

# Lightning-Fast Web Performance

Scott Jehl

---

Author, Responsible Responsive Design

# Course Agenda

1. Introduction
2. Why Performance Matters
3. Metrics! How do we define fast?
4. Identifying Performance Problems
5. **Making Things Faster**
6. Wrapping Up

Making Things  
**Faster**

Easy, classic performance optimizations:

# **Optimize / Minify / Compress**

---

# Optimizing images

---

Jpg, png, webp



Mac app

Web service

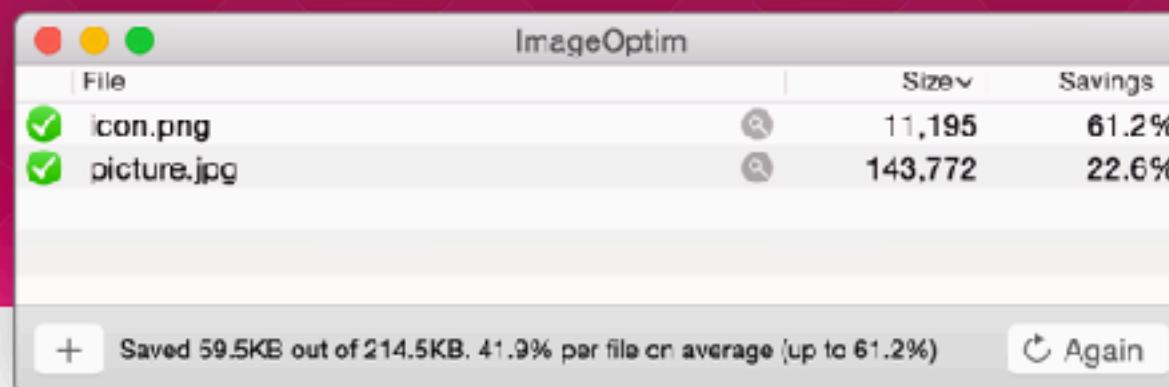
# ImageOptim makes images load faster

Removes bloated metadata. Saves disk space & bandwidth by compressing images without losing quality.

[Download for Free](#)

[Other versions](#)

Requires macOS 10.9+. Works with Mojave. It's Free and Open Source. Donate.



Faster web pages and apps

**Reduces image file sizes** – so they take up less disk space and download faster – by applying advanced

Image files scrubbed clean

**Removes invisible junk:** private EXIF metadata from digital cameras, embedded thumbnails, comments,

Best tools with drag'n'drop

Seamlessly combines all the best image optimization tools: [MozJPEG](#), [pnccrush](#), [7zip](#), [SVGO](#) and



<https://imageoptim.com/mac>



Optimage

About

Features

Examples

Benchmark

Contact



# Advanced image optimization tool

Automatically compress images achieving the highest compression ratio at consistent image quality.

[Free Download](#)

[Buy Now – \\$15](#)

Version 3.3.1 (History) for macOS 10.11+

Free 24 images per day



<https://optimage.app/>



# WebPonize

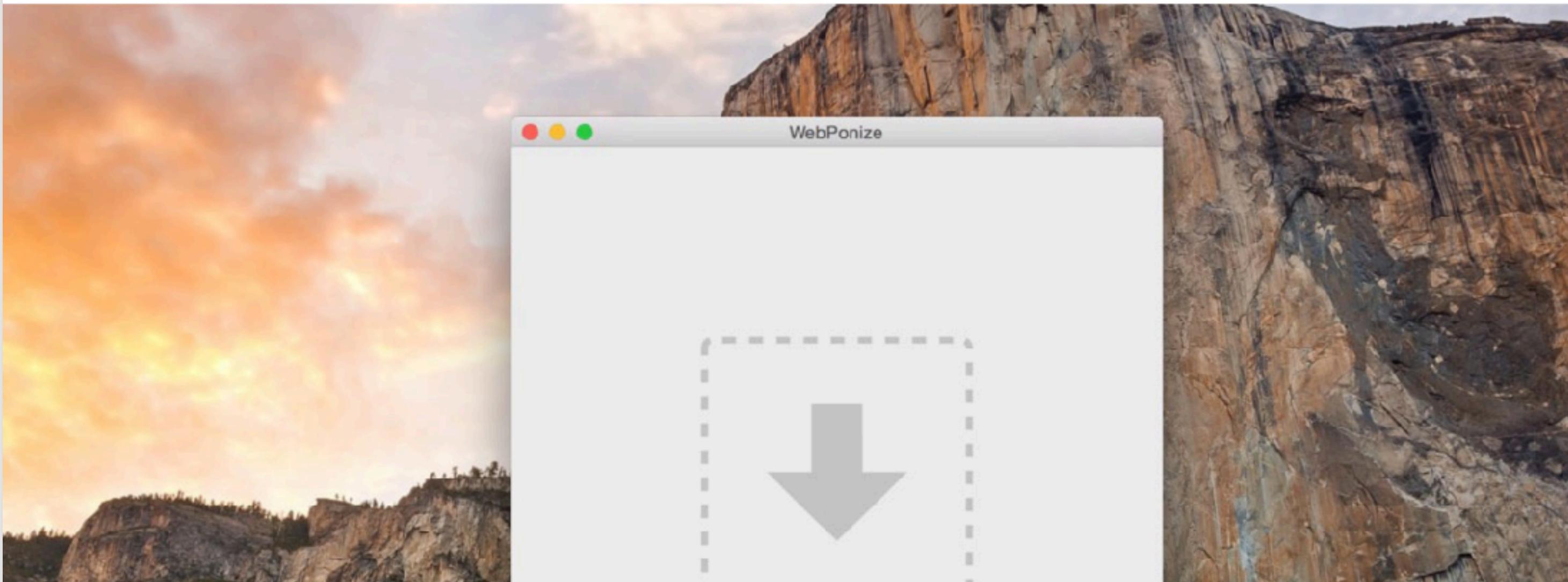
macOS app which converts images to WebP.

