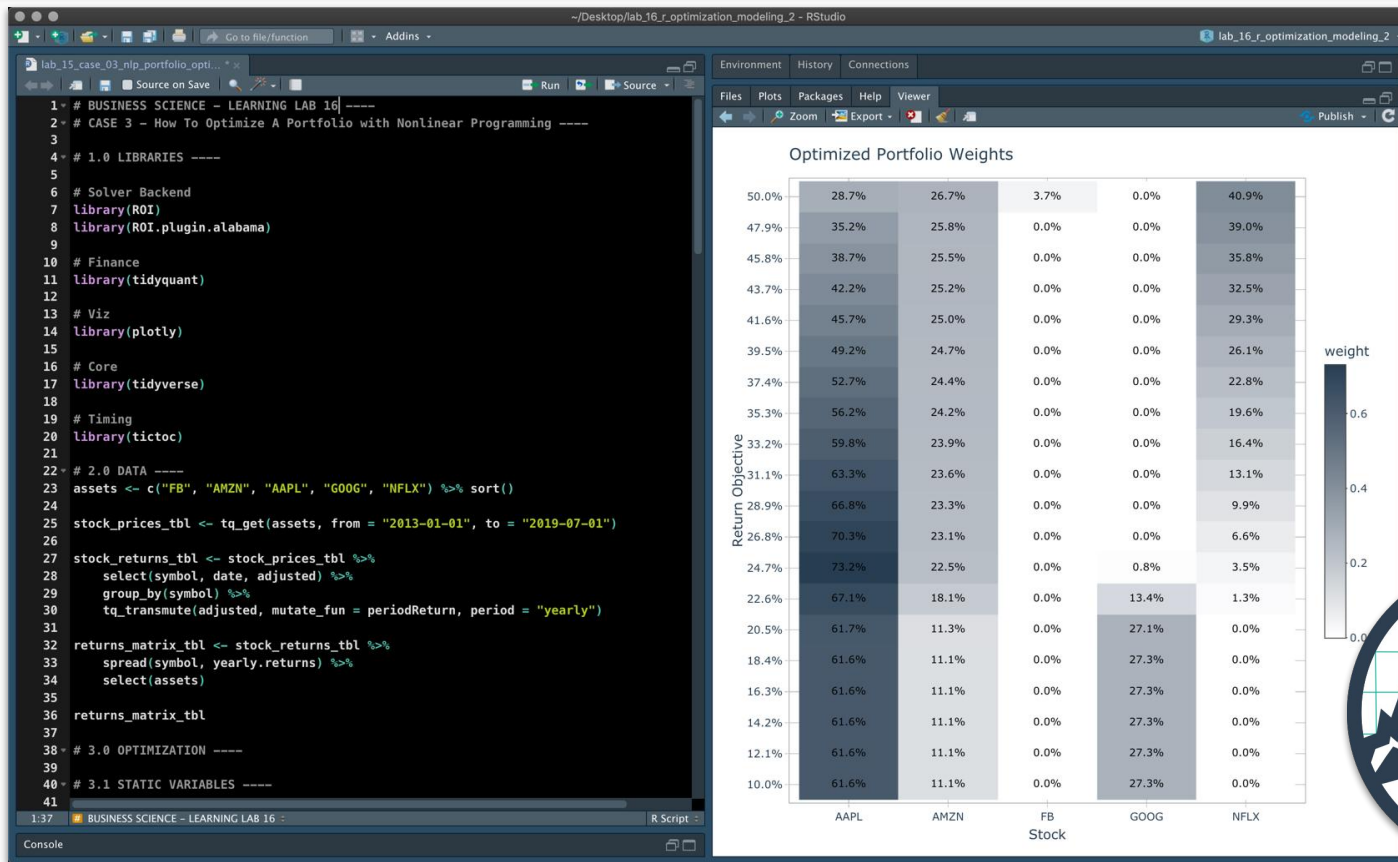
www.business-science.io

13 years of business experience. And, I like to **educate**.

