



# Wiki Addition Viewer: An extension to add insights to your Wikipedia experience

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2022-2023 Comps

Advisor: Sneha Narayan





# 01 Project Overview and Motivation

Introduction to our comps project, use cases, and motivation

# 02 Use Cases

Going through how our extension can be useful

# 03 Background

Looking into past examples

# 04 Architecture

Diagram of our extension's design, Wikipedia APIs

# 05 Features

Graph, highlighting, text matching



## 06 User Study

We conducted 2 user studies

## 07 Live Demo

It works!

## 08 Future Improvement

Data interpretation, authorship, talk page

## 09 Conclusion

Performance, acknowledgements, and references



# 01

## Project Overview and Motivation



# Carleton College

文 A 12 languages ▾

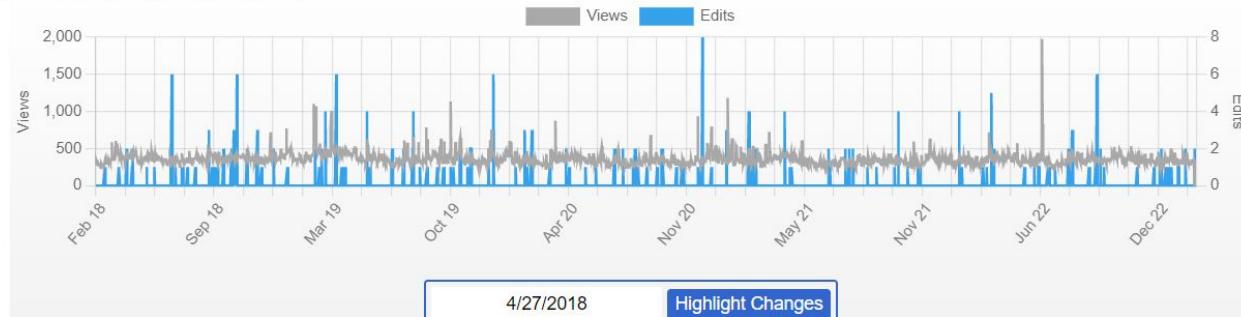
Article Talk

Read Edit View history

From Wikipedia, the free encyclopedia

Coordinates: 44°27'43"N 93°9'13"W

ALL 5Y 3Y 1Y 6M 3M



We highlighted 111 changes which represent additions to the page between 4/27/2018 (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.

*This article is about the college in Minnesota, United States. For the university in Ontario, Canada, see [Carleton University](#).*

**Carleton College** (/kərˈlton/ KARL-tin) is a private liberal arts college in Northfield, Minnesota.<sup>[7]</sup> Founded in 1866, it had 2,105 undergraduate students and 269 faculty members in fall 2016. The 200-acre main campus is between Northfield and the 800-acre Cowling Arboretum, which became part of the campus in the 1920s.<sup>[8]</sup>

Admissions is highly selective with an acceptance rate of 16.5% in 2022,<sup>[9]</sup> and Carleton is annually ranked near the top in most rankings of liberal arts schools. Carleton is particularly renowned for its undergraduate teaching, having been ranked #1 in Undergraduate Teaching by [U.S. News & World Report](#) for over a decade.<sup>[10]</sup>

Students can choose courses from 33 major programs and 31 minor programs and have the option to design their own major. Carleton's varsity sports compete at the NCAA Division III level in the [Minnesota](#)

## Carleton College



Latin: Collegium Carleton

Former names Northfield College (1866–1971)



# Why Choose Wikipedia?

## Monthly overview

All wikis



### Reading

#### Total page views

**24B**

January ↑ 5.26% month over month



**274B** ↑ 12.47% year over year

Last 12 Months (Feb 2022 - Jan 2023)

#### Page views by country

Countries with the most views for January

4B	United States of America
1B	Japan
999M	Germany
995M	United Kingdom

**!**  
The Unique devices metric  
is not available for all  
projects. Select a specific  
wiki

### Contributing

#### Edits

**51M**

January ↑ 12.53% month over month



**555M** ↑ 34.68% year over year

Last 12 Months (Feb 2022 - Jan 2023)

#### New registered users

**290K**

January ↑ 18.92% month over month



**3M** ↑ 14.96% year over year

Last 12 Months (Feb 2022 - Jan 2023)

#### User edits

**30M**

January ↑ 24.75% month over month



**306M** ↑ 51.10% year over year

Last 12 Months (Feb 2022 - Jan 2023)

From Wikimedia Statistics



# History Page

## Problem:

- Not visible to readers
- Not intuitive (very hard to make sense of the revisions)

## Carleton College: Revision history

Article Talk

[View logs for this page](#) [\(view filter log\)](#)

Read Edit [View history](#)

### Filter revisions

External tools:

[Find addition/removal](#) (Alternate ↗) • [Find edits by user](#) (Alternate ↗) • [Page statistics](#) (Alternate ↗) • [Pageviews](#) (Alternate ↗) • [Fix dead links](#) (Alternate ↗)

For any version listed below, click on its date to view it. For more help, see [Help:Page history](#) and [Help>Edit summary](#). (cur) = difference from current version, (prev) = difference from preceding version, m = minor edit, → = section edit, ← = automatic edit summary

(newest | oldest) View (newer 50 | older 50) (20 | 50 | 100 | 250 | 500)

### Compare selected revisions

• (cur   prev)	<input checked="" type="radio"/> 17:14, 8 February 2023	137.22.90.29	(talk)	.. (63,881 bytes) <small>(-6)</small> .. <small>(→Athletics)</small> (undo) <small>(Tag: Manual revert)</small>
• (cur   prev)	<input checked="" type="radio"/> 17:14, 8 February 2023	137.22.90.29	(talk)	.. (63,887 bytes) <small>(+6)</small> .. <small>(→Athletics)</small> (undo) <small>(Tag: Reverted)</small>
• (cur   prev)	<input type="radio"/> 15:03, 28 January 2023	Wmtribe2015	(talk   contribs)	.. (63,881 bytes) <small>(+48)</small> .. <small>(added years to former name)</small> (undo)
• (cur   prev)	<input type="radio"/> 04:20, 28 January 2023	WikiCleanerBot	(talk   contribs)	m .. (63,833 bytes) <small>(0)</small> .. <small>(v2.05b - Bot T20 CW#61 - Fix errors for CW project (Reference before punctuation))</small> (undo) <small>(Tag: WPCleaner)</small>
• (cur   prev)	<input type="radio"/> 18:04, 26 January 2023	Banks Irk	(talk   contribs)	.. (63,833 bytes) <small>(+337)</small> .. <small>(→Academics: most popular majors, more recent source)</small> (undo)
• (cur   prev)	<input type="radio"/> 19:59, 16 January 2023	Wozal	(talk   contribs)	.. (63,496 bytes) <small>(+84)</small> .. <small>(added Category:Universities and colleges accredited by the Higher Learning Commission using HotCat)</small> (undo)
• (cur   prev)	<input type="radio"/> 08:05, 10 January 2023	Blaylockjam10	(talk   contribs)	.. (63,412 bytes) <small>(-8)</small> .. <small>(undo)</small>
• (cur   prev)	<input type="radio"/> 23:27, 6 January 2023	Jweiss11	(talk   contribs)	.. (63,420 bytes) <small>(-12)</small> .. <small>(ce in lead: ultimate is not an NCAA sport)</small> (undo)
• (cur   prev)	<input type="radio"/> 04:04, 31 December 2022	TortillaDePapas	(talk   contribs)	.. (63,432 bytes) <small>(-4)</small> .. <small>(specified [of what] tag)</small> (undo) <small>(Tag: Visual edit)</small>
• (cur   prev)	<input type="radio"/> 03:49, 31 December 2022	TortillaDePapas	(talk   contribs)	m .. (63,436 bytes) <small>(-3)</small> .. <small>(removed space between some citations)</small> (undo) <small>(Tag: Visual edit)</small>
• (cur   prev)	<input type="radio"/> 08:12, 27 December 2022	Liruqi	(talk   contribs)	m .. (63,439 bytes) <small>(0)</small> .. <small>(Fix en wikititable style syntax, src: https://github.com/liruqi/wikipedia/blob/master/wikitable.py)</small> (undo)
• (cur   prev)	<input type="radio"/> 02:56, 19 December 2022	Rublamb	(talk   contribs)	.. (63,439 bytes) <small>(+12)</small> .. <small>(updated short description)</small> (undo)
• (cur   prev)	<input type="radio"/> 04:29, 21 November 2022	Nick Number	(talk   contribs)	.. (63,427 bytes) <small>(+35)</small> .. <small>(repaired link(s) to disambiguation pages (you can help); mdy dates)</small> (undo)



# History Page (Compare Revision)

From Wikipedia, the free encyclopedia

Coordinates: 44°27'43"N 93°9'13"W

Compare selected revisions

Revision as of 23:06, 14 September 2022 (edit) (undo)  
Qzd (talk | contribs)  
*(Reverted edits by DarwyAverly (talk) to last version by Wikipelli)  
(Tags: Rollback, SWViewer [1.4])  
← Previous edit*

Latest revision as of 17:14, 8 February 2023 (edit) (undo)  
137.22.90.29 (talk)  
(→Athletics)  
(Tag: Manual revert)

(15 intermediate revisions by 14 users not shown)

Line 1:

- {{Short description Private liberal arts college in Minnesota, U.S.}}	+ {{Short description Private liberal arts college in Northfield, Minnesota, U.S.}}
{{About the college in Minnesota, United States the university in Ontario, Canada Carleton University}}	{{About the college in Minnesota, United States the university in Ontario, Canada Carleton University}}
{{Infobox university  name = Carleton College}}	{{Infobox university  name = Carleton College}}

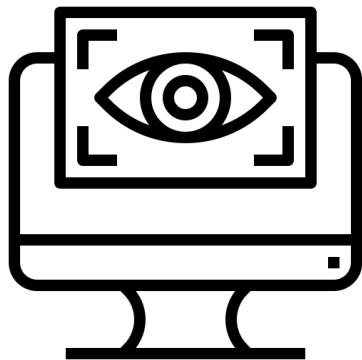
Line 6:

image_upright = 1.1	image_upright = 1.1
latin_name = Collegium Carleton	latin_name = Collegium Carleton
-  former_names = Northfield College	+  former_names = Northfield College (1866–1871)
motto = "Declaratio Sermonum Tuorum Illuminat" ([Latin])	motto = "Declaratio Sermonum Tuorum Illuminat" ([Latin])
mottoeng = The Revelation / Announcement of	mottoeng = The Revelation / Announcement of

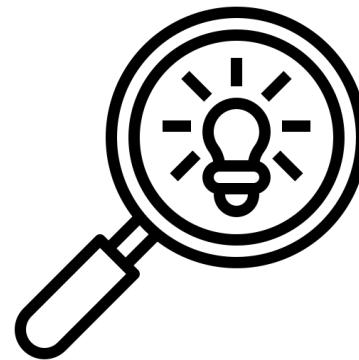
Browse history interactively



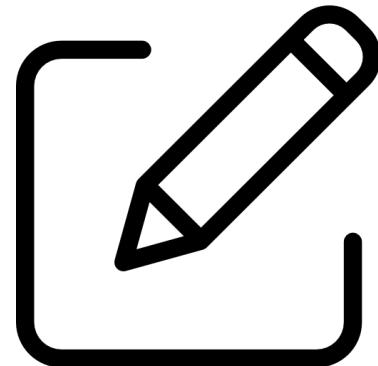
# Goals of Our Extension



Visualize



Explore



Interact



# 02

## Use Cases



# New Changes

Directs attention to new changes on the page from highlights:

Users can identify any new changes made on the page.