Star

446

Fork

24



<https://webponize.org/>

Can I use

webp

?



Settings

10 results found

## # WebP image format - UNOFF

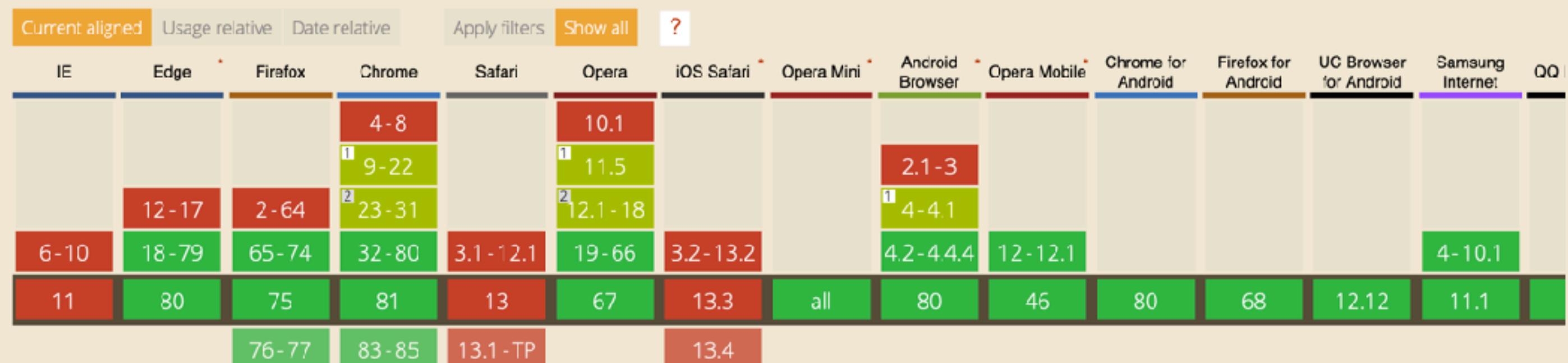
Usage

% of all users



77.43% + 0.2% = 77.63%

Image format that supports lossy and lossless compression, as well as animation and alpha transparency.



# Example server webp reroute

## ▼ Request Headers [view source](#)

```
Accept: image/webp,image/apng,image/*,*/*;q=0.8  
Accept-Encoding: gzip, deflate  
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8  
Cache-Control: no-cache  
Connection: keep-alive
```

HTTP Request 'Accept' header

```
RewriteCond %{HTTP_ACCEPT} image/webp [OR]
```

```
RewriteRule (.+)\.(?:jpe?g|png)$ $1.webp
```

```
Header append Vary Accept
```

# Use Imagemin to compress images

Nov 5, 2018 · Updated Apr 6, 2020

Appears in: [Fast load times](#)



Katie Hempenius

[Twitter](#) · [GitHub](#) · [Glitch](#)

## Why should you care?

Uncompressed images bloat your pages with unnecessary bytes. The photo on the right is 40% smaller than the one on the left, yet would probably look identical to the average user.



<https://web.dev/use-imagemin-to-compress-images/>

Introducing the "Ultimate Digital Asset Management Guide"

[View Now](#)



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DOCUMENTATION

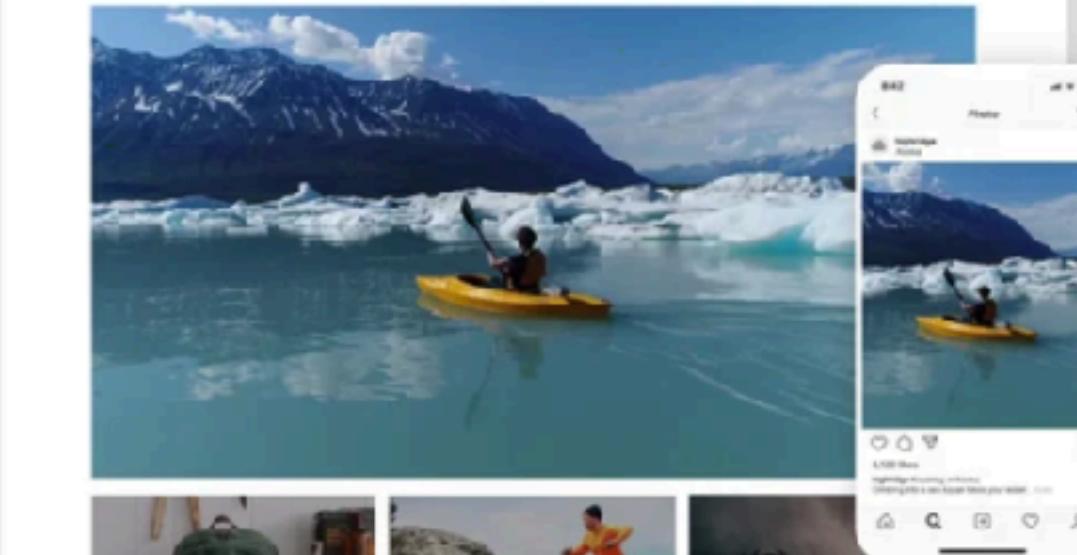
ADD-ONS

[SIGN UP FOR FREE](#)

# Your Customers Demand an Engaging Digital Experience

Use Cloudinary to efficiently manage, optimize, and deliver images, videos and other media across every device and channel.