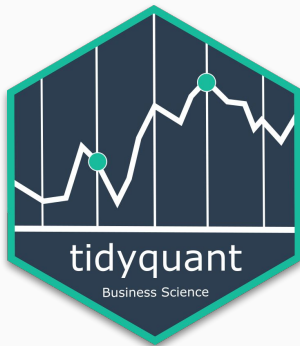


Matt Dancho

Data Science Resume



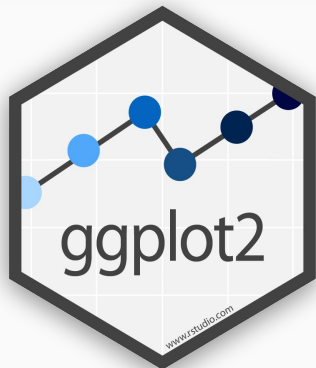
Tidyquant & dplyr



```
22 # 2.0 DATA ----
23 assets <- c("FB", "AMZN", "AAPL", "GOOG", "NFLX") %>% sort()
24
25 stock_prices_tbl <- tq_get(assets, from = "2013-01-01", to = "2019-07-01")
26
27 stock_returns_tbl <- stock_prices_tbl %>%
28   select(symbol, date, adjusted) %>%
29   group_by(symbol) %>%
30   tq_transmute(adjusted, mutate_fun = periodReturn, period = "yearly", col_rename = "returns")
31
32 returns_matrix_tbl <- stock_returns_tbl %>%
33   spread(symbol, returns) %>%
34   select(assets)
35
36 returns_matrix_tbl
37
```

```
130 # 4.3.1 Heat Map ----
131 plot_heatmap <- function(data) {
132
133   data_transformed_tbl <- data %>%
134     mutate(sharpe_ratio = portfolio_return / portfolio_stddev) %>%
135     mutate(portfolio_id = row_number()) %>%
136     gather(key = stock, value = weight,
137            -sharpe_ratio, -portfolio_return, -portfolio_stddev,
138            -portfolio_id, -return_constraint,
139            factor_key = TRUE) %>%
140     mutate(return_objective = scales::percent(return_constraint)) %>%
141     mutate(label_text = str_glue("Return Objective: {scales::percent(return_constraint)}
142                                Portfolio Return: {scales::percent(portfolio_return)}
143                                Portfolio Sharpe: {round(sharpe_ratio, 2)}
144                                Portfolio StdDev: {round(portfolio_stddev, 2)}"))
145
```

ggplot2 & purrr



```
145
146 g <- data_transformed_tbl %>%
147   ggplot(aes(stock, y = return_objective, fill = weight)) +
148   geom_tile() +
149   geom_point(aes(text = label_text), size = 0.1, alpha = 0) +
150   scale_fill_gradient(low = "#FFFFFF", high = "#2c3e50") +
151   geom_text(aes(label = scales::percent(weight)), size = 3) +
152   theme_tq() +
153   labs(title = "Optimized Portfolio Weights", x = "Stock", y = "Return Objective")
154
155   ggplotly(g, tooltip = "text")
156
157 }
158
159 portfolio_sim_results_tbl %>% plot_heatmap()
160
```

```
119
120 # 4.2 Map (Simulation) ----
121 tic()
122 portfolio_sim_results_tbl <- seq(0.10, 0.50, length.out = 20) %>%
123   map_dfr(optimize_portfolio)
124 toc()
125
126 portfolio_sim_results_tbl
127
```

Now I get to do fun things like DSGO19!

ML Powered Web Apps for Business!



