

## IV. 데이터로 소통하기

### 2. 대시보드와 교육





7.79%

Average annual rate for a 30-year fixed mortgage in Oct. 2023

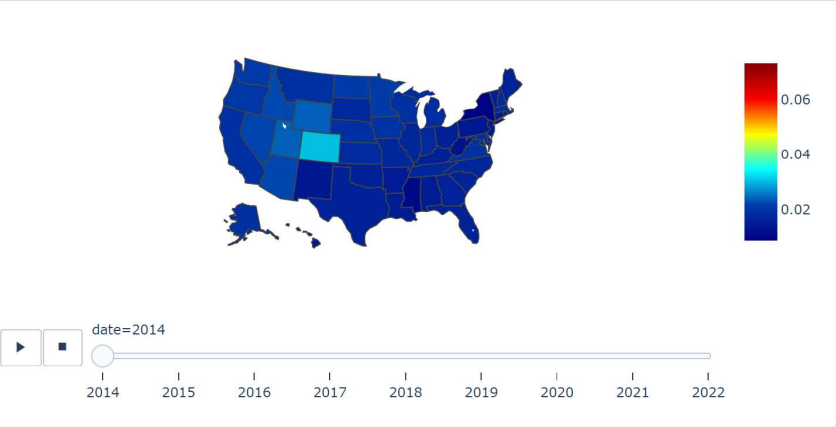
7.03%

Average annual rate for a 15-year fixed mortgage in Oct. 2023

\$388k

National median home price

Mortgage Originations per Capita

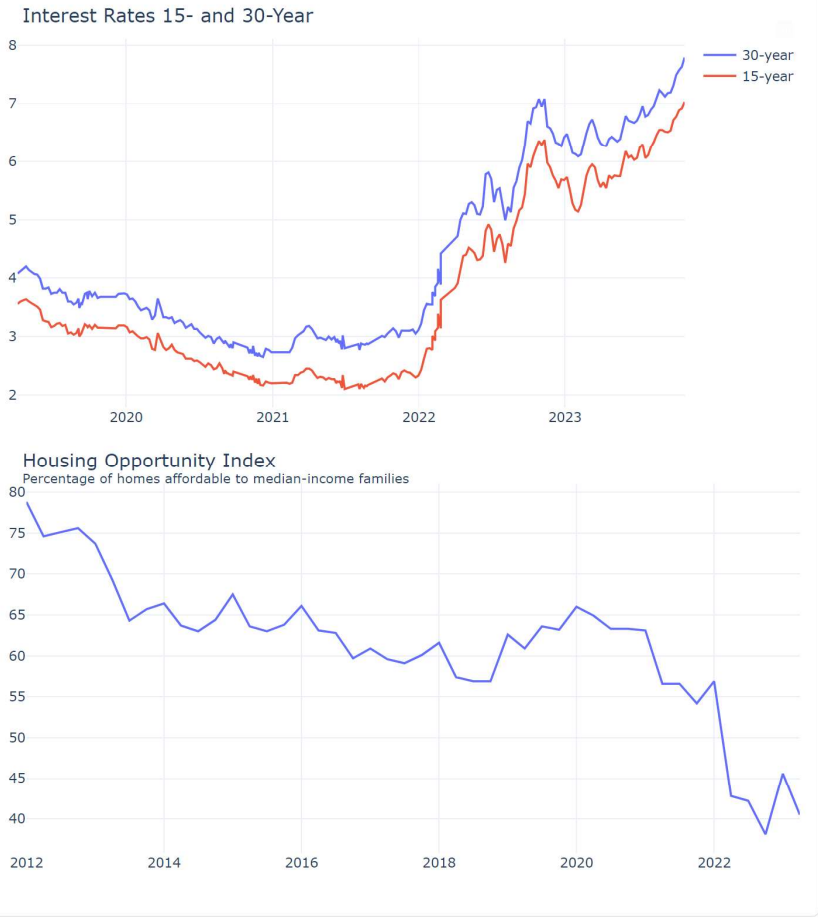


Mortgage Originations

myd	fixed_30	fixed_15	date
Apr-19-05	4.08	3.56	2019-04-05
Apr-19-12	4.12	3.6	2019-04-12
Apr-19-19	4.17	3.62	2019-04-19
Apr-19-26	4.2	3.64	2019-04-26
May-19-03	4.14	3.6	2019-05-03
May-19-10	4.1	3.57	2019-05-10
May-19-17	4.07	3.53	2019-05-17
May-19-24	4.06	3.51	2019-05-24
May-19-31	3.99	3.46	2019-05-31
Jun-19-07	3.82	3.28	2019-06-07
Jun-19-14	3.82	3.26	2019-06-14

Housing Economics

Median Price



# 정의와 목적

- 정의

- 단일한 주제에 대한 상호연관된 다양한 정보를 주로 그래픽(도표)의 형태로 일관성 있게 제시한 것
- 데이터로 소통하는 한 방식(수단): 리포트, 프레젠테이션 등

- 목적

- 핵심 정보 전달
- 이해(understanding)