## Personal life [edit]

She has close friendships with [Jordyn Woods](#), [Normani](#), [Winnie Harlow](#), and [Ryan Destiny](#), according to [Essence](#).<sup>[27]</sup>

## Relationships [edit]

In January 2016, she began dating [Dutch yute Memphis Depay](#). They were engaged in June 2017<sup>[28]</sup> and separated by 2018.<sup>[29]</sup>

Following the end of her engagement to Depay, Harvey was briefly linked to British racing driver [Lewis Hamilton](#) and R&B singer [Trey Songz](#). She was later linked with the rapper [Future](#); the pair confirmed their relationship in January 2020, and broke up in August of that year.<sup>[30]</sup> Future later took aim at Harvey on his featured verse on the song "[Maybach](#)" by [42 Dugg](#), with the lyrics "Magic City, I'm the owner. Tell Steve Harvey, I don't want her".<sup>[31]</sup>

In November 2020, Harvey began dating actor [Michael B. Jordan](#).<sup>[32]</sup> In December 2021, Jordan declared in an interview with [The Hollywood Reporter](#), that he "finally found what love was" with Harvey.<sup>[33]</sup> In June 2022, it was reported that the couple had ended their relationship.<sup>[34]</sup>

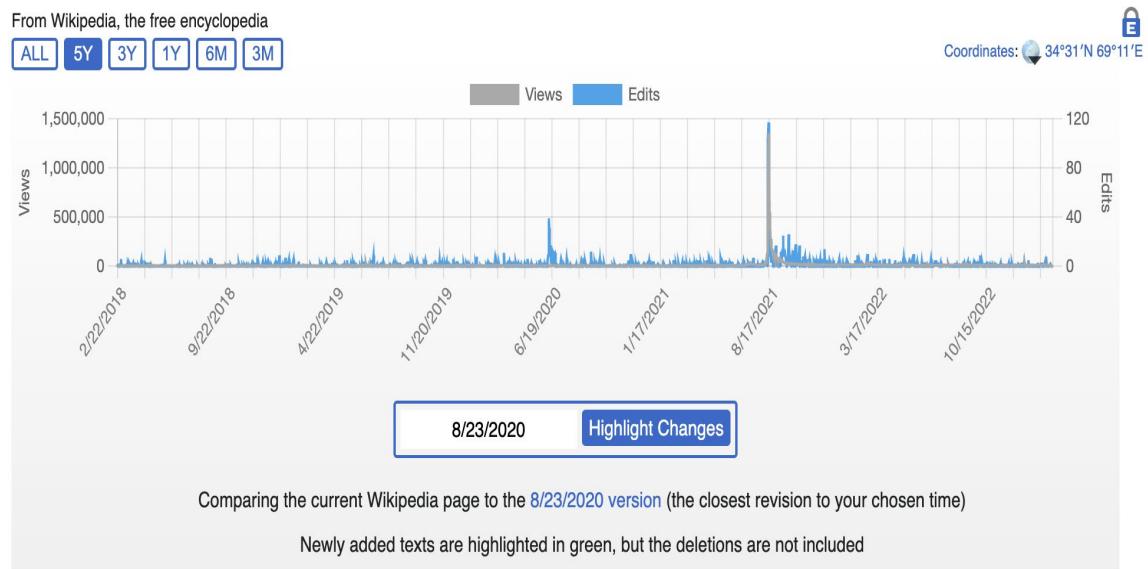
Harvey confirmed that she is dating actor [Damson Idris](#), in January 2023.<sup>[35]</sup>



# Make Connections between Peaks on Graph and Current Affairs

From Wikipedia, the free encyclopedia

[ALL](#) [5Y](#) [3Y](#) [1Y](#) [6M](#) [3M](#)

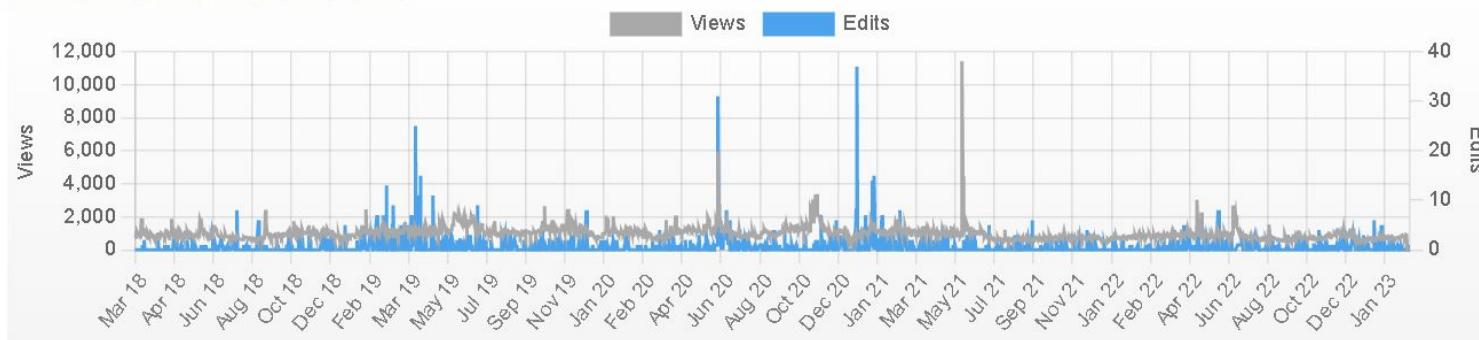


This is the Wikipedia page for Afghanistan. Here, we can see that on 17th August, 2021, the page received an unprecedented amount of views and edits.



# Updating on current affairs

## LGBT rights in the United States

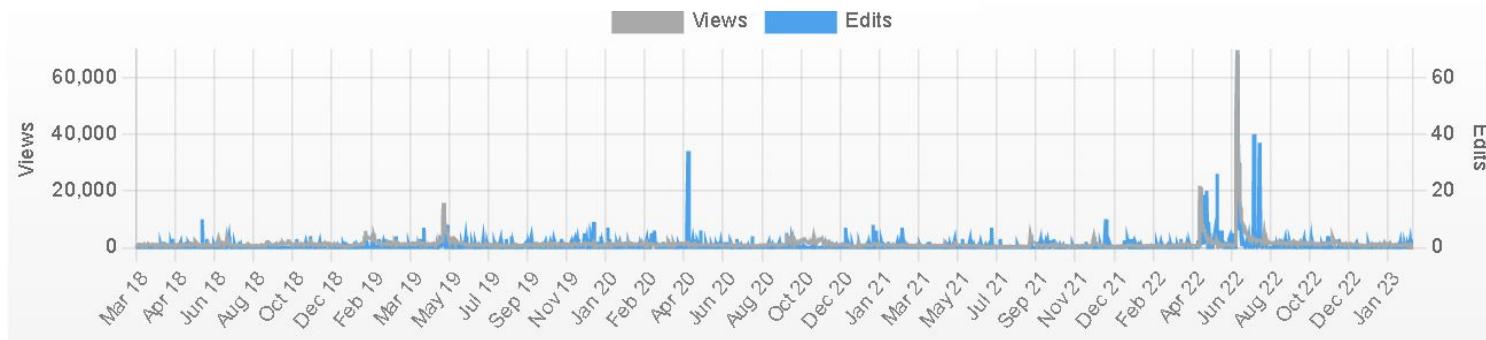


On January 25, 2021, the new Biden Administration revoked Trump's ban through an executive order, reverting the policy regarding Transgender people and military service to what it was in 2016 under the Obama Administration. Transgender personnel are now allowed to serve in the military under varying conditions and requirements. On April 30, 2021, the United States Department of Defense enacted a new policy calling for better medical access and gender marker assistance to transgender people serving in the United States Military. [88][89]



# Updating on current affairs

## Abortion in the United States

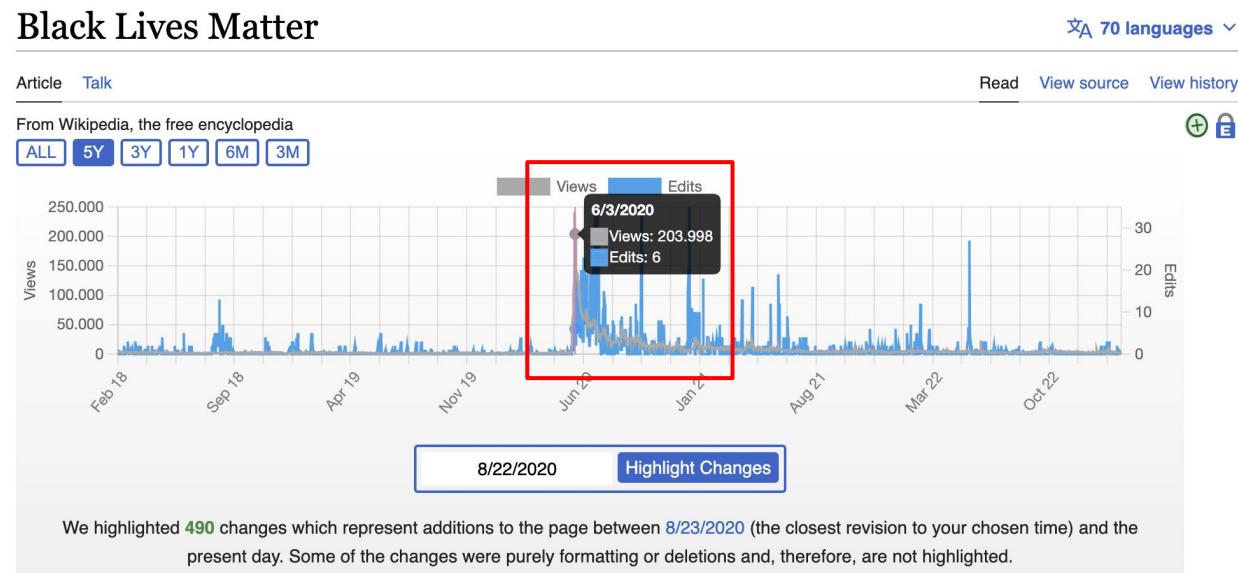


On January 28th, 2023, the Minnesota state Senate passed a bill guaranteeing women's rights to abortion and other reproductive medicine which was signed into law on January 31st. The bill prohibits state and local governments from attempting to restrict access to sterilization or prenatal care, while also requiring contraceptive cost compensation.<sup>[202][203]</sup>



# View and Edit History

Shows insight on edit and view history on the graph





# Compare Differences Between Revisions

Provides a more interactive way to get to compare differences between revision page

We highlighted 144 changes which represent additions to the page between 12/28/2022 (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.