Matt Dancho

Day 1, Friday 27

Day 2, Saturday 28

Day 3, Sunday 29

The Newcomer

The Practitioner

The Manager

Artificial Intelligence

Big Data / Analytics

Machine Learning

Data Visualization

Data Science in Business

Deep Learning

Careers / Empowerment

8:00 - 17:00

Exclusive Workshops: These are NOT included in the regular ticket price and are sold separately after securing your DSGO pass. *We have limited seats available.*

Main Foyer

Registration for Training Day

Workshop Room 1

Michael Padilla

Incorporating Docker into Your Data Science Workflow

|

Workshop Room 2

Geoff Sims

Beyond bi-grams: How to Make Friends with Product Managers

|

Workshop Room 1

Kirill Eremenko

Visualization & Presentation Hacks for Data Scientists

|

Workshop Room 2

Laura Norén

Are you an Ethical Technologist? Build your Ethical Imagination

|

Workshop Room 1

Alison Peebles Madigan

Saving Puppies with Pandas

|

Workshop Room 2

Matt Dancho

Building Machine Learning-Powered Web Applications for the Business

|

16:00 - 18:00

Pre-Registration for the Conference

18:00 - 21:00

Networking bar crawl

A circular logo featuring a stylized line graph with an upward trend, set against a dark background with a city skyline silhouette.

The Roadmap

How **Web Apps** Solve Business Problems

Case Study: True Cost of Employee Churn