- 주요 적용 분야: 비즈니스, 경영학

- 고객 분석
- 금융 정보
- 실적 및 마케팅 정보
- 인적 자원 관리
- 웹 분석

# 종류

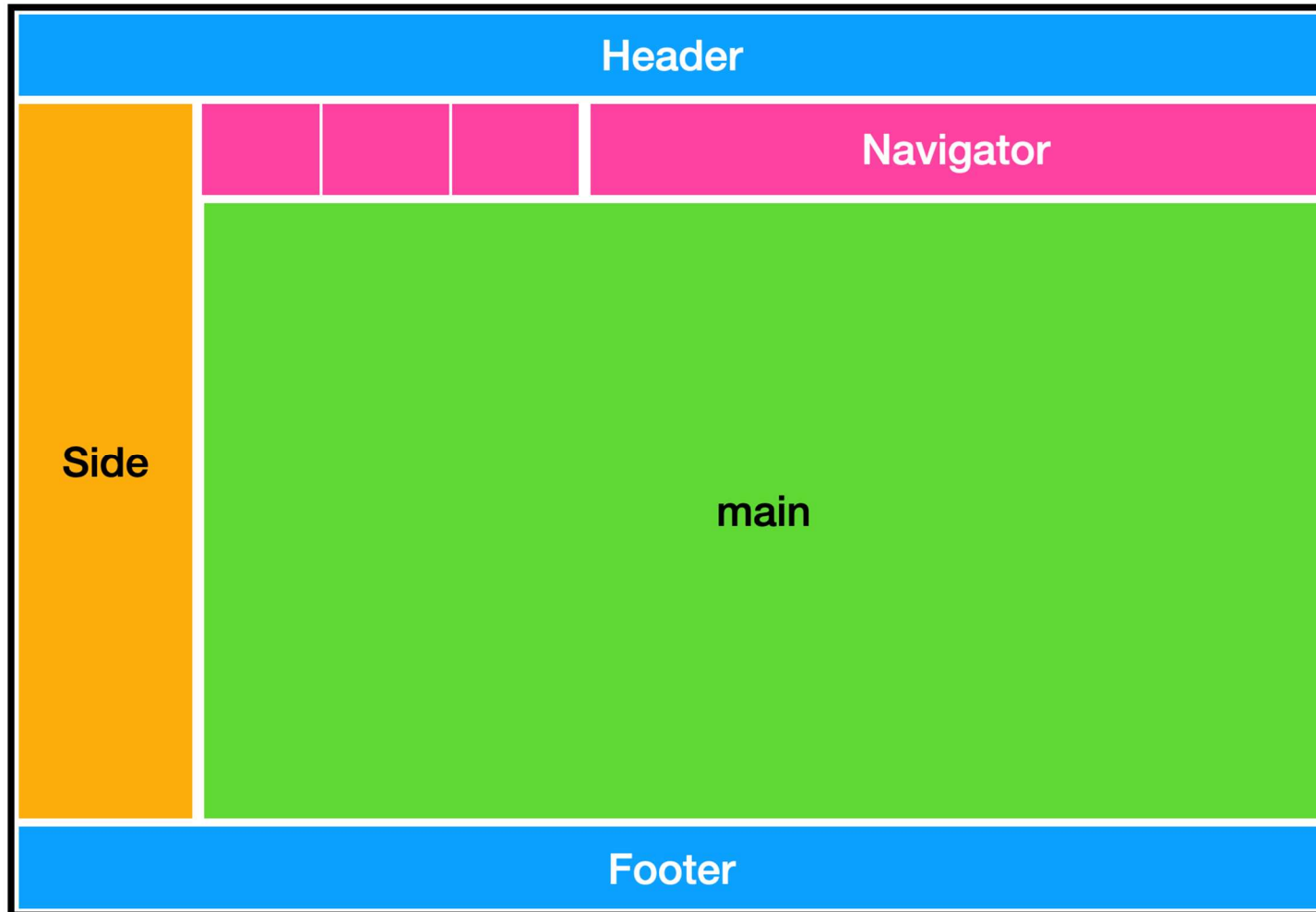
- 종류 1

- 아날로그
- 디지털
  - 파일
  - 웹-기반

- 종류 2

- 정적(static)
  - 제작 용이, 사용 편이, 보안 용이
  - 제시 기능에 한정
- 동적(interactive): 완전한 반응형
  - 데이터 필터링, 말풍선, 하이퍼링크, 값 변경 등 기능 장착
  - 탐색 기능으로 확장
- 제한적 반응형
  - 일부 반응형 기능 제공

# 기본 구조

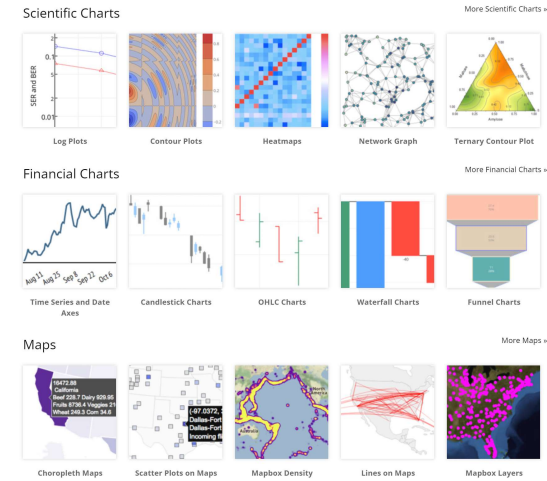



# 구성 요소

- 메인 바디(main body)
  - 카드(cards): 기본 단위
  - 내용 요소: 그래프(차트, 플롯), 지도, 테이블, 텍스트, 밸류박스(valuebox)
  - 레이아웃 요소: 행(row), 열(column), 탭셋(tabset), 페이지(page)
- 헤더(header)
  - 주요 메타 정보(로고, 제목, 저자 등)
- 내비게이터(navigator)
  - 레이아웃 요소들 간의 이동: 특히 최상위 요소인 페이지간 이동
- 사이드바(sidebar)
  - 주로 사용자의 인풋, 텍스트 설명
- 푸터(footer)
  - 부차적 메타 정보

# 내용 요소

- 그래프(차트, 플롯)
  - 정적 그래프: ggplot2
  - 동적 그래프: gganimate
  - 반응형 그래프: plotly
- 지도
  - 정적 지도: ggplot2, tmap
  - 동적 지도: gganimate
  - 반응형 지도: leaflet
- 테이블
  - 시각성이 가미된 테이블: gt
  - 반응형 테이블: DT





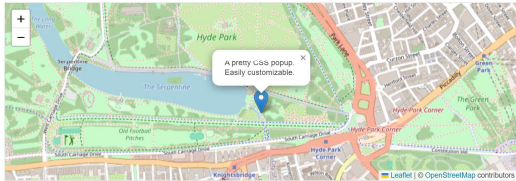
an open-source JavaScript library  
for mobile-friendly interactive maps

[Overview](#)
[Tutorials](#)
[Docs](#)
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[Blog](#)

May 18, 2023 — [Leaflet 1.9.4](#) has been released!