[SIGN UP FOR FREE](#)



<https://cloudinary.com/>



Mac app

Web service

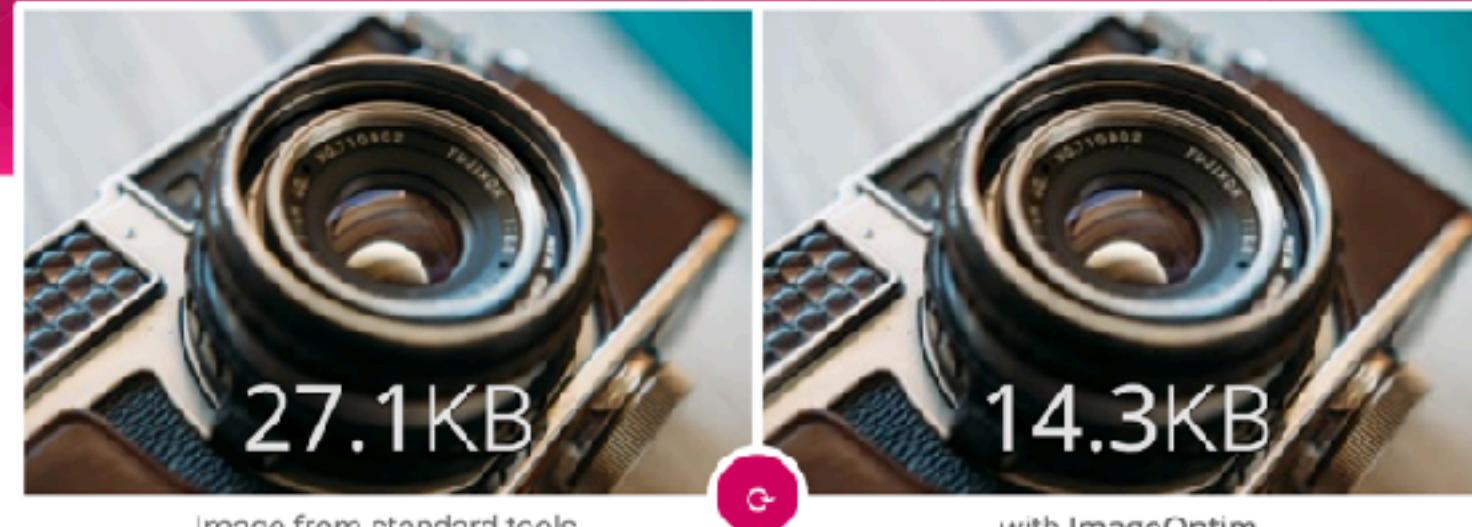
## ImageOptim API makes pages load faster

Web service for image compression. Easily resize and optimize images on your server.

[Sign up](#)

[Pricing](#)

[Documentation](#)