- **SIMPLE CALCULATION**

Direct costs

Lost Productivity

Savings (Salary & Benefits)

- **\$78K COST / EMPLOYEE**

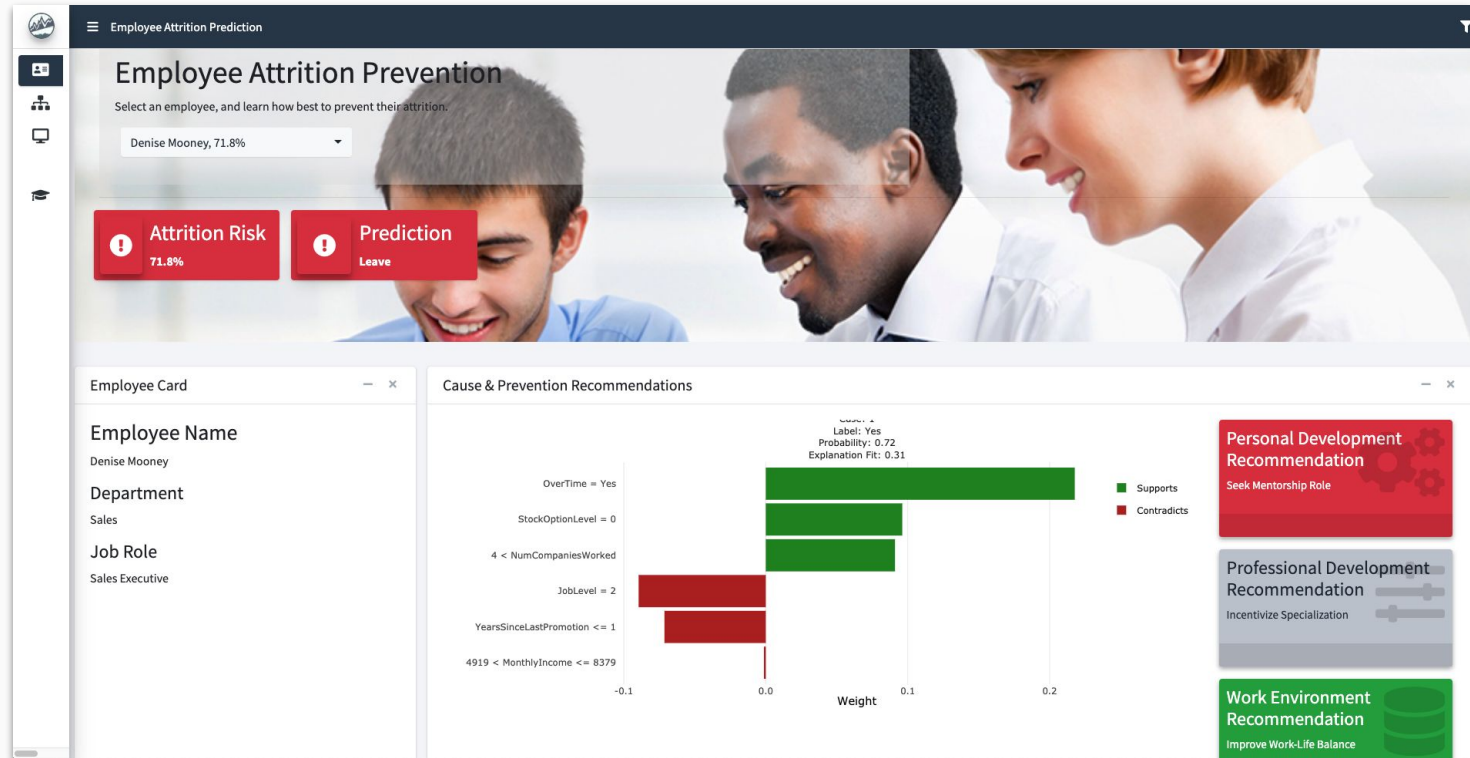
- **IF ORGANIZATION LOSES 200 HIGH PERFORMERS EACH YEAR...**

```
calculate_attrition_cost <- function(  
  
  # Employee  
  n          = 1,  
  salary     = 80000,  
  
  # Direct Costs  
  separation_cost = 500,  
  vacancy_cost   = 10000,  
  acquisition_cost = 4900,  
  placement_cost  = 3500,  
  
  # Productivity Costs  
  net_revenue_per_employee = 250000,  
  workdays_per_year       = 240,  
  workdays_position_open  = 40,  
  workdays_onboarding     = 60,  
  onboarding_efficiency    = 0.50  
  
) {  
  
  # Direct Costs  
  direct_cost <- sum(separation_cost, vacancy_cost, acquisition_cost, placement_cost)  
  
  # Lost Productivity Costs  
  productivity_cost <- net_revenue_per_employee / workdays_per_year *  
    (workdays_position_open + workdays_onboarding * onboarding_efficiency)  
  
  # Savings of Salary & Benefits (Cost Reduction)  
  salary_benefit_reduction <- salary / workdays_per_year * workdays_position_open  
  
  # Estimated Turnover Per Employee  
  cost_per_employee <- direct_cost + productivity_cost - salary_benefit_reduction  
  
  # Total Cost of Employee Turnover  
  total_cost <- n * cost_per_employee  
  
  return(total_cost)  
}
```