Leaflet is the leading open-source JavaScript library for mobile-friendly interactive maps. Weighing just about 42 KB of JS, it has all the mapping [features](#) most developers ever need.

Leaflet is designed with *simplicity*, *performance* and *usability* in mind. It works efficiently across all major desktop and mobile platforms, can be extended with lots of [plugins](#), has a beautiful, easy to use and [well-documented API](#) and a simple, readable [source code](#) that is a joy to [contribute](#) to.



Player	Rank	Points	Titles	Prize Money	Rank Change
Novak Djokovic	1	11,360	24	\$23,800,000	0
Rafael Nadal	2	10,235	22	\$21,700,000	0
Andy Murray	3	8,787	15	\$18,000,000	0
Daniil Medvedev	4	7,555	10	\$15,500,000	0
Stefanos Tsitsipas	5	6,875	8	\$14,000,000	0

**TENNIS PLAYERS**

Mix text and image, use the functions `compose` and `as_image`. The table shows a tennis players ranking.

[compose](#) [image](#)

**MARIO KART**

Mix text and image to build a

Character	Rank	Points	Titles	Prize Money	Rank Change
Mario	1	11,360	24	\$23,800,000	0
Luigi	2	10,235	22	\$21,700,000	0
Rosalina	3	8,787	15	\$18,000,000	0
Metal Mario	4	7,555	10	\$15,500,000	0
Waluigi	5	6,875	8	\$14,000,000	0
Wario	6	6,150	7	\$12,500,000	0
Bowser	7	5,425	6	\$11,000,000	0

[model](#) [as\\_flextable](#)



# 대시보드 산업

- Microsoft Power BI
- Tableau Public
- GoodData
- Databox
- Kumu
- Vizzlo
- Visme
- Piktochart
- Infogram
- Canva



# 데이터사이언스와 대시보드

- 오픈 소스로 작성된 웹-기반 (제한적) 반응형 대시보드
- 연구의 과정과 결과를 일목요연하게 제시
  - 학술 포스터(academic poster)
  - 종관적(綜觀的, synoptic) 프레젠테이션
  - 배후에 데이터와 코드 존재: 재현성 고양
- 탐색적 데이터분석의 도구를 활용 가능
  - 상호작용성(interactivity)의 수준에 의존
  - 학습 도구로서의 가능성
- 레이아웃 설계의 유연성
  - 소통 상대에 따른 맞춤형 변환 용이
- 실시간 업데이트 가능
  - API 활용

# 대시보드와 교육

- 교육 통계
  - United States Education Dashboard(<https://dashboard.ed.gov/>)
- 교육 정책 및 행정 대시보드
  - OECD Education Equity Dashboard(<https://www.oecd.org/education/education-equity-dashboard/>)
  - Global Education Policy Dashboard(<https://www.educationpolicydashboard.org/>)
  - California School Dashboard(<https://www.caschooldashboard.org/>)
- 에듀테크 플랫폼 및 학습 허브(learning hub)
  - LMS의 대시보드 설계
- 교육 성취 모니터링 시스템
  - 학교, 학급, 학생