Faster web pages and apps

**Make images load faster** and save

Image resizing on demand

Easily create **responsive images** and

Technology managed for you

**Integrate easily** without installing

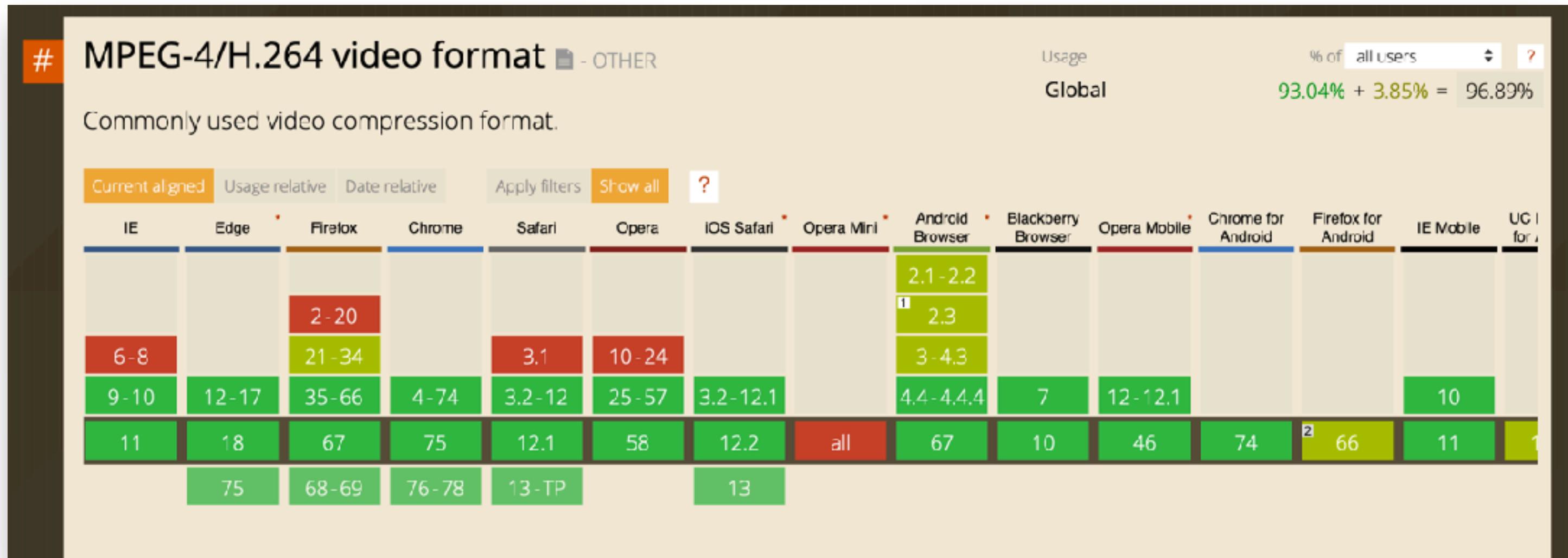


<https://imageoptim.com/mac>

# Optimizing video

---

Mp4, webm



<https://caniuse.com/#search=mp4>

Can I use

webm

?

[Settings](#)

2 results found

#

## WebM video format - OTHER

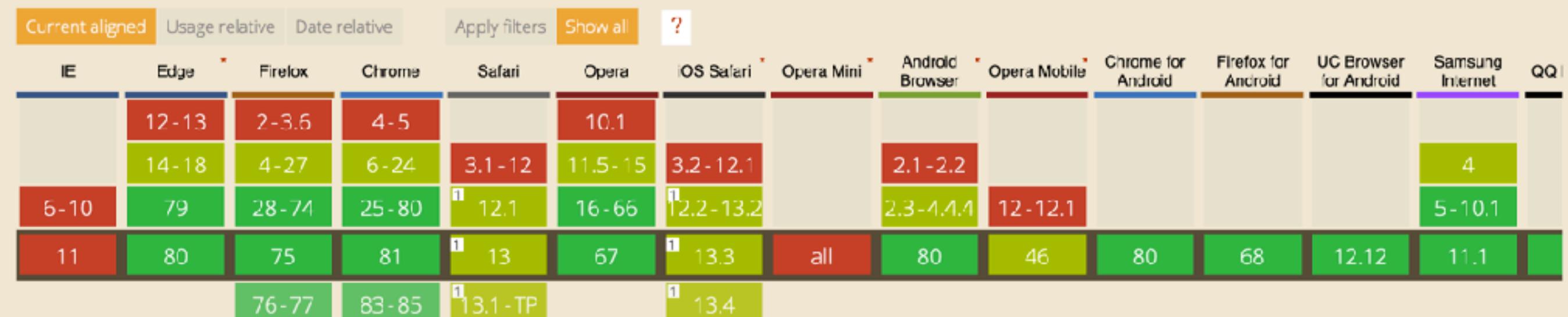
Usage

Global

% of all users

75.06% + 18.99% = 94.05%

Multimedia format designed to provide a royalty-free, high-quality open video compression format for use with HTML5 video. WebM supports the video codec VP8 and VP9.

<https://caniuse.com/#search=webm>



# HandBrake

The open source video transcoder

HandBrake is a tool for converting video from nearly any format to a selection of modern, widely supported codecs.

**Reasons you'll love HandBrake:**

- Convert video from nearly any format
- Free and Open Source
- Multi-Platform (Windows, Mac and Linux)

**Download HandBrake 1.2.2**  
For Mac OS X 10.11 or later

(Other Platforms)

It's free!

[News](#) | [Features](#) | [Downloads](#) | [Community & Support](#) | [Docs](#) | [GitHub](#)



MiroVideoConverter

Finally!

A beautiful, simple way to convert almost any video to MP4, WebM (vp8), Ogg Theora, or for Android, iPhone, and iPad. Batch conversion, custom sizing, and more!

100% Free and open-source.

DOWNLOAD MiroVideoConverter

From the creators of Miro, a wonderful video player and downloader  
[Try Miro! \(also free and open\)](#)

m

Miro Video Converter

Building\_on\_the\_Past.mp4 38%

Big Buck Bunny.mp4 6%

Drag more videos here or Choose File...

Converting to: Phone 5

Apple ▾ Android ▾ Other ▾ Format ▾

Show All Conversions



<http://www.mirovideoconverter.com/>

File Upload  
& StorageCloud Asset  
ManagementImage & Video  
ManipulationOptimization &  
Fast Delivery

Presentation

# Image & Video Manipulation

Manipulate your images and videos dynamically to fit any graphics design. Apply effects, resizing, cropping, face detection, watermarks and tons of processing capabilities.

[Image manipulation >](#)[Video manipulation >](#)<https://cloudinary.com/>

# Optimizing fonts

---

woff, woff2

100% Free For Commercial Use.



Hot Recent Top Font Deals Swag **Generator** Font Identifier Font Talk Blog

SEARCH FONTS & FOUNDRIES



# Webfont Generator

**Usage:** Click the "Upload Fonts" button, check the agreement and download your fonts. If you need more fine-grain control, choose the **Expert** option.