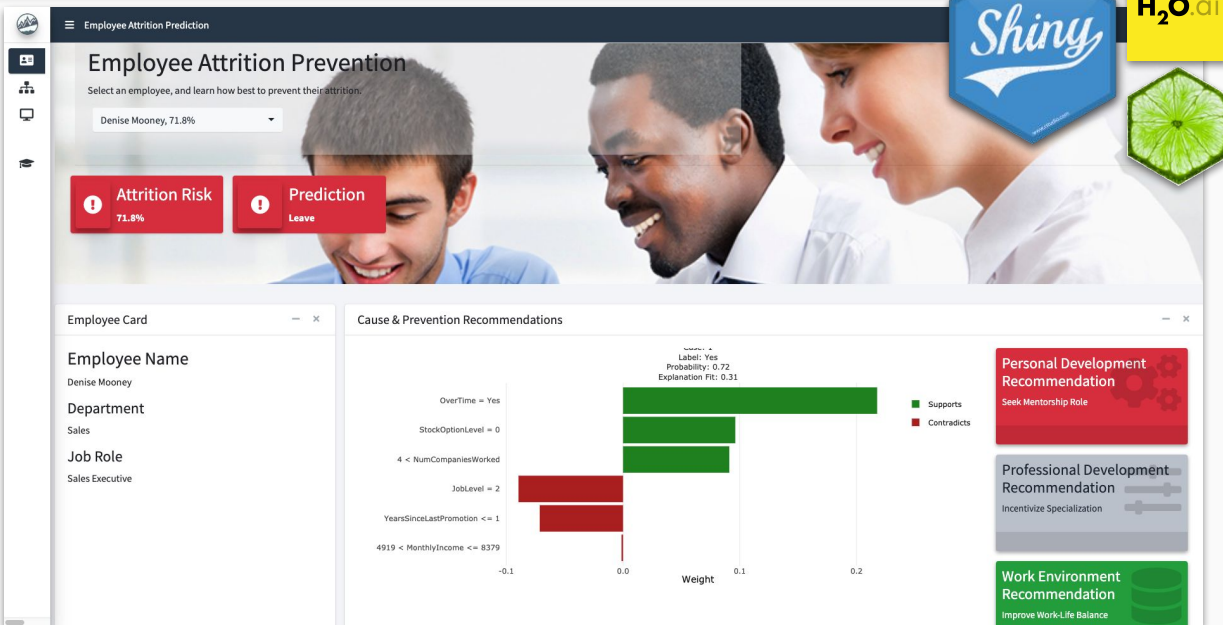

\$15M

Per Year

How much you can save your organization by solving a
large business problem

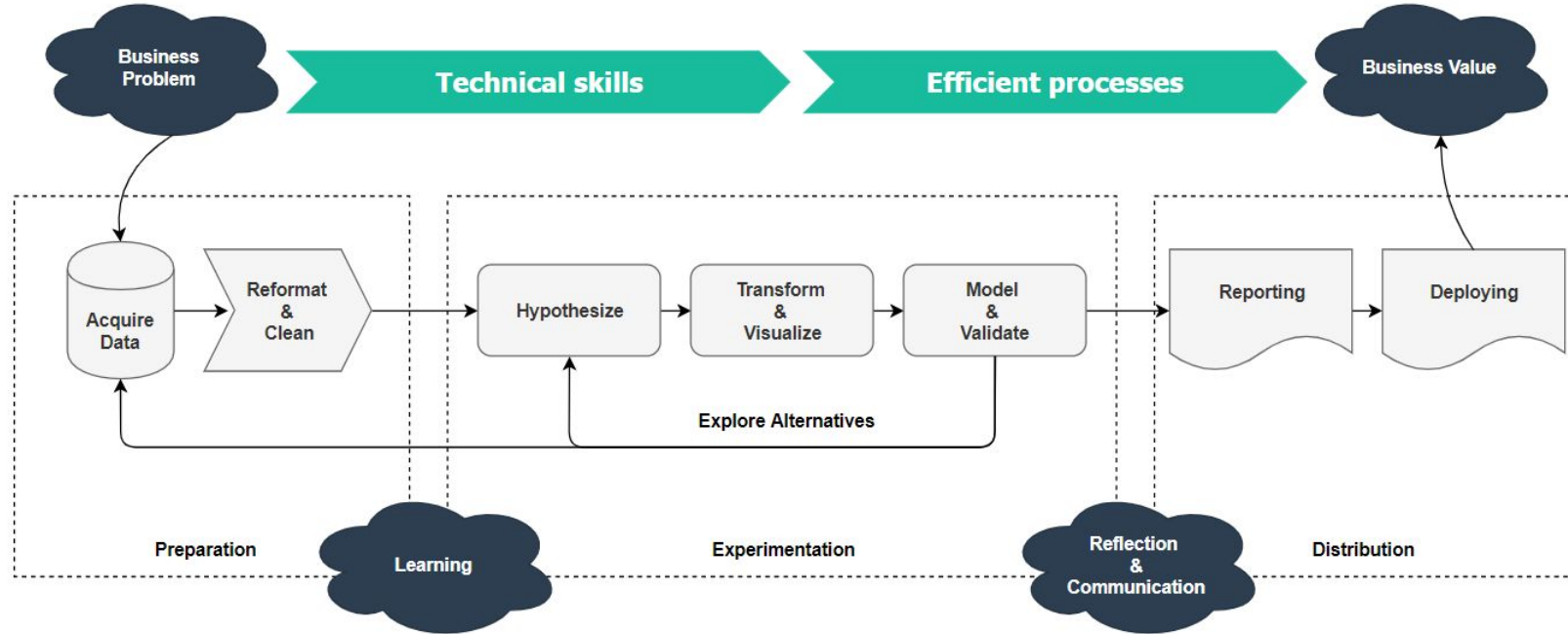