## 2022–2023 Brazilian election protests: Difference between revisions

Article Talk

From Wikipedia, the free encyclopedia

4 languages

Read Edit View history

Help

Browse history interactively

Revision as of 16:36, 28 December 2022 (edit)

Roman Reigns Fanboy (talk | contribs)

(→Timeline)

(Tags: Mobile edit, Mobile web edit, Advanced mobile edit)

← Previous edit

Latest revision as of 21:18, 11 February 2023 (edit) (undo)

SnoopyBird (talk | contribs)

(protests started in the night of october 30, not october 31 (and carried into 2023, by the way). also adding that the protests (as far as we know) ended.)

(173 intermediate revisions by 59 users not shown)

Line 2:

{{use dmy dates|date=November 2022}}

{{Infobox civil conflict

- | title = 2022 Brazilian election protests

Line 2:

{{use dmy dates|date=November 2022}}

{{Infobox civil conflict

+ | title = 2022–2023 Brazilian election protests

+ | partof =



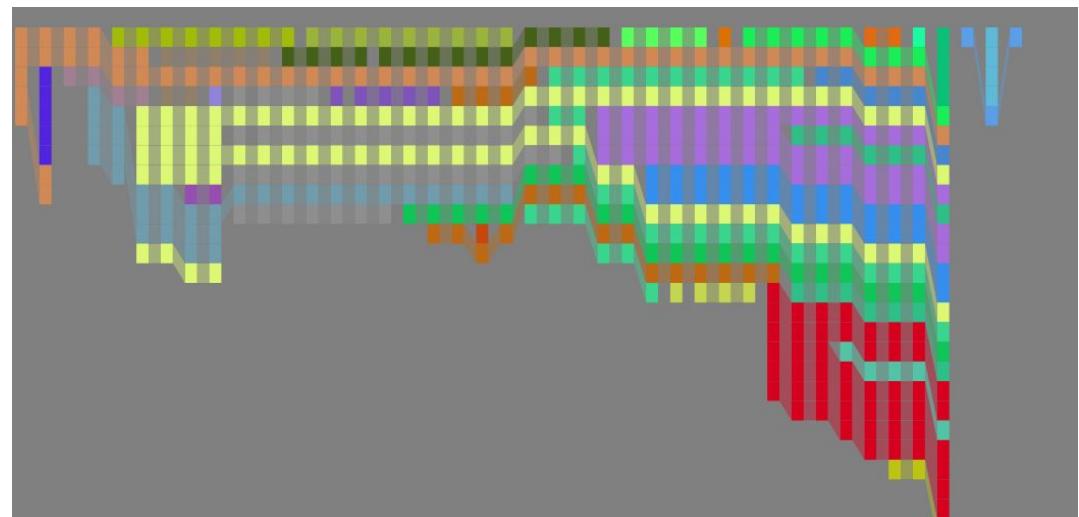
# 03

## Background



# Wiki History Flow

- Visualizes edit history from a given wikipedia article
- No strong connection to the text on the page

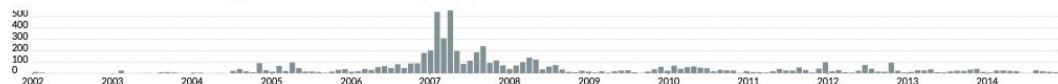




# Contropedia

- Highlights links based on controversy metrics
- Has non-interactive time histories of edit history
- Only highlight links
- In a sandbox with example articles

## Global warming controversy :: layer view

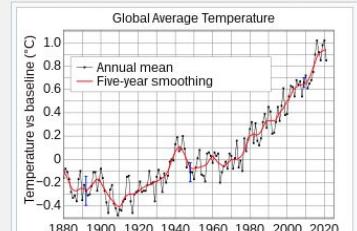


① Currently viewing revision 639708480 from 2014-12-26 18:28:11, with controversy scores calculated since 2002-01-14 18:24:14

## Global warming controversy

The global warming controversy concerns the public debate over whether [global warming](#) is occurring, how much has occurred in modern times, what has caused it, what its [effects](#) will be, whether any action should be taken to curb it, and if so what that action should be. In the [scientific literature](#), there is a [strong consensus that global surface temperatures have increased](#) in recent decades and that the trend is caused primarily by human-induced emissions of greenhouse gases.<sup>[2][3][4][5][6]</sup> No scientific body of national or international standing [disagrees with this view](#).<sup>[7]</sup> Though a few organizations with members in [extractive industries](#) hold [non-committal positions](#),<sup>[8]</sup> Disputes over the key scientific facts of global warming are now more prevalent in the [popular media](#) than in the scientific literature, where such issues are treated as resolved, and more in the [United States](#) than [globally](#).<sup>[9][10]</sup>

Primary issues concerning the existence and cause of climate change include the reasons for the increase seen in the [instrumental temperature record](#), whether the warming trend exceeds normal climatic variations, and whether [human activities have contributed significantly to it](#). Scientists have



Global mean land-ocean temperature change from 1880–2012, relative to the 1951–1980 mean. The black line is the



# Our Extension

- Shows an interactive time series for views and edits
- Highlights text that has been added between current and a given time
- Links people to the revision comparison page
- Works on any English Wikipedia page in real time

## Carleton College

12 languages ▾

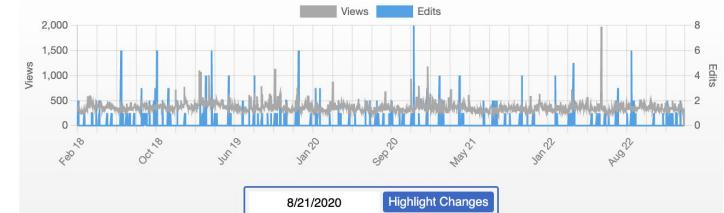
Article Talk

Read Edit View history

From Wikipedia, the free encyclopedia

[ALL](#) [5Y](#) [3Y](#) [1Y](#) [6M](#) [3M](#)

Coordinates: 44°27'43"N 93°9'13"W



We highlighted 40 changes which represent additions to the page between 8/28/2020 (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.

This article is about the college in Minnesota, United States. For the university in Ontario, Canada, see [Carleton University](#).

Carleton College (*/kɑːrlɪtn/ KARL-tin*) is a private liberal arts college in Northfield, Minnesota.<sup>[7]</sup> Founded in 1866, it had 2,105 undergraduate students and 269

faculty members in fall 2016. The 200-acre main campus is between Northfield and the 800-acre Cowling Arboretum, which became part of the campus in the 1920s.<sup>[8]</sup>

Admissions is highly selective with an acceptance rate of 16.5% in 2022,<sup>[9]</sup> and Carleton is annually ranked near the top in most rankings of liberal arts schools. Carleton is particularly renowned for its undergraduate teaching, having been ranked #1 in Undergraduate Teaching by [U.S. News & World Report](#) for over a decade.<sup>[10]</sup>

Students can choose courses from 33 major programs and 31 minor programs and have the option to design their own major. Carleton's varsity sports compete at the [NCAA Division III](#) level in the [Minnesota Intercollegiate Athletic Conference](#).

Carleton is also known for its [ultimate Frisbee](#) team, which has won multiple





# 04

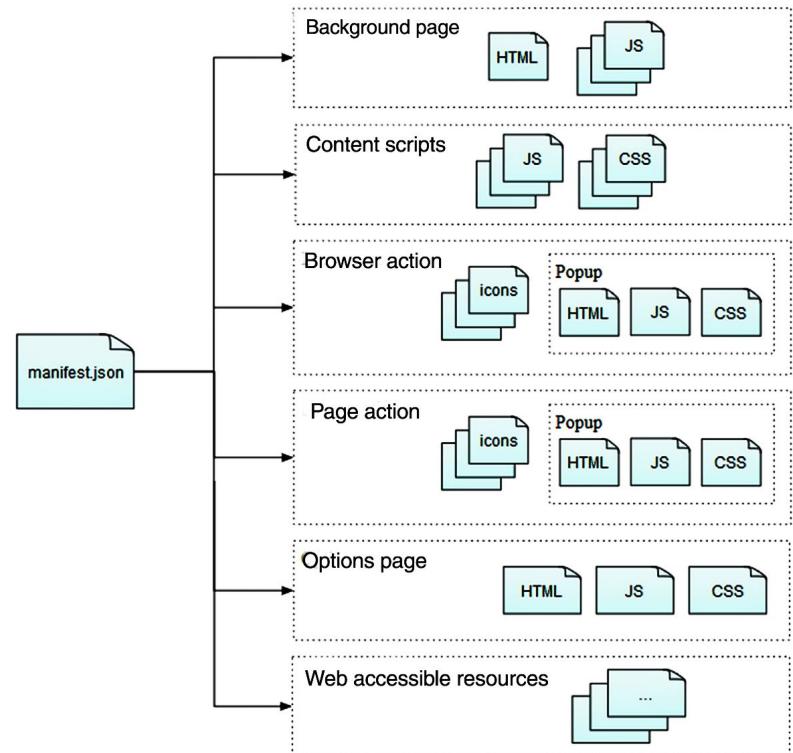
## Architecture



# Browser Extension

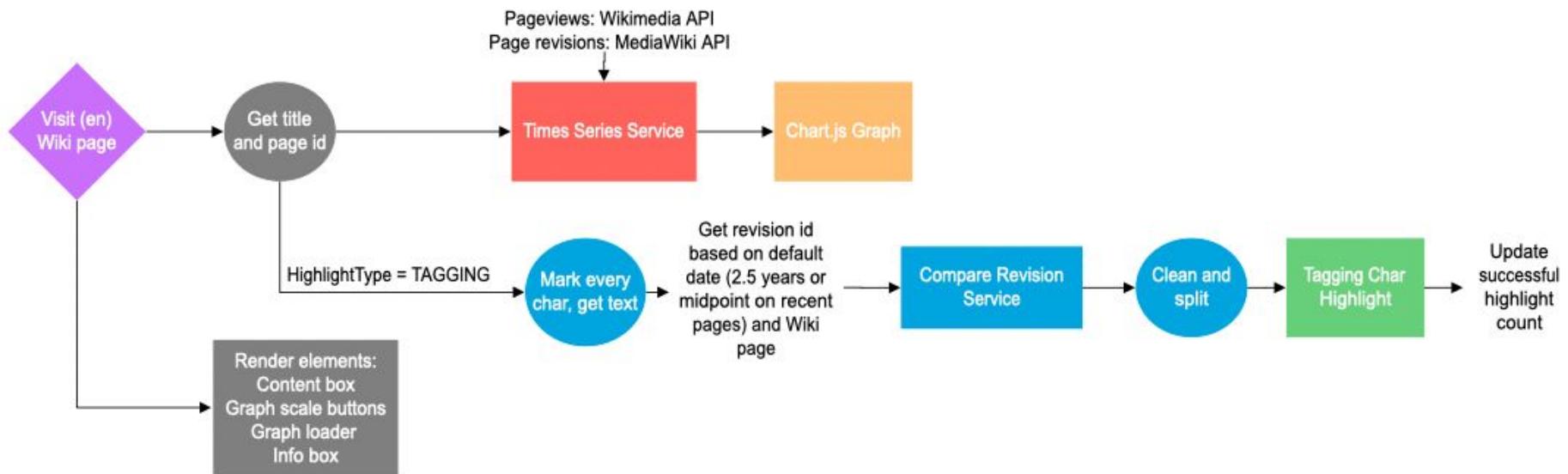
## General idea

- Background scripts - persisting scripts (server)
- Content scripts - javascript inserted into the current webpage
- Popup - Toolbar button page
- Options page
- Web accessible resources - files your extension can access like images and videos