**UPLOAD FONTS ↑**

You currently have no fonts uploaded.

**BASIC**

Straight conversion with minimal processing.

**OPTIMAL**

Recommended settings for performance and speed.

**EXPERT...**

You decide how best to optimize your fonts.

**Agreement:**

**Yes, the fonts I'm uploading are legally eligible for web embedding.**

Font Squirrel offers this service in good faith. Please honor the EULAs of your fonts.

[Advertise on Font Squirrel!](#)

## FONT LISTS

Recently Added

Tags

Most Popular

Classifications

Hot Today

Languages

Hot Web Fonts

Foundries

Almost Free

## FIND FONTS

### CLASSIFICATIONS

Sans Serif

### TAGS

Paragraph

429 557

Display

Display

349 534



<https://www.fontsquirrel.com/tools/webfont-generator>

## Use **glyphhanger**

We can test our site to see what glyphs are used at a URL using a tool we've developed called `glyphhanger`.

Find `glyphhanger` on [GitHub](#) or [npm](#).

```
npm install -g glyphhanger
```

At its simplest, `glyphhanger` can take a URL and return a Unicode range for all of the content used on the site.

For example (don't include the \$ if you copy these commands):

```
$ glyphhanger https://www.filamentgroup.com/  
U+20,U+21,U+26,U+28,U+29,U+2B-38,U+3A,U+3F-47,U+49,U+4C-  
50,U+52-55,U+57-5A,U+61-70,U+72-77,U+79,U+7C,U+A9,U+DC,U+2014,U+  
2019,U+25A2
```