Student Performance Dashboard

Data refreshed at May 14,2024 09:05 AM

Select Year

All

Select Grade

All

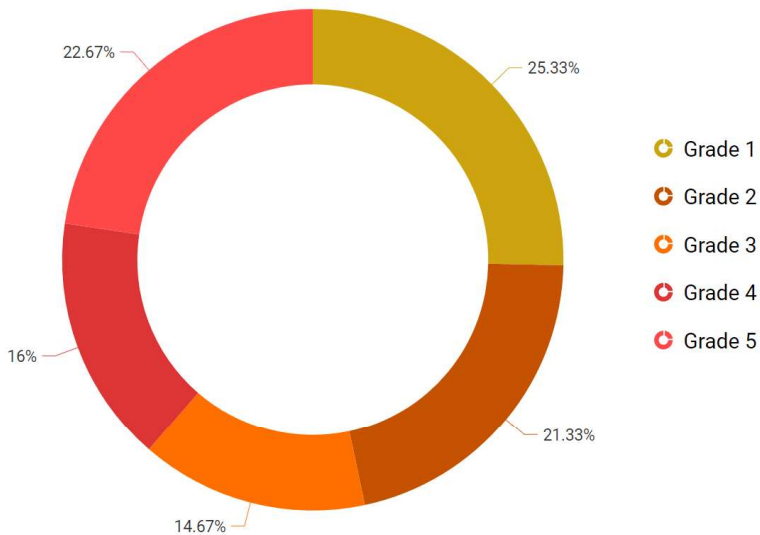


Students

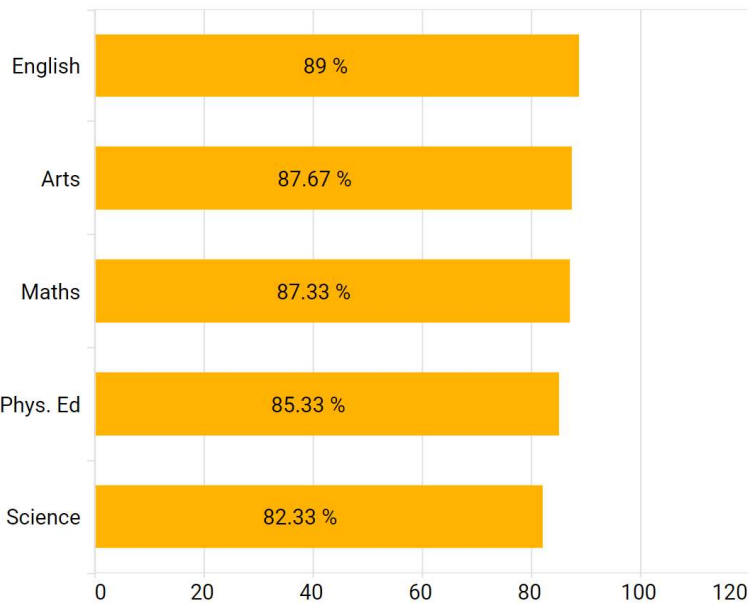
300

Students by Grade and Gender

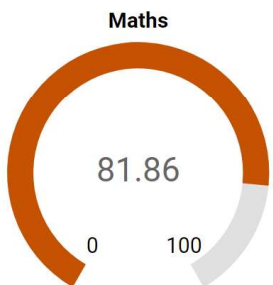
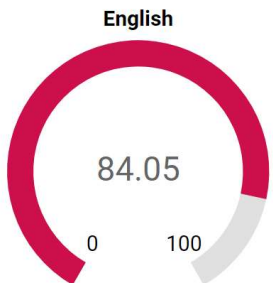
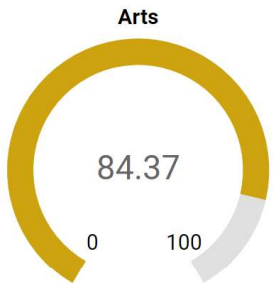
Drill down to show the number of students by gender.