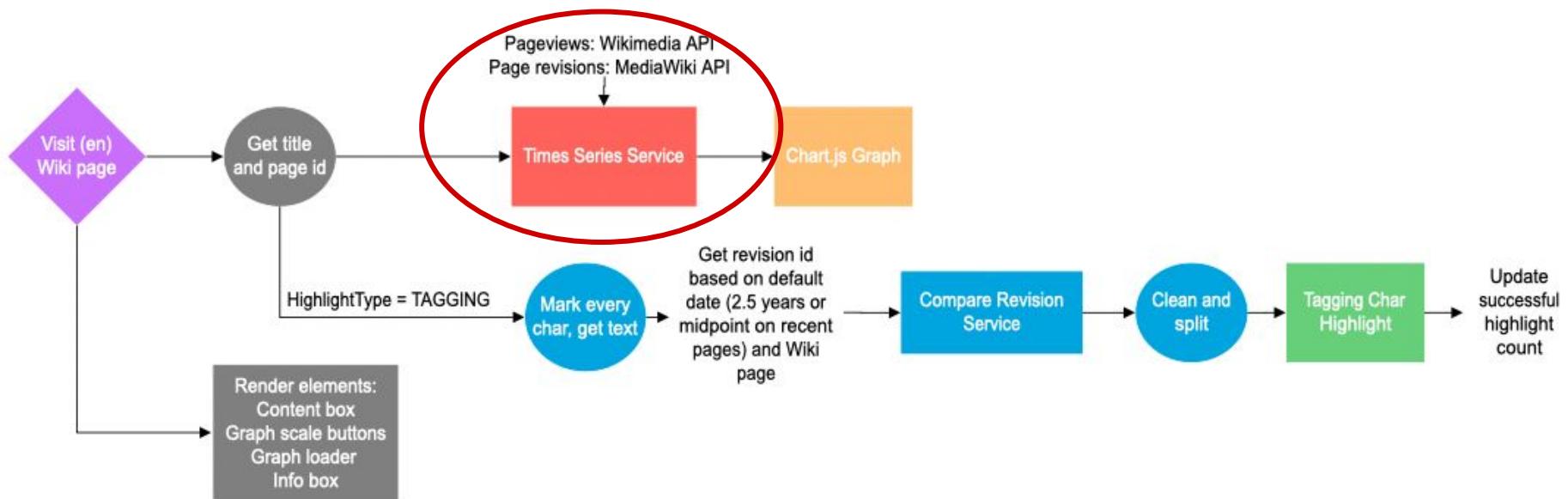


# Diagram - On Page Load



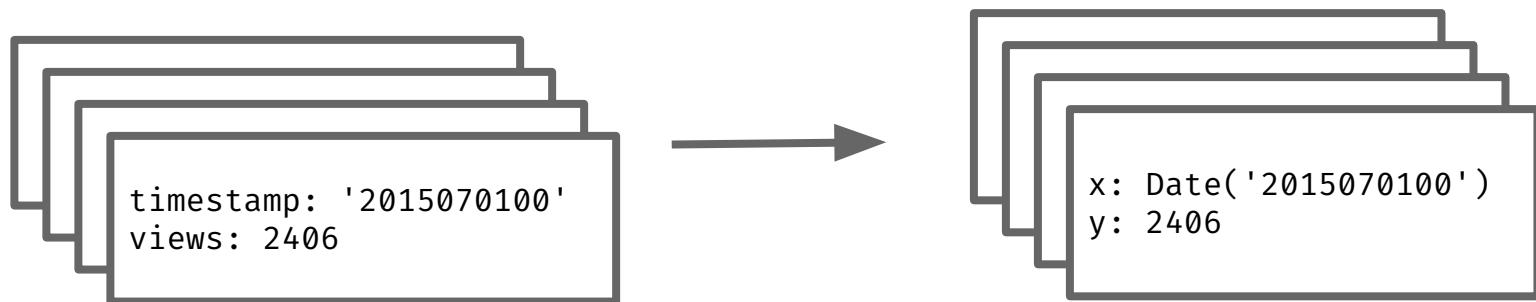


# Diagram - On Page Load



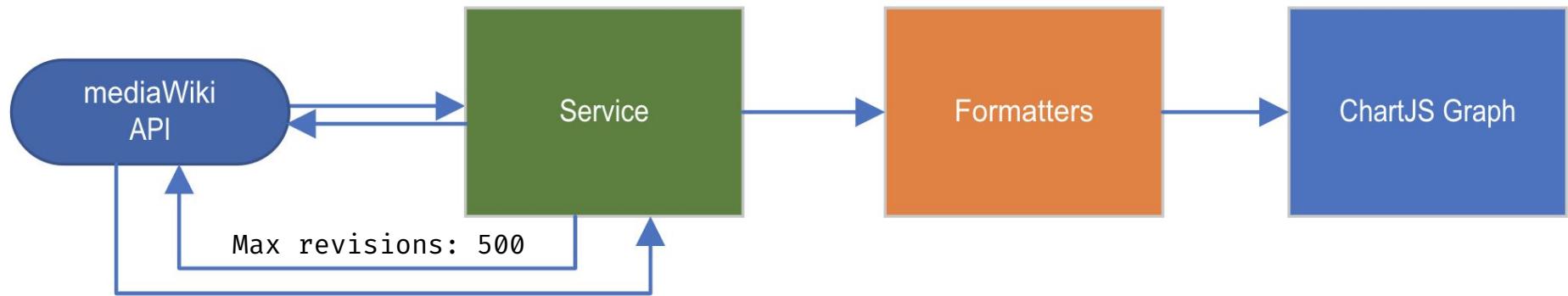


# Time Series Service (PageViews)



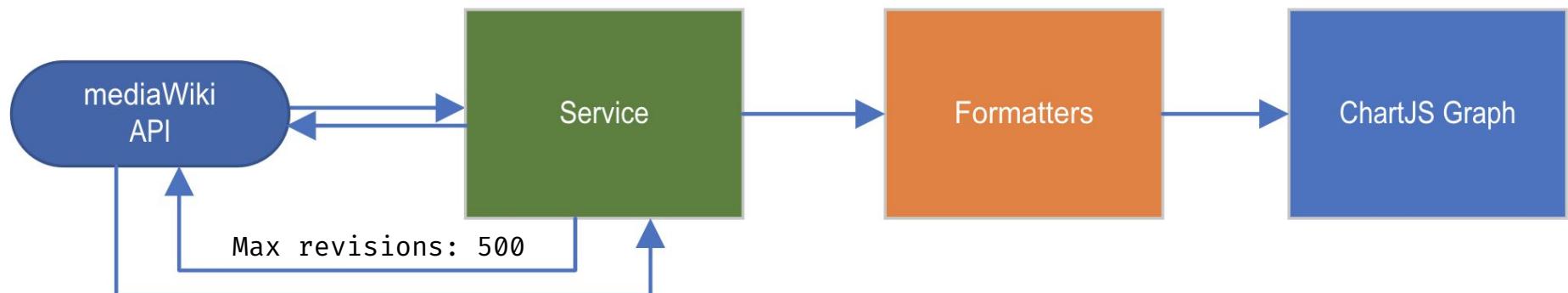
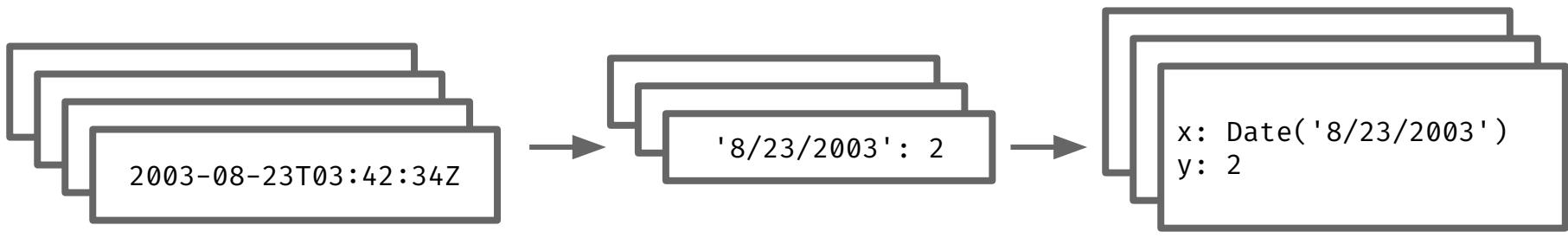


# Time Series Service (Revisions)





# Time Series Service (Revisions)





# Is the 500-Revision Limit a Big Deal?

## Umbrella

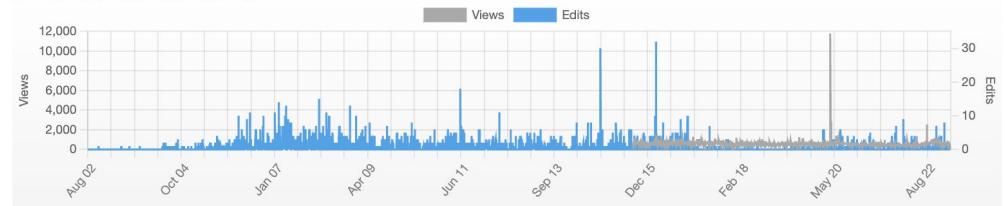
文 A 107 languages ▾

Article Talk

Read Edit View history

From Wikipedia, the free encyclopedia

ALL 5Y 3Y 1Y 6M 3M



2,914 Revisions  
(6 API calls)