Drive Business Outcomes with Web Apps

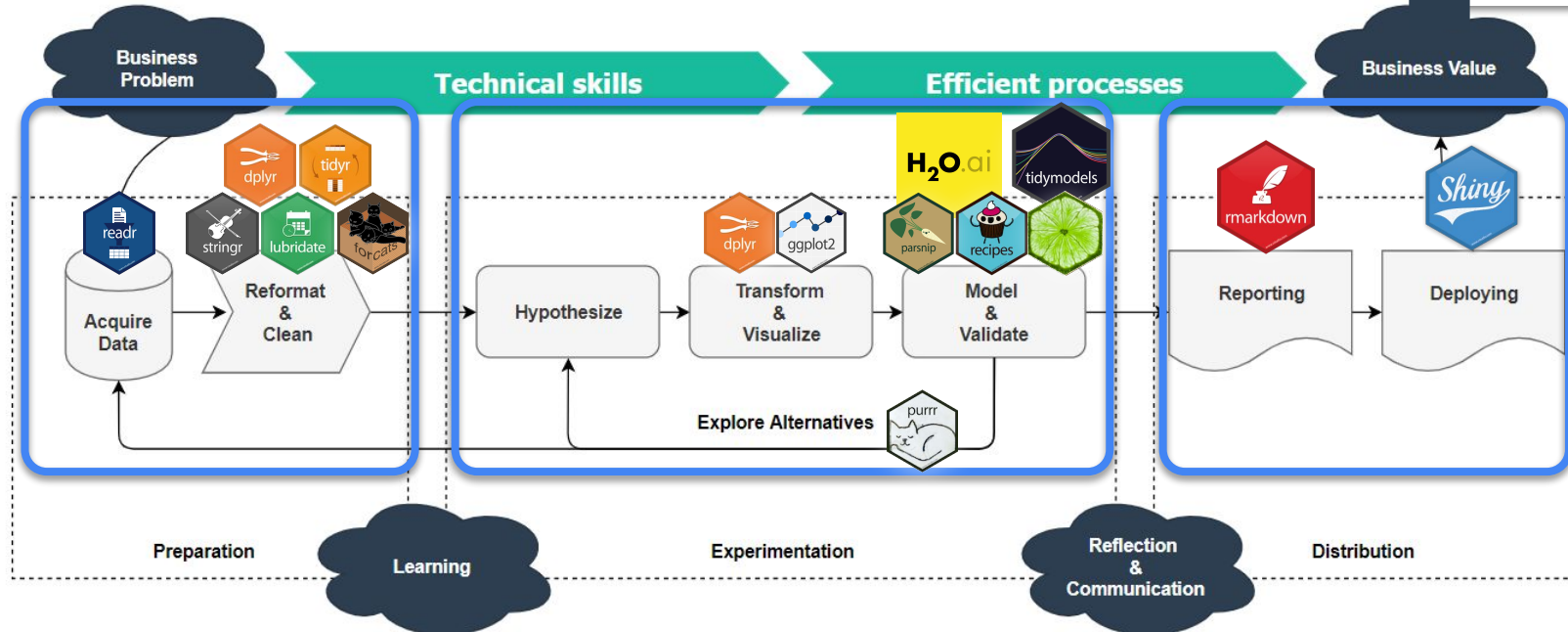
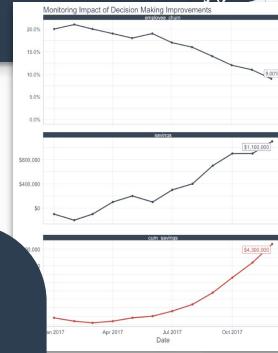
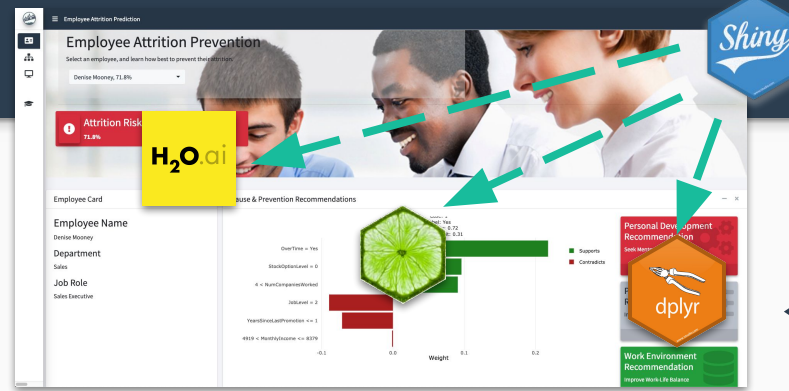