<https://www.filamentgroup.com/lab/glyphhanger/>

# # WOFF 2.0 - Web Open Font Format - CR

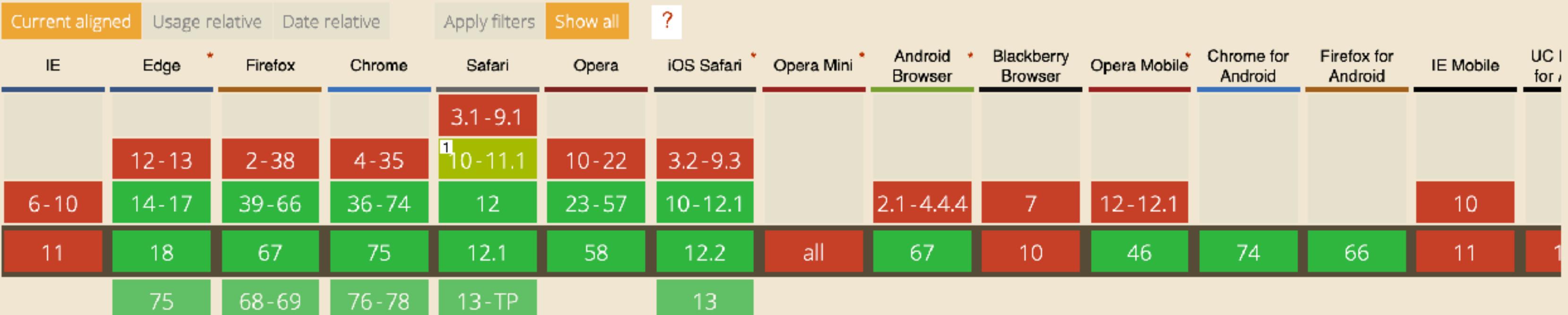
Usage

% of all users

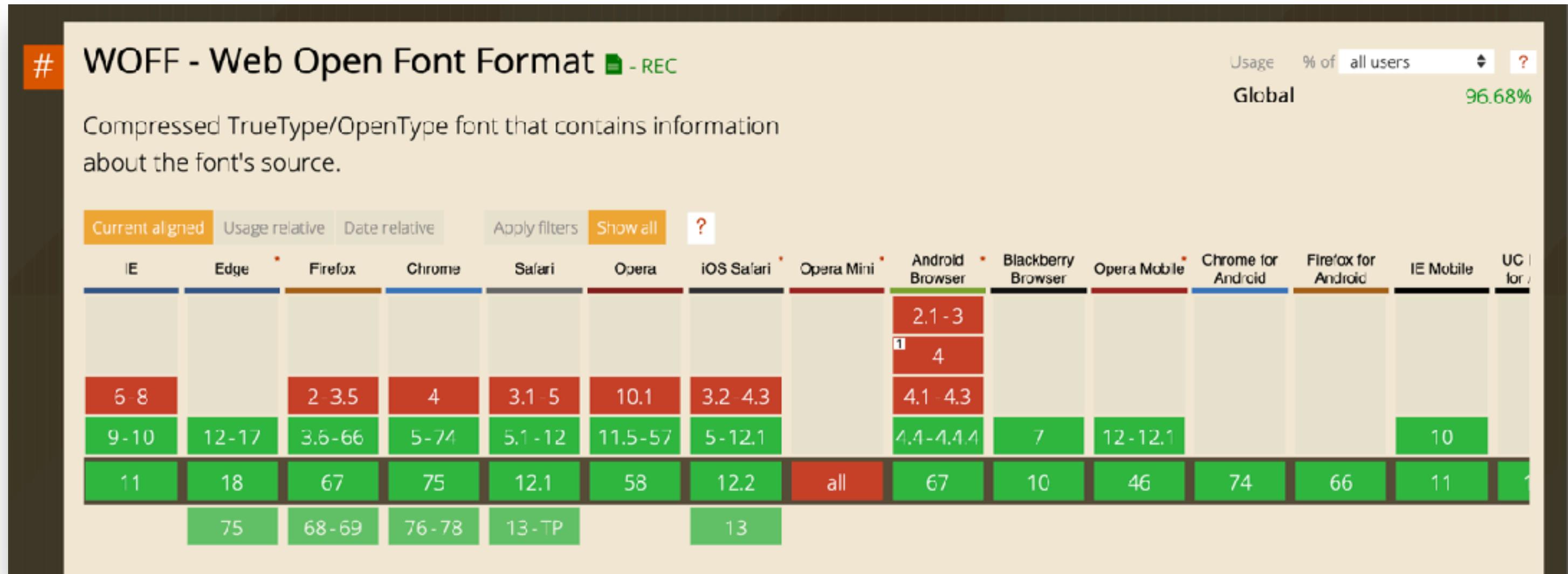


88.13% + 0.51% = 88.63%

TrueType/OpenType font that provides better compression than  
WOFF 1.0.



<https://caniuse.com/#search=woff2>



<https://caniuse.com/#search=woff>

## TT Geekette Variable

Display: 100  200

A loopy monospaced typeface with adjustable stroke contrast, moving between monoline and horizontal stress, and additional retractable serifs.

Design: TypeType, Vika Usmanova

Publisher: TypeTrends

Characters: Latin, Cyrillic

Release: 2020-02-04

Licensing: Paid/commercial

Info/fonts: [myfonts.com](https://myfonts.com)

АВСДЕҒҒИ҃ЖКЛ҃МНОР҃ҚСТУ҃  
ШХҮ҃Ζ абсдеғиҗкәтнорә<sup>р</sup>  
естешхүз 0123456789 А  
БВГДЕЖЗИЙКЛНОПРСТУФХЦ  
ЧШ҃҃бвгэжзиийкл  
мнօրստуֆխչայինեյյ

## Ansaige Variable

Weight: 50  900

ΛΔСРЕСШИ ИКІ ММОРДСТИИИИИИ



<https://v-fonts.com/>



# Roboto

Designed by Christian Robertson

Select styles

Glyphs

About

License

Pairings

Download family

## Styles

Type here to preview text

Almost before we knew it, we had left the ground.

Size 30 px

Thin 100

Almost before we knew it, we had left the ground.

- Remove this style

Thin 100 italic

Almost before we knew it, we had left the ground.

+ Select this style

### Selected family

Review

Embed

To embed a font, copy the code into the <head> of your html

<link href="https://fonts.googleapis.com/css2?family=Roboto:ital,wght@0,100;0,500;1,500&display=swap" rel="stylesheet">

CSS rules to specify families

font-family: 'Roboto', sans-serif;