## United States

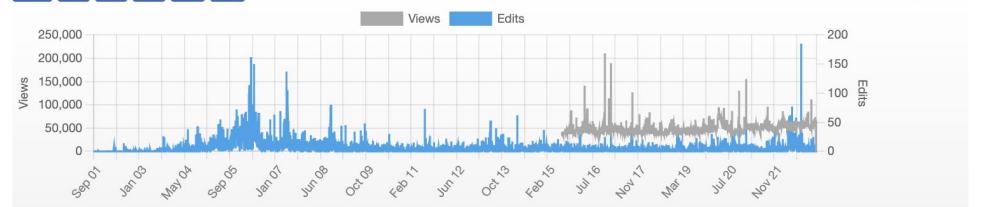
文 A 308 languages ▾

Article Talk

Read View source View history

From Wikipedia, the free encyclopedia

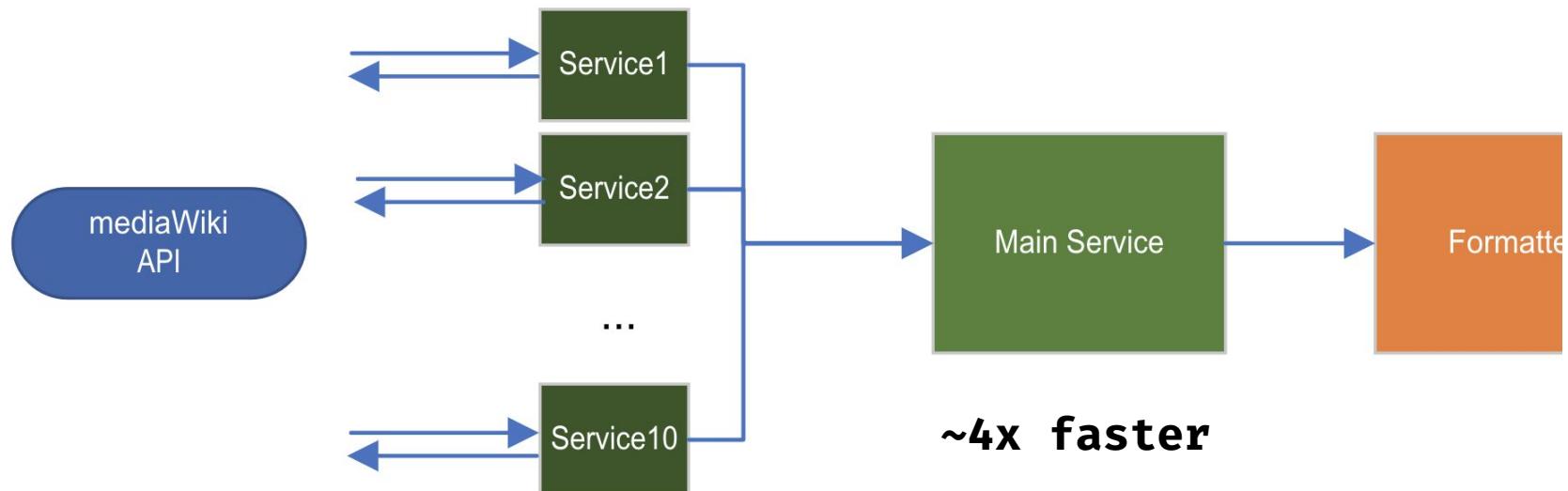
ALL 5Y 3Y 1Y 6M 3M



46,533 Revisions  
(94 API calls)

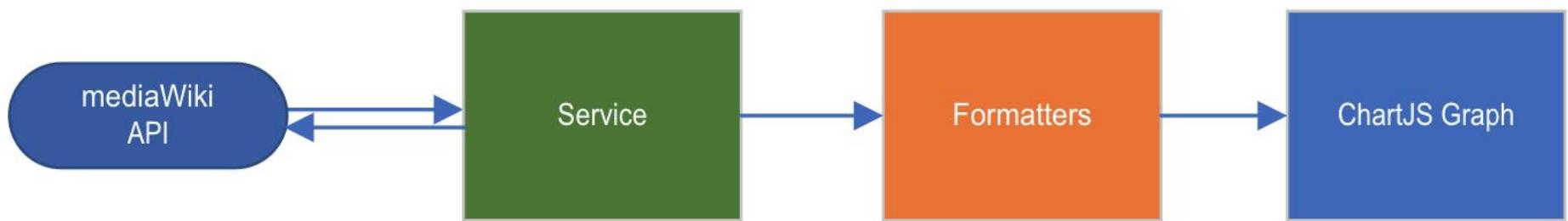
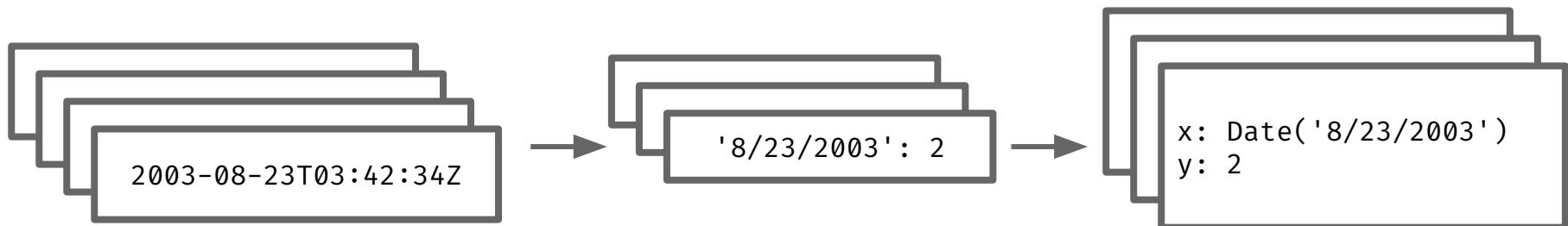


# Is the 500-Revision Limit a Big Deal?



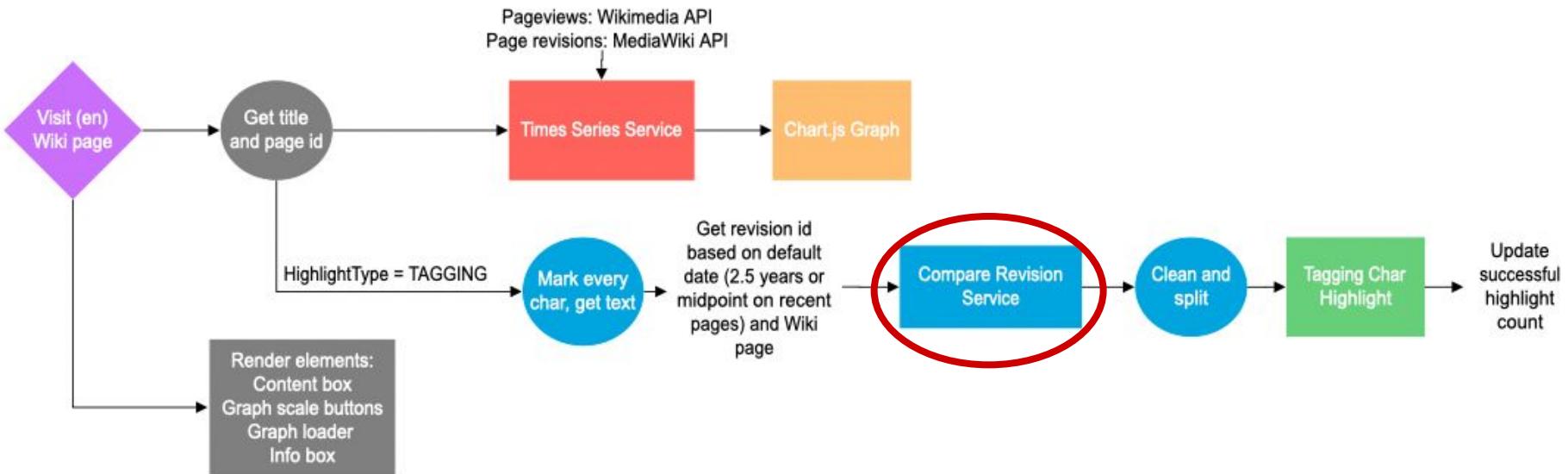


# Time Series Service (Revisions)



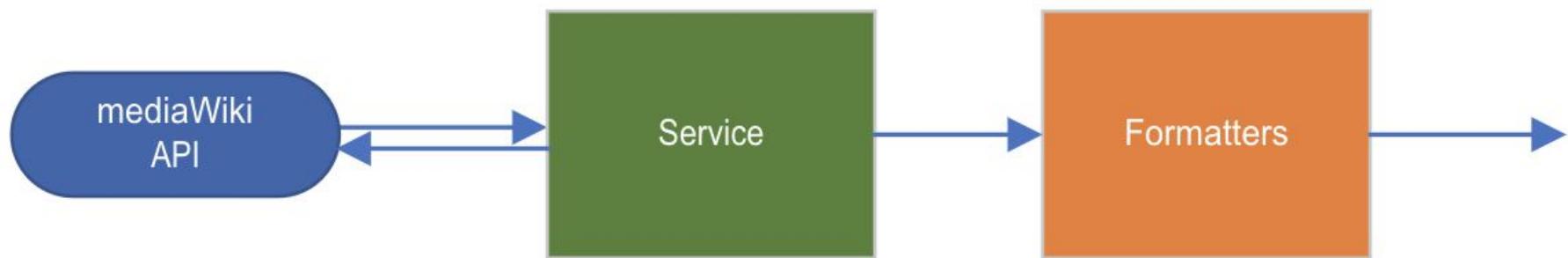


# Diagram - On page load





# Compare Revision Service





# A Brief Background

## Wikitext

```
'''Carleton College''' ({{IPAc-en|'kɑːrltən|n}}  
{{Reppell|KARL|tin}}) is a [[Private college|private]]  
[[Liberal arts colleges in the United States|liberal arts  
college]] in [[Northfield, Minnesota]].<ref name=about>  
{{cite web|title = About Carleton |url =  
https://apps.carleton.edu/about/ |publisher=Carleton College  
|access-date = October 31, 2017}}</ref> Founded in 1866, it  
had 2,105 undergraduate students and 269 faculty members in  
fall 2016. The 200-acre main campus is between Northfield
```

(What API Returns)

## HTML

```
<p>  
  <b>Carleton College</b>  
  " ("  
  <span class="rt-commentedText nowrap">  
    <span class="IPA nopopups noecerpt" lang="en-fonipa">  
      <a href="/wiki/Help:IPA/English" title="Help:IPA/English">  
        "/</a>  
      <span style="border-bottom:1px dotted">  
        <span title="/': primary stress follows">'</span>  
        <span title="'k' in 'kind'">k</span>  
        <span title="/ɑ:r/: 'ar' in 'far'">a:r</span>  
        <span title="'l' in 'lie'">l</span>  
        <span title="'t' in 'tie'">t</span>  
        <span title="/ɪ/: 'i' in 'kit'">i</span>  
        <span title="'n' in 'nigh'">n</span>  
      </span>  
      "/</span>  
    </span>  
  </span>  
</p>
```

## Displayed

**Carleton College** (/kaːrltən/ *KARL-tin*) is a private liberal arts college in Northfield, Minnesota.<sup>[7]</sup> Founded in 1866, it had 2,105 undergraduate students and 269 faculty



# Compare Revision Service (Wikitext)

-  
:'''Enriched macaroni products''' – largely the same as ''macaroni products'' except that each such food must contain thiamin, riboflavin, niacin or niacinamide, folic acid and iron, with specified limits. Additional optional ingredients that may be added include vitamin D, calcium, and defatted wheat germ. The optional ingredients specified may be supplied through the use of dried yeast, dried torula yeast, partly defatted wheat germ, enriched farina, or enriched flour.