Student Participation Rate by Branch



Avg. Subject Score



Examination Results by Branch

# 학습분석 (기반) 대시보드

- LADs (learning analytics dashboards)
  - 학습자에게 학습 진전 상황을 알려주는 대시보드
  - 학습자의 디지털 족적(footprint)을 바탕으로 학습자의 수행성 및 참여도를 분석
  - 결과를 시각적으로 제시
  - 학습자에게 awareness, reflection, insights 제공
- 체계적 리뷰(systematic review) 연구



## Learning analytics dashboards are increasingly becoming about learning and not just analytics - A systematic review

Lucas Paulsen<sup>1</sup>  · Euan Lindsay<sup>2</sup> 

Susnjak et al. *Int J Educ Technol High Educ* (2022) 19:12  
<https://doi.org/10.1186/s41239-021-00313-7>

International Journal of Educational  
Technology in Higher Education

**RESEARCH ARTICLE**

**Open Access**

## Learning analytics dashboard: a tool for providing actionable insights to learners



Teo Susnjak\* , Gomathy Suganya Ramaswami and Anuradha Mathrani

# 학습 도구로서의 대시보드

- 교과와 학습 내용을 효과적으로 교수하도록 도와주는 도구
- 데이터 탐색을 통해 학습자 스스로 이해, 지식, 통찰을 얻도록 도와주는 도구



[pubs.acs.org/jchemeduc](https://pubs.acs.org/jchemeduc)

Article

## Python and Plotly Dash, A Quick and Convenient Way to Develop Web Apps for Teaching Physical Chemistry Models

Renato Lombardo\*



Cite This: <https://doi.org/10.1021/acs.jchemed.3c01167>



Read Online

# Maxwell-Boltzmann distribution

explore how each curve changes on changing the parameters

The probability  $P$  that a molecule has a speed between  $v$  and  $v + \Delta v$  is

$$P = \int_v^{v+\Delta v} F(v) dv$$

$F(v)$  is the **probability density** that depends on speed  $v$ , mass of the molecule,  $m$  and temperature,  $T$  according to Maxwell Boltzmann equation

$$F(v) = \sqrt{\left(\frac{m}{2\pi kT}\right)^3} 4\pi v^2 e^{-\frac{mv^2}{2kT}}$$

[less info](#)

Add plot

O<sub>2</sub> ×

Delete

☐  $v_p = 395 \text{ m s}^{-1}$

☐  $v_{avg} = 445 \text{ m s}^{-1}$

☐  $v_{rms} = 483 \text{ m s}^{-1}$

temperature 300 K

200 K

400 K

600 K

800 K

1000 K

0 m/s

2000 m/s

4000 m/s

6000 m/s

Probability ---

He ×

Delete

☒  $v_p = 1116 \text{ m s}^{-1}$

☒  $v_{avg} = 1259 \text{ m s}^{-1}$

☒  $v_{rms} = 1367 \text{ m s}^{-1}$

temperature 300 K

200 K

400 K

600 K

800 K

1000 K

0 m/s

2000 m/s

4000 m/s

6000 m/s

Probability[2000-6000] m/s = 0.091

The figure displays a Maxwell-Boltzmann distribution plot comparing the probability density of molecular speeds for O<sub>2</sub> and He at 300 K. The x-axis represents speed in m/s, ranging from 0 to 6000. The y-axis represents probability density in s/m, ranging from 0 to 0.002. The O<sub>2</sub> curve (blue) is narrower and taller, peaking at approximately 0.0022 s/m at 395 m/s. The He curve (red) is broader and shorter, peaking at approximately 0.00075 s/m at 1116 m/s. Vertical dashed lines indicate the peak speeds for each gas. A shaded red area under the He curve from 2000 to 6000 m/s represents a probability of 0.091.

Gas	Temperature (K)	Peak Speed $v_p$ (m/s)	Average Speed $v_{avg}$ (m/s)	RMS Speed $v_{rms}$ (m/s)
O <sub>2</sub>	300	395	445	483
He	300	1116	1259	1367