# Removing unused text

---

Uncss, tree shaking

# Minify Text Files

```
@charset "UTF-8";.dialog-open:focus,.snapper:focus{outline:0}.carousel-nav-paginated .carousel-active-page a,.tablesaw-
btn,.tablesaw-btn:hover,a{text-decoration:none}.collapsible-enhanced.collapsible-collapsed .collapsible-
content,.enhanced .collapsible-collapsed .collapsible-content{display:none}.dialog-background,.dialog-
content{position:absolute;top:0;left:0;right:0;display:none}.carousel,.carousel-
slide,.snapper,.snapper_item,.snapper_nav,.snapper_nextprev_contain,.snapper_pane{position:relative}.dialog-
background{background:#aaa;filter:alpha(opacity=40);background-color:rgba(0,0,0,.4);z-index:99999;height:100%;bottom:
0}.dialog-content{margin:1em;background:#fff;padding:1em 2em;max-width:30em;box-shadow:0 1px 2px #777;z-index:10000}
@media (min-width:30em){.dialog-content{width:30em}}.dialog-background-open,.dialog-open{display:block}.dialog-background-
trans{background:0 0}@media (min-width:32em){.dialog-content{margin:4em auto
1em}}.snapper:after,.snapper:before,.snapper_items:after,.snapper_items:before,.snapper_nav:after,.snapper_nav:before,.sna
pper_nextprev_contain:after,.snapper_nextprev_contain:before{content:
"};display:table}.snapper:after,.snapper_items:after,.snapper_nav:after,.snapper_nextprev_contain:after{clear:both}.snapper
*{box-sizing:border-box}.enhanced .snapper_pane_crop,.snapper-
enhanced .snapper_pane_crop{overflow:hidden}.enhanced .snapper_pane_crop .snapper_pane,.snapper-
enhanced .snapper_pane_crop .snapper_pane{padding-bottom:30px;margin-bottom:-30px}.snapper_pane{overflow-x:auto;overflow-
y:hidden;white-space:nowrap;width:100%;-webkit-overflow-scrolling:touch;-webkit-scroll-snap-type:mandatory;-ms-scroll-
snap-type:mandatory;scroll-snap-type:mandatory;-webkit-scroll-snap-points-x:repeat(100%);-ms-scroll-snap-points-
x:repeat(100%);scroll-snap-points-x:repeat(100%)}.snapper_item{width:100%;white-space:normal;scroll-snap-
align:start}.enhanced .snapper_item,.snapper-enhanced .snapper_item{display:none}.enhanced .snapper_item:first-
child,.snapper-enhanced .snapper_item:first-child,.snapper-enhanced .snapper_item[style]{display:block}.snapper-
enhanced .snapper_item:first-child,.snapper-enhanced .snapper_item[style]{float:left!important;clear:none!
important}.checkbox,.form-group:after,.radiobutton,.sect-group:after,.tablesaw-bar,.tablesaw-bar-section label,.tablesaw-
bar-section-table{clear:both}.snapper_item img{width:100%}.snapper_nav{margin:1em
0;overflow:hidden}.snapper_nav_inner{overflow:auto;-webkit-overflow-scrolling:touch;white-space:nowrap;padding:2px 1px
30px;margin-bottom:-30px;height:84px}.snapper_nav a{overflow:hidden;white-space:normal;display:inline-
block;float:none;vertical-align:middle;height:50px;margin:0 5px 0 0}.snapper_nav img{display:block;height:
100%;width:auto;max-width:100%}.carousel{width:100%}.carousel .carousel-item{display:none}.carousel .carousel-
active{display:block}.carousel-fade .carousel-item:not(.carousel-active){pointer-events:none}.carousel .carousel-nav:nth-
child(2){display:none}.carousel-slide{overflow:hidden;-webkit-transform:translate3d(0,0,0);-moz-
transform:translate3d(0,0,0);-ms-transform:translate3d(0,0,0);-o-
transform:translate3d(0,0,0);transform:translate3d(0,0,0)}.carousel-slide .carousel-item{position:absolute;left:100%;top:
0;width:100%;display:block;z-index:1}.carousel-nav-paginated li,.carousel-nav-paginated li a,.politespace-
proxy{position:relative;display:inline-block}.carousel-slide .carousel-active{left:0;position:relative;z-index:
3}.carousel-slide .carousel-item-next{z-index:2}.carousel-slide .carousel-in{left:0}.carousel-slide-reverse .carousel-
out{left:100%}.carousel-slide .carousel-out,.carousel-slide-reverse .carousel-in{left:-100%}.carousel-slide-
reverse .carousel-item{-webkit-transition:left .1s ease;-moz-transition:left .1s ease;-ms-transition:left .1s ease;-o-
transition:left .1s ease;transition:left .1s ease}.carousel-slide-reverse .carousel-active{left:0}.carousel-item.no-
active{display:none}.carousel-item.active{display:block}.carousel-item.next{display:none}.carousel-item.out{display:none}.
```



CSS Minifier

API Languages Blog



We've been hosted on [Digital Ocean](#) since 2013 and highly recommend it for your hosting too. [Try it now!](#)

# CSS Minifier

Online CSS Minifier/Compressor. Free! Provides an API. Simple Quick and Fast.

Written and hosted by [Andrew Chilton \(@andychilton\)](#) since 2009.

Input CSS

Minified Output



<https://cssminifier.com/>

♥ Nouveau Papier Mâché

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Get unlimited public & private packages + package-based permissions with npm Pro. [Get started »](#)

## cssmin

0.4.3 • [Public](#) • Published 5 years ago

 [Readme](#)

 [Explore](#) BETA

 [0 Dependencies](#)

 [105 Dependents](#)

 [9 Versions](#)

## Description

This is a node.js module that minimize CSS files (cssmin). It uses a port of YUICompressor made in JavaScript by Stoyan Stefanov based on Isaac Schlueter work. [For more informations about YUICompressor](#)

## Installation

### Install

```
> npm i cssmin
```

### Weekly Downloads

165,742



<https://www.npmjs.com/package/cssmin>

Search or jump to...  Pull requests Issues Marketplace Explore

svg / svgo Used by 1,174,202 Watch 246 Star 11,987 Fork 895

Code Issues 241 Pull requests 23 Projects 0 Wiki Security Insights

Node.js tool for optimizing SVG files

svg minification nodejs svgo javascript optimization cli

979 commits 2 branches 67 releases 121 contributors View license

Branch: master New pull request Create new file Upload files Find File Clone or download

GreLI	Fix removeUnusedNS not counting usage in <svg> tag	...	Latest commit 95f7603 29 days ago
bin	lib/svgo/		7 years ago
docs/how-it-works	Update ko.md		last year
examples	fix for references nonexistent transformsWithOnePath plugin (#980)		last year
lib	Updage changelog and documentation parts		2 months ago
plugins	Fix removeUnusedNS not counting usage in <svg> tag		29 days ago
test	Fix removeUnusedNS not counting usage in <svg> tag		29 days ago



<https://github.com/svg/svgo>



IMAGE

MARKUP



8.54k → 5.08k 59.52%



## Global settings

 Show original Compare gzipped Prettify markup

## Precision

## Features

 Remove doctype Remove XML instructions Remove comments Remove <metadata> Remove xmlns Remove alt data<https://jakearchibald.github.io/svgomg/>

**npm** npm is now a part of GitHub 

Newly Potted Mandrakes Products Pricing Documentation Community

**npm**  Search packages Search Sign Up Sign In

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## uglify-js

3.9.1 • [Public](#) • Published 9 days ago

 [Readme](#)  [Explore](#) BETA  [1 Dependency](#)  [3,624 Dependents](#)  [227 Versions](#)

# UglifyJS 3

UglifyJS is a JavaScript parser, minifier, compressor and beautifier toolkit.