-  
:'''Enriched macaroni products with fortified protein''' – similar to ''enriched macaroni products'' with the addition of other ingredients to meet specific protein requirements. Edible protein sources that may be used include food grade flours or meals from nonwheat cereals or oilseeds. Products in this category must include specified amounts of thiamin, riboflavin, niacin or niacinamide and iron, but not folic acid. The products in this category may also optionally contain up to 625 milligrams of calcium.

-  
:'''Milk macaroni products''' – the same as ''macaroni products''

+  
\*\* '''Enriched macaroni products with fortified protein''' – similar to ''enriched macaroni products'' with the addition of other ingredients to meet specific protein requirements. Edible protein sources that may be used include food grade flours or meals from nonwheat cereals or oilseeds. Products in this category must include specified amounts of thiamin, riboflavin, niacin or niacinamide and iron, but not folic acid. The products in this category may also optionally contain up to {{convert|625|mg}} of calcium.

+  
\*\* '''Milk macaroni products''' – the same as ''macaroni products'' except that milk or a specified milk product is used as the sole moistening ingredient in preparing the dough. Other than milk, allowed milk products include concentrated milk, evaporated milk, dried milk, and a mixture of butter with skim, concentrated skim, evaporated skim, or nonfat dry milk, in any combination, with the limitation on the amount of milk solids relative to amount of milk fat.

+  
\*\* '''Nonfat milk macaroni products''' – the same as ''macaroni products'' except that nonfat dry milk or concentrated skim milk is used in preparing the dough. The finished macaroni product must contain between 12% and 25% milk solids-not-fat. Carrageenan or carrageenan salts may be added in specified amounts. The use of egg whites, disodium phosphate and gum gluten optionally allowed for ''macaroni products'' is not permitted for this category.

+  
\*\*\* '''Enriched nonfat milk macaroni products''' – similar to ''nonfat milk macaroni products'' with added requirements that products in this category contain thiamin, riboflavin, niacin or niacinamide, folic acid and iron, all within specified ranges.

+  
\*\*\* '''Vegetable macaroni products''' – ''macaroni products'' except

What we are trying to fetch



# Compare Revision Service

Line 1:

- {{short description|Cured dried beef seasoned with a spice paste}}

[[File:Basturma or Pastroma from Armenia 2.JPG|thumb|right|Pastirma]]

'''Pastirma''' or '''basturma''',{{cite book|author1=Ramesh C. Ray|author2=Montet Didier|title=Microorganisms and Fermentation of Traditional Foods|url=https://books.google.com/books?hl=en&lr=&q=9780128008601}}

Line 1:

+ {{Short description|Spiced dried beef from the Middle East}}

[[File:Basturma or Pastroma from Armenia 2.JPG|thumb|right|Pastirma]]

+

context-before: "{{}  
highlight: "**Short**"  
context-after: "description|"

context-before: "description|"  
highlight: "**Spiced**"  
context-after: "dried beef"

mediaWiki API

Service

context-before: "dried beef"  
highlight: "**from the Middle East**"  
context-after: "{}"



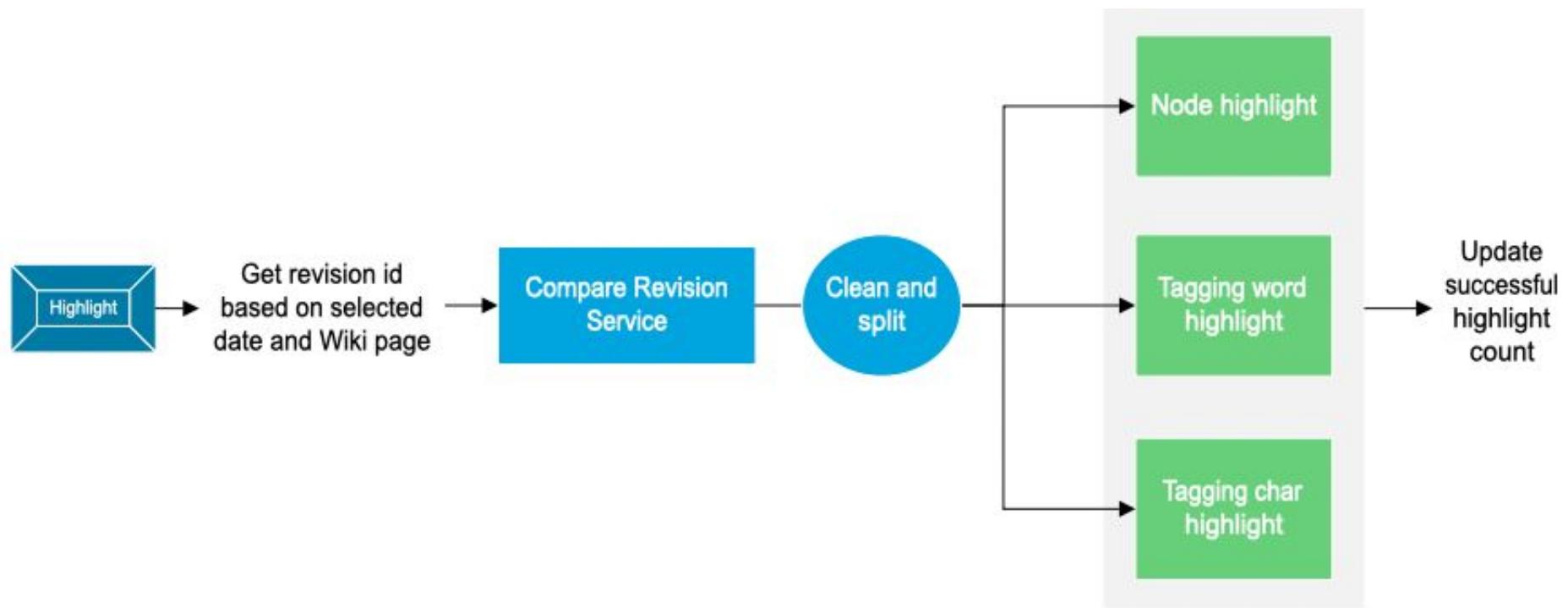
# Compare Revision Service

```
<td class=\"diff-addedline
diff-side-added\"><div>{{<ins class=\"diffchange
diffchange-inline\">Short</ins> description|<ins
class=\"diffchange
diffchange-inline\">Spiced</ins> dried beef <ins
class=\"diffchange
diffchange-inline\">from</ins> <ins
class=\"diffchange diffchange-inline\">the</ins>
<ins class=\"diffchange
diffchange-inline\">Middle</ins> <ins
class=\"diffchange
diffchange-inline\">East</ins>}}</div></td>
```

```
Changes:[
  {
    context-before: "{}"
    highlight: "Short"
    context-after: "description|"
  },
  {
    context-before: "description|"
    highlight: "Spiced"
    context-after: "dried beef"
  },
  {
    context-before: "dried beef"
    highlight: "from the Middle East"
    context-after: "}}}"
  },
  ...
}
```



# Diagram - Highlight





# 05

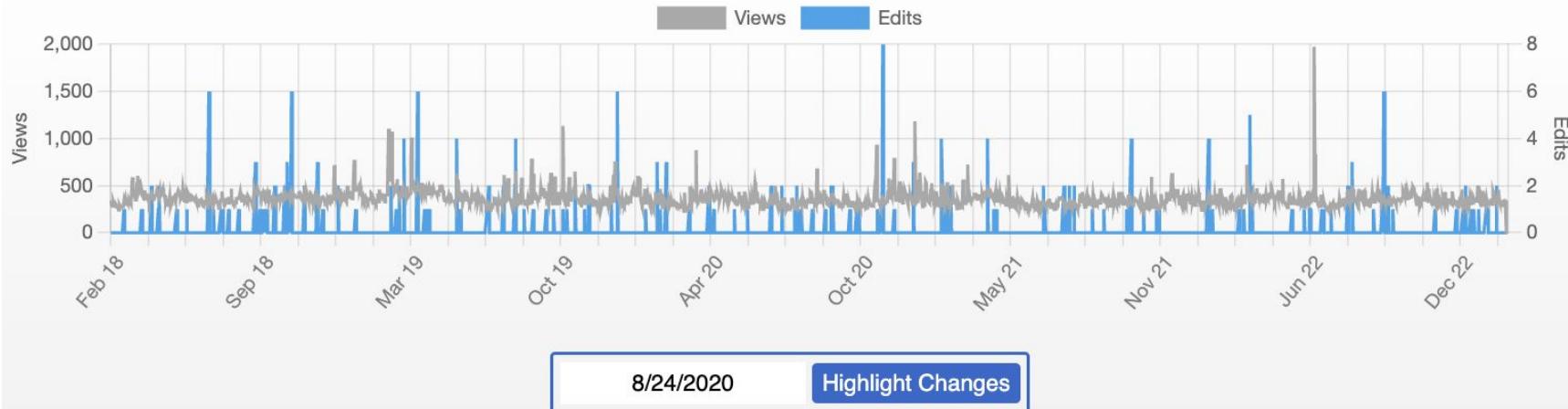
## Features



# Graph

ALL **5Y** 3Y 1Y 6M 3M

Coordinates: 44°27'43"N 93°9'13"W



We highlighted **40** changes which represent additions to the page between [8/28/2020](#) (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.

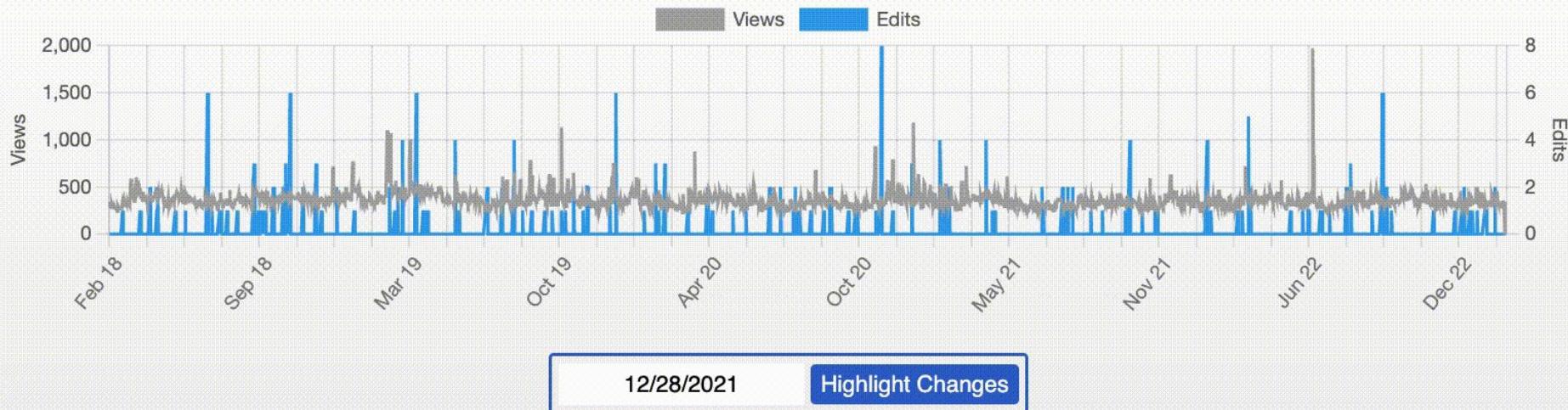


# Graph (Scale)

From Wikipedia, the free encyclopedia

ALL **5Y** 3Y 1Y 6M 3M

Coordinates: 44°27'43"N 93°9'13"W



We highlighted **40** changes which represent additions to the page between **8/28/2020** (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.