THE
“BETTER DECISION-MAKING”
EFFECT

Data Science Workflow



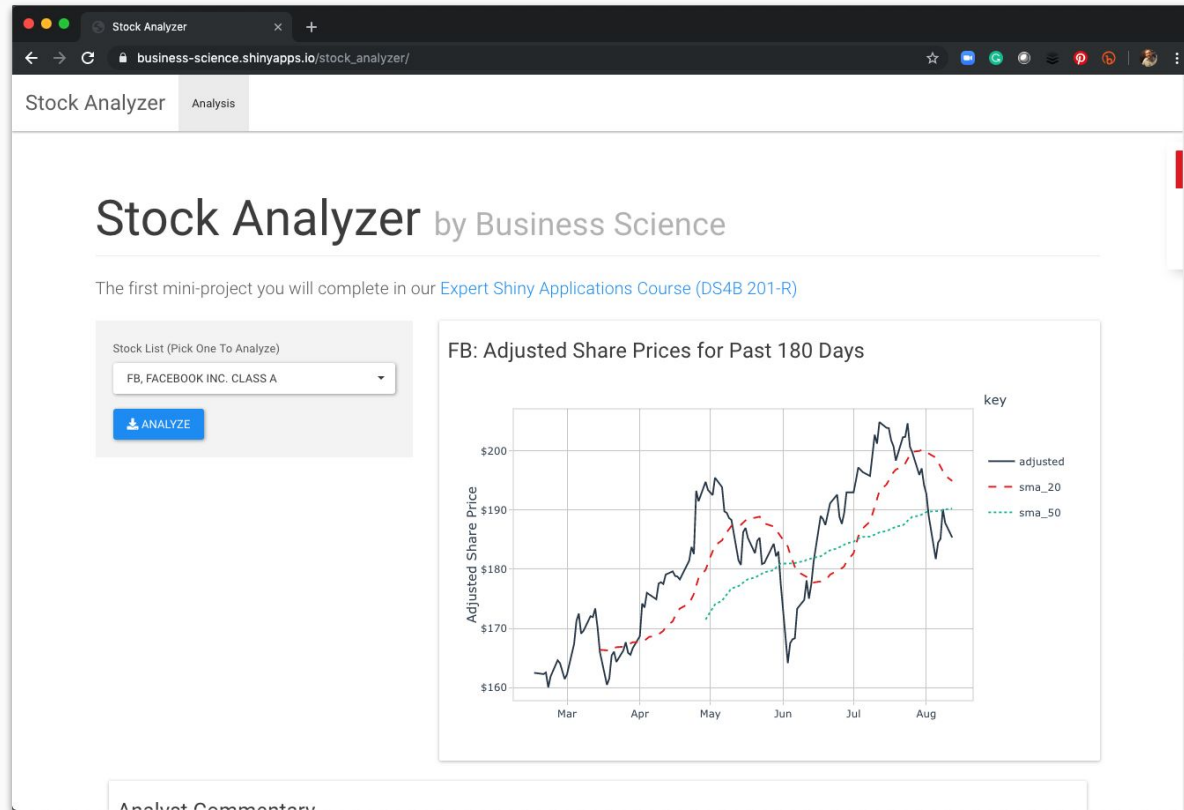
Data Science Workflow



The Plan

DSGO19 Workshop

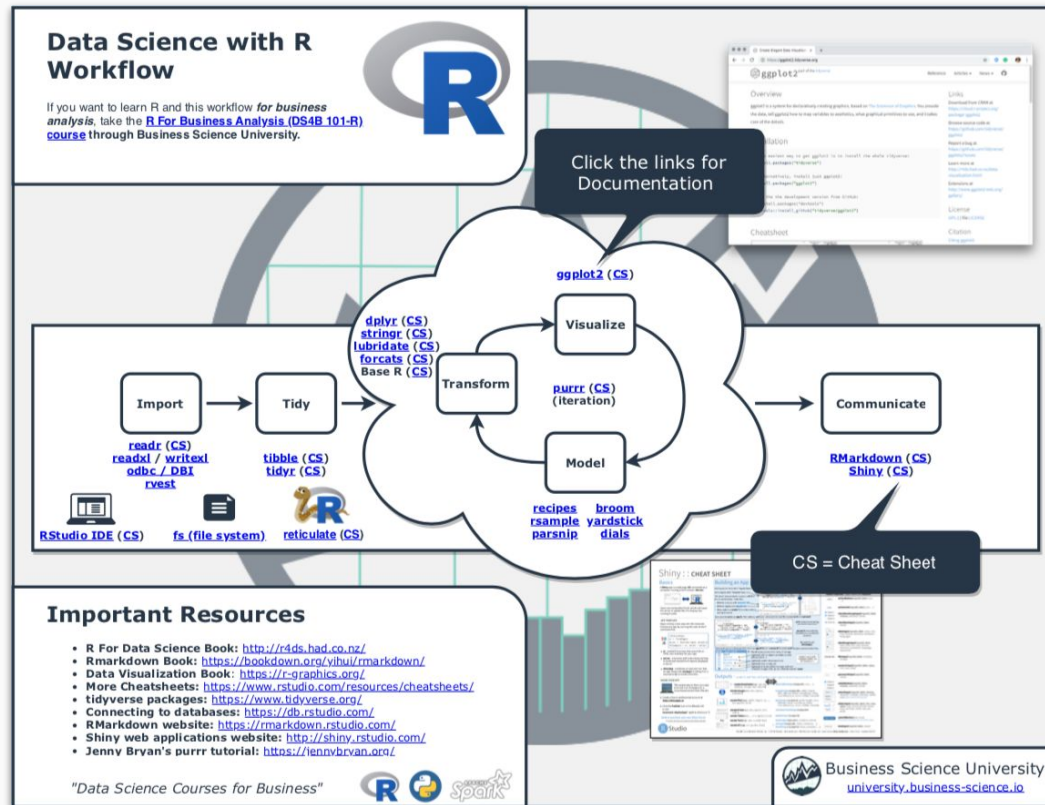
Build a Stock Analyzer App



https://business-science.shinyapps.io/stock_analyzer/

The Resources

Thank you for showing up







The screenshot shows a web application titled "Employee Attrition Prevention". It features a sidebar with navigation icons, a main content area with a header "Employee Attrition Prevention" and a sub-header "Select an employee, and learn how best to prevent their attrition." Below this is a dropdown menu showing "Denise Mooney, 71.8%". Two red buttons are visible: "Attrition Risk 71.8%" and "Prediction Leave". A large dark blue banner with the text "ML Powered Web Apps" and "Decision Making at Scale" is overlaid on the interface. Below the banner, a table displays employee data, including "Sales Executive", "JobLevel = 2", and "YearsSinceLastPromotion <= 1". To the right, there are sections for "Professional Development Recommendation" and "Incentivize Specialization".

ML Powered Web Apps
Decision Making at Scale

Sales Executive

JobLevel = 2

YearsSinceLastPromotion <= 1

Professional Development Recommendation

Incentivize Specialization

Matt Dancho
Business Science Workshop at DSGO19