**Note:**

- `uglify-js@3` has a simplified [API](#) and [CLI](#) that is not backwards compatible with `uglify-js@2`.
- Documentation for UglifyJS 2.x releases can be found [here](#).

**Install**

```
> npm i uglify-js
```

**Weekly Downloads**

12,572,989 

[Version](#) [License](#)



<https://www.npmjs.com/package/uglify-js>

# UnCSS

npm v0.17.0   Linux build passing   Windows build failing   coverage 97%   dependencies up to date   dev dependencies up to date

UnCSS is a tool that removes unused CSS from your stylesheets. It works across multiple files and supports Javascript-injected CSS.

## How

The process by which UnCSS removes the unused rules is as follows:

1. The HTML files are loaded by [jsdom](#) and JavaScript is executed.
2. All the stylesheets are parsed by [PostCSS](#).
3. `document.querySelector` filters out selectors that are not found in the HTML files.
4. The remaining rules are converted back to CSS.

### Please note:

- UnCSS cannot be run on non-HTML pages, such as templates or PHP files. If you need to run UnCSS against your templates, you should probably generate example HTML pages from your templates, and run `uncss` on those



<https://github.com/uncss/uncss>



# UnCSS Online!

Simply UnCSS your styles online!

...over, .btn-info:active, .focus, .btn-info:active:focus, .btn-info:active:hover, .open>, dropdown

- Usage: focus, .open>.dropdown-toggle .btn-info:hover{color:#fff;background-color:#269abc;} b

...dropdown-toggle, .btn-info{background-image:none}, .btn-info.disabled, .btn-info.disabled.act

...o Copy&paste your HTML and CSS into boxes below :hover, .btn-info[disabled], .btn-info[disabled].acti

...ve, .btn-info[disabled]:hover, .fieldset[disabled] .btn-info, .fieldset[disabled] .b

...tn-info, .fieldset[disabled] .btn-info:disabled, .fieldset[disabled] .b

...tn-info:disabled, .fieldset[disabled] .btn-info:disabled, .fieldset[disabled] .b

...tn-info:disabled, .fieldset[disabled] .btn-info:disabled, .fieldset[disabled] .b

...tn-warning{color:#fff;background-color:#f0ad4e;border-color:#ff9933;outline-color:#99550d}, .b

...tn-warning.active, .btn-warning:active, .btn-warning:active, .b

...tn-warning:active, .btn-warning:active, .focus, .btn-warning:active:focus, .b

...tn-warning:active, .focus, .btn-warning:active, .focus, .focus, .dropdown

## Your HTML

Insert your HTML here

## Your CSS

Insert your CSS here

**UNCSS MY STYLES**



<https://uncss-online.com/>

Sponsor webpack and get apparel from the [official shop](#)! All proceeds go to our [open collective](#)!

X



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webpack v4.34.0

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> Output Management

> ...

# Tree Shaking

*Tree shaking* is a term commonly used in the JavaScript context for dead-code elimination. It relies on the static structure of ES2015 module syntax, i.e. `import` and `export`. The name and concept have been popularized by the ES2015 module bundler `rollup`.

The webpack 2 release came with built-in support for ES2015 modules (alias *harmony modules*) as well as unused module export detection. The new webpack 4 release expands on this capability with a way to provide hints to the compiler via the `"sideEffects"` `package.json` property to denote which files in your project are "pure" and therefore safe to prune if unused.

*The remainder of this guide will stem from [Getting Started](#). If you haven't read through that guide already, please do so now.*

## Add a Utility

Let's add a new utility file to our project, `src/math.js`, that exports two functions:

project



<https://webpack.js.org/guides/tree-shaking/>

# Compress for Transit

---

Gzip / Brotli

# Gzip Text Files: CSS, JS, SVG,

```
<ifModule mod_deflate.c>
  <filesMatch "\.(html|svg|js|css)$">
    SetOutputFilter DEFLATE
  </filesMatch>
</ifModule>
```

[ABOUT](#)[WORK](#)[BLOG](#)[CODE](#)[HIRE US](#)

Performance    Memory    Network    Storage    DOM    ...

All    HTML    CSS    JS    XHR    Fonts    Images    Media    WS    Other     Persist Logs     Disable cache    No throttling

Cause	Type	Transferred	Size	0 ms	1.28 s	2.6 s	Headers	Cookies	Params
document	html	5.87 KB	19.85 ...	425 ms			cache-control: max-age=0		
script							content-encoding: gzip		
stylesheet							content-length: 5634		
script	js	cached	4.66 KB		124 ms		content-type: text/html; charset=utf-8		
img	jpeg	cached	143.91...		126 ms		date: Tue, 18 Jun 2019 03:36:53 GMT		
img	png	cached	23.88 ...		129 ms		expires: Tue, 18 Jun 2019 03:36:53 GM		
ima	idea	cached	93.87 ...		128 ms		server: Apache		

# Brotli: smaller than gzip

```
AddOutputFilterByType BR0TLI_COMPRESS text/html text/  
plain text/xml text/css text/javascript application/  
javascript
```

Can I use

brotli

?



Settings

1 result found

# Brotli Accept-Encoding/Content-Encoding OTHER