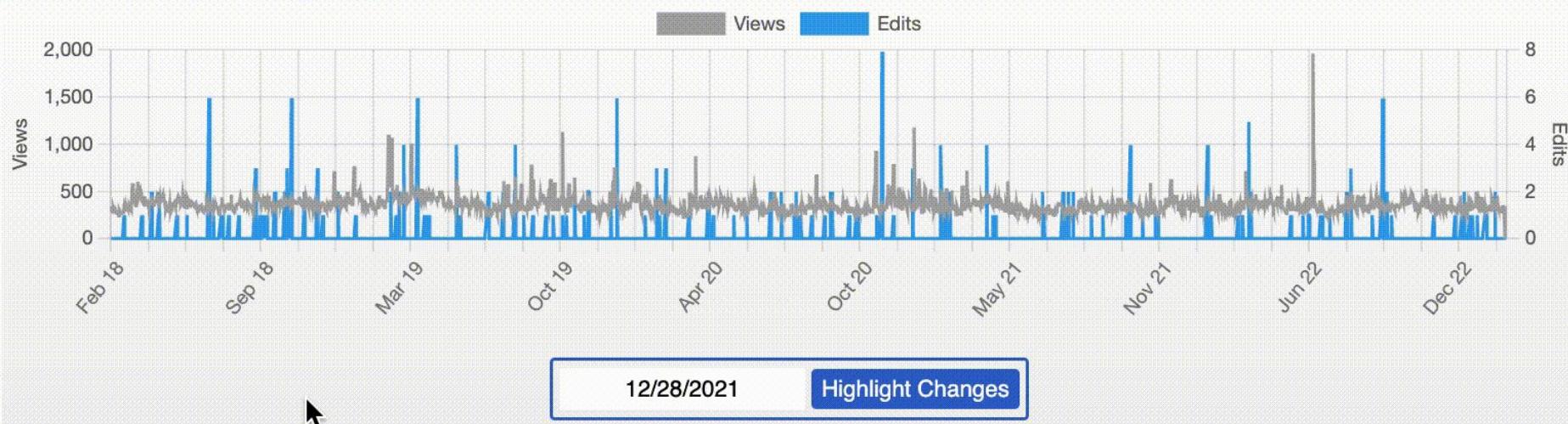


# Graph [Click on Graph]

From Wikipedia, the free encyclopedia

[ALL](#) [5Y](#) [3Y](#) [1Y](#) [6M](#) [3M](#)

Coordinates: 44°27'43"N 93°9'13"W



We highlighted **40** changes which represent additions to the page between **8/28/2020** (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.



# Graph (Loading)

From Wikipedia, the free encyclopedia

[ALL](#) [5Y](#) [3Y](#) [1Y](#) [6M](#) [3M](#)

Coordinates: 46°N 94°W



5 %

*This article is about the U.S. state. For the river, see Minnesota River. For other uses, see Minnesota (disambiguation).*

Looks slow because  
of the conversion  
to gif format

ate in the [Upper Midwestern](#) region of the  
[state in area](#) and the [22nd most populous](#), with  
home to western [prairies](#), now given over to  
in the southeast, now partially cleared, farmed,  
[Birch Woods](#), used for mining, forestry, and





# Highlighting

4/10/2022

Highlight Changes

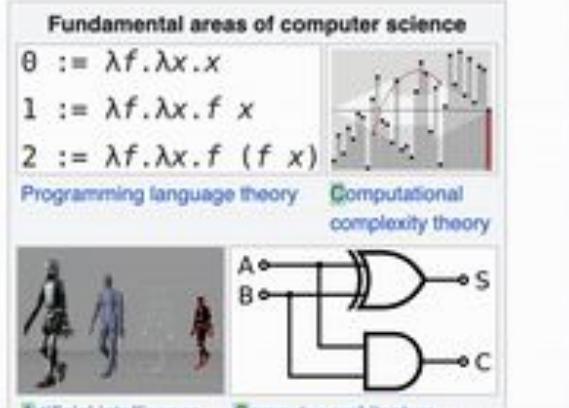
We highlighted 88 changes which represent additions to the page between 4/13/2022 (the closest revision to your chosen time) and the present day. Some of the changes were purely formatting or deletions and, therefore, are not highlighted.

For other uses, see [Computer science \(disambiguation\)](#).

**Computer science** is the study of computation, automation, and information.<sup>[1][2][3]</sup> Computer science spans theoretical disciplines (such as algorithms, theory of computation, information theory, and automation) to practical disciplines (including the design and implementation of hardware and software).<sup>[4][5][6]</sup> Computer science is generally considered an academic discipline and distinct from computer programming.<sup>[7]</sup>

Algorithms and data structures are central to computer science.<sup>[8]</sup>

The theory of computation concerns abstract models of computation and general classes of problems that can be solved using them. The fields of cryptography and computer security involve studying the means for secure communication and for preventing security vulnerabilities. Computer graphics and computational geometry address the generation of images. Programming language theory considers different ways to describe computational processes, and database theory concerns the management of





# Text matching

## API output

### Wikitext

Hi, we are the [[Wiki]]  
Chrome '''Browser'''  
extension ''team'''!

## The Wikipedia page

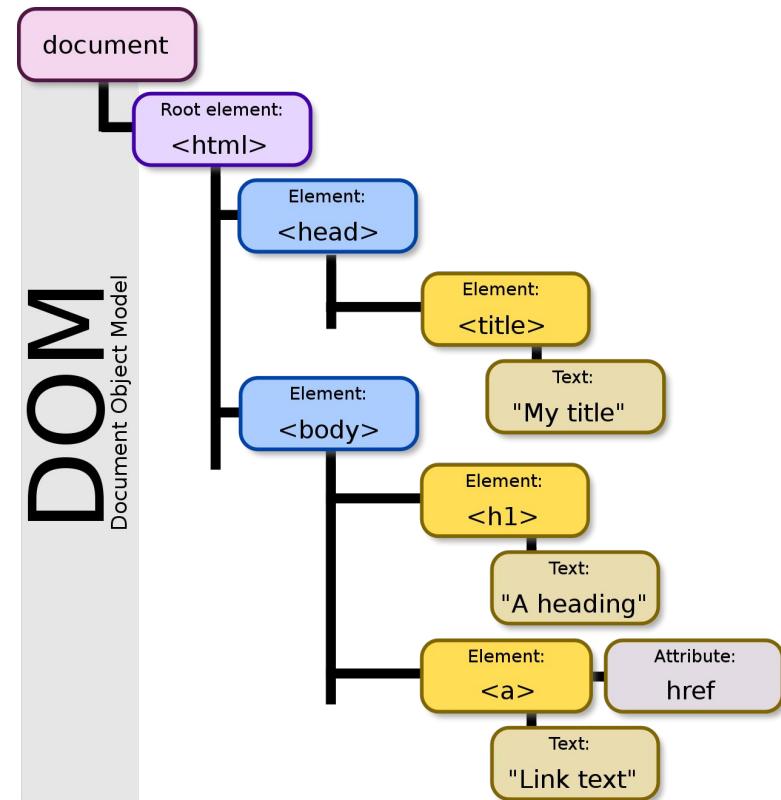
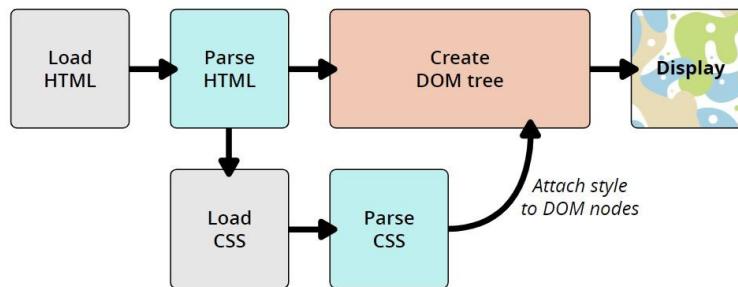
### HTML

<p>Hi, we are the <a>Wiki</a>  
Chrome <b>Browser</b>  
extension <i>team</i>!</p>



# DOM Tree Basics

- The Document Object Model (DOM) is a programming interface for web documents
- Hierarchical structure
- Used to render web pages





# Text Nodes

Carleton College

KARL

-tin

) is a

private

liberal arts college

in

Northfield, Minnesota

Founded in 1866, it had 2,105 undergraduate students and 269 faculty members in fall 2016. The 200-acre main campus Northfield and the 800-acre

Cowling Arboretum

, which became part of the campus in the 1920s.

**Carleton College** (/ka:rltin/ *KARL-tin*) is a **private liberal arts college** in **Northfield, Minnesota**.<sup>[7]</sup> Founded in 1866, it had 2,105 undergraduate students and 269 faculty members in fall 2016. The 200-acre main campus is between Northfield and the 800-acre **Cowling Arboretum**, which became part of the campus in the 1920s.<sup>[8]</sup>



# Text matching - links problem

Links were causing us a problem in Node highlighting, as they were in different levels in the tree as the context

```
Element to be split: content.js:65
▼ {content_before: '', highlight: "The 1996 film [[D3: The Mighty Ducks]] w
  as partially filmed on Carleton's campus.", content_after: ''} i
  content_after: ""
  content_before: ""
  highlight: "The 1996 film [[D3: The Mighty Ducks]] was partially filmed ..."
▶ [[Prototype]]: Object
```



# Text matching - links solution

Split result:

```
▼ (3) [{...}, {...}, {...}] ⓘ  
  ▼ 0:  
    content_after: "D3: The Mighty Ducks"  
    content_before: ""  
    highlight: "The 1996 film "  
    ► [[Prototype]]: Object  
  ▼ 1:  
    content_after: " was partially filmed on Carleton's campus."  
    content_before: "The 1996 film "  
    highlight: "D3: The Mighty Ducks"  
    ► [[Prototype]]: Object  
  ▼ 2:  
    content_after: ""  
    content_before: "D3: The Mighty Ducks"  
    highlight: " was partially filmed on Carleton's campus."
```



The educational video game series [The Oregon Trail](#) was initially created by three Carleton students.<sup>[112]</sup>

The 1996 film [D3: The Mighty Ducks](#) was partially filmed on Carleton's campus.<sup>[113]</sup>



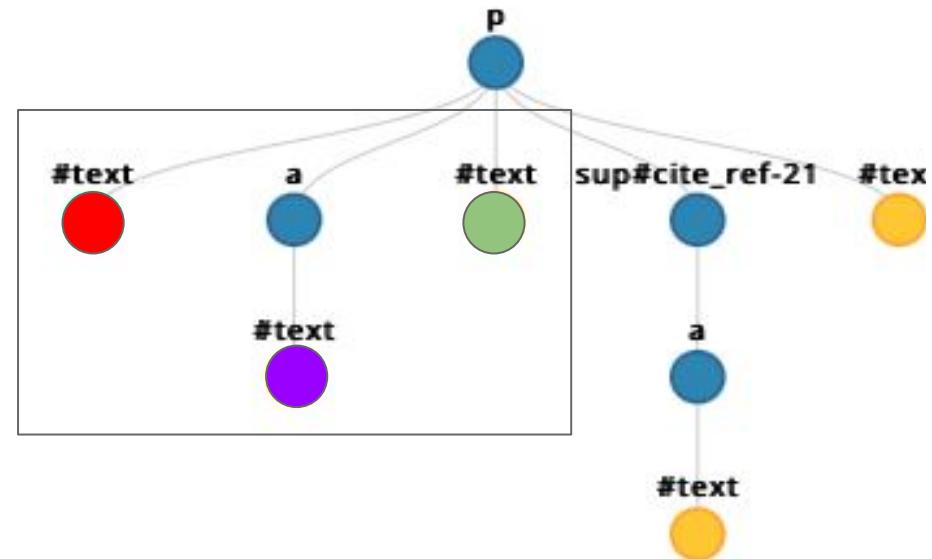
# Node Highlight

## General idea

For every context entry, loop over the DOM tree text nodes and replace the matched text with a mark node if:

- Content matches
- Short contents matches
- The parent's next sibling and the parent's previous node include contents

In 1927, students founded the first student-run pub in the nation, The Cave. Located in the basement of Evans Hall, it continues to host live music shows and other events several times each week.<sup>[21]</sup>





# Tagging Highlight

## General idea

Once the page loads, we traverse the DOM tree text nodes:

- Append the text to a variable
- Replace each node with a tagged version

At the end:

- We have a variable with all the text of the page
- A way to add CSS styling to any character on the page

```
<a href="/wiki/Rice_flour" title="Rice flour">Rice flour</a>
                                         ↓
▼<a href="/wiki/Rice_flour" title="Rice flour">
  <mark id="mark-569">R</mark>
  <mark id="mark-570">i</mark>
  <mark id="mark-571">c</mark>
  <mark id="mark-572">e</mark>
  <mark id="mark-573"> </mark>
  <mark id="mark-574">f</mark>
  <mark id="mark-575">l</mark>
  <mark id="mark-576">o</mark>
  <mark id="mark-577">u</mark>
  <mark id="mark-578">r</mark>
</a>
```



# Highlighting

## Tagging

### Pros

- Can access the entire text to use context before and after
- Highlights more

### Cons

- Bloats page HTML
- Affects accessibility

## Node

### Pros

- Simple, no change in Wikipedia's HTML (other than the highlights)

### Cons

- Can't highlight when the content is in different nodes in the DOM tree
- Needs multiple DOM tree traversals



# Highlight limitations

We don't highlight cases where the content includes internal attributes

competition.*[citation needed]* In the competition.{{**citation needed**|date=October 2017}} Content after

*Kiplinger's Personal Finance* places

'''[[Kiplinger's Personal Finance]]''' places

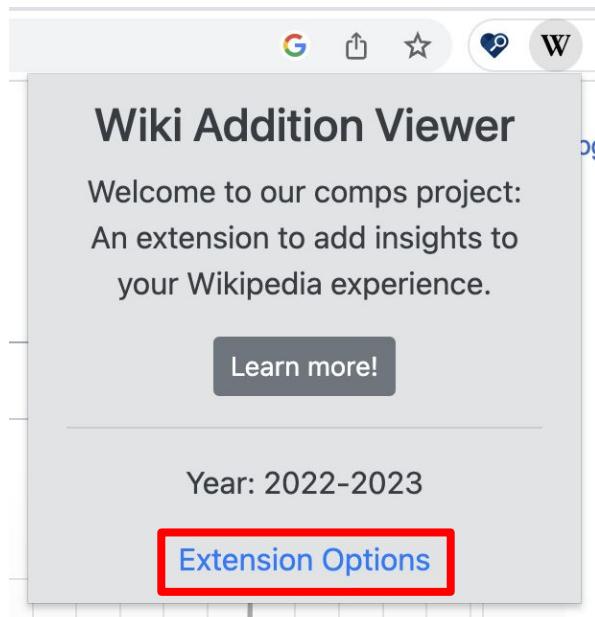
Content before missing ]]

Content after missing [[

We clean and highlight only well-formed elements



# Options Page



## Options

**Highlight Color:**



Restore Color

Save



# 06

## User study



## Why?

1. Critical to see how users were interacting with our tool
2. To determine whether our tool was intuitive or not
3. Figure out features to improve

## How?

1. “Speak as you think” method
2. Carefully designed questions
3. 2 iterations
4. 8 users
5. Interviews lasted 30-45 minutes each



# Before User Study 1

## Pasta

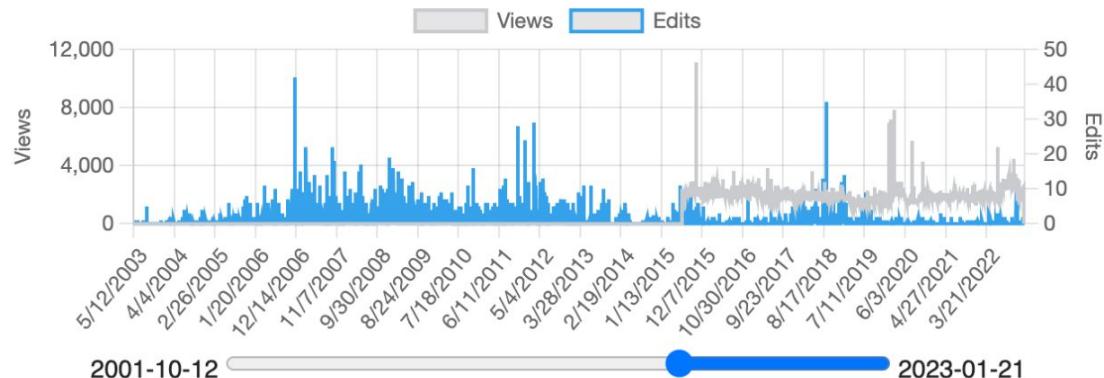
文 A 87 languages ▾

Article Talk

Read View source View history



From Wikipedia, the free encyclopedia



### Highlights

This article had 428 terms highlighted.  
These are the revisions that were made  
on this particular date.

06 / 18 / 2016

[Go To Revision Page](#)

Showing highlight for closest revision (date: 2016-06-18)



# After User Study 1

## Pasta

文 87 languages ▾

Article Talk

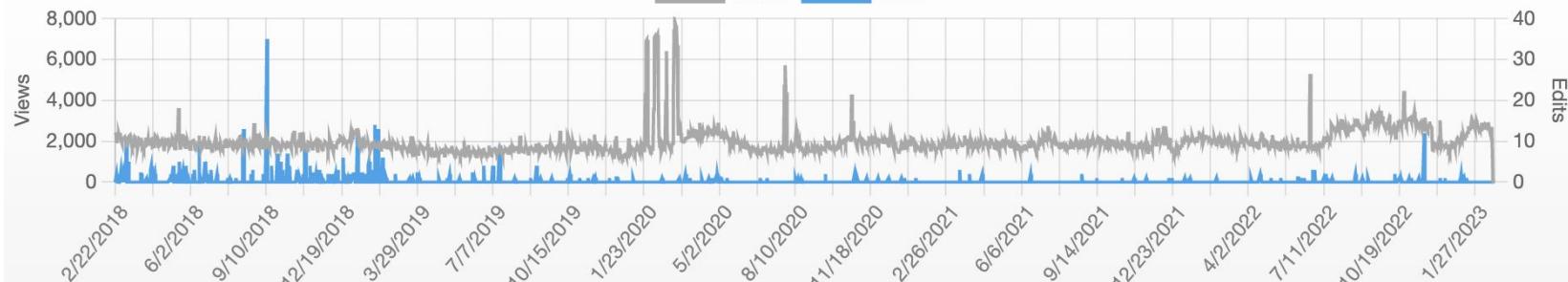
Read View source View history

From Wikipedia, the free encyclopedia

ALL 5Y 3Y 1Y 6M 3M



Views Edits



Comparing the current Wikipedia page to the [9/19/2020 version](#) (the closest revision to your chosen time)

Newly added texts are highlighted in green, but the deletions are not included



# Results of User Study 2

P1: “Oh that happened last week! Nice to see it highlighted”

P7: “I want to find out why the views peaked on Christmas”

P3: “I would perhaps use this for researching something currently in the news”



# 07

## Demo



# 08

## Future improvements



- Data Interpretation
- Authorship
- Talk Page Integration



# 09

## Conclusion



# Achievements

1. Directly convey information on the history of Wikipedia pages
2. Create connections between the revisions of the page and the current page
3. Easily accessible and convenient to use extension



# We published the extension in the Chrome Web Store

chrome web store



luisaescosteguy@gmail.com

[Home](#) > [Extensions](#) > Wiki Addition Viewer

## Wiki Addition Viewer

★★★★★ 2 ⓘ | [Fun](#) | 3 users

Available on Chrome

Rate us!



Overview

Privacy practices

Reviews

Related

Carleton College

[Article](#) [Talk](#)

From Wikipedia, the free encyclopedia

[ALL](#) [5Y](#) [3Y](#) [1Y](#) [6M](#) [3M](#)

Views Edits



Shirin Sharma 2 minutes ago ★★★★☆

Excellent Extension! Very useful while reading Wikipedia articles. Everyone must try!



# Fun Facts

## 80 PRs Merged

We merged most of our 88 branches

## 14 Interviews

We conducted 2 user studies, with 8 different subjects

## 2 Sprints

We separated our dev work in 2 sprints (Fall, Winter)

## 3 Languages

90% JS, 7% CSS, 3% HTML

## 71 Tasks

We completed 71 tasks

## Over 250 PR Comments

We had 43 comments on the most commented PR



# Extension Performance

## Baseline

Carleton College page  
with no extension

9 ms  Loading

136 ms  Scripting

54 ms  Rendering

4 ms  Painting

55 ms  System

## Wiki Addition Viewer

Carleton College page  
with Tagging

13 ms  Loading

1157 ms  Scripting

448 ms  Rendering

45 ms  Painting

277 ms  System

Carleton College page  
with Node

9 ms  Loading

1198 ms  Scripting

81 ms  Rendering

12 ms  Painting

211 ms  System



# Acknowledgements

Prof. Sneha Narayan

Prof. Eric Alexander

Prof. Austin Mason

The 8 participants from our user studies

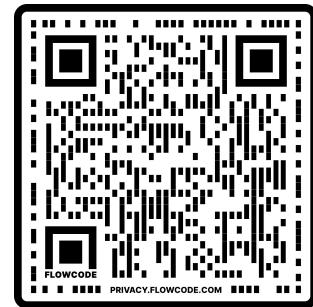


Chrome Web Store



# Questions?

Team Website





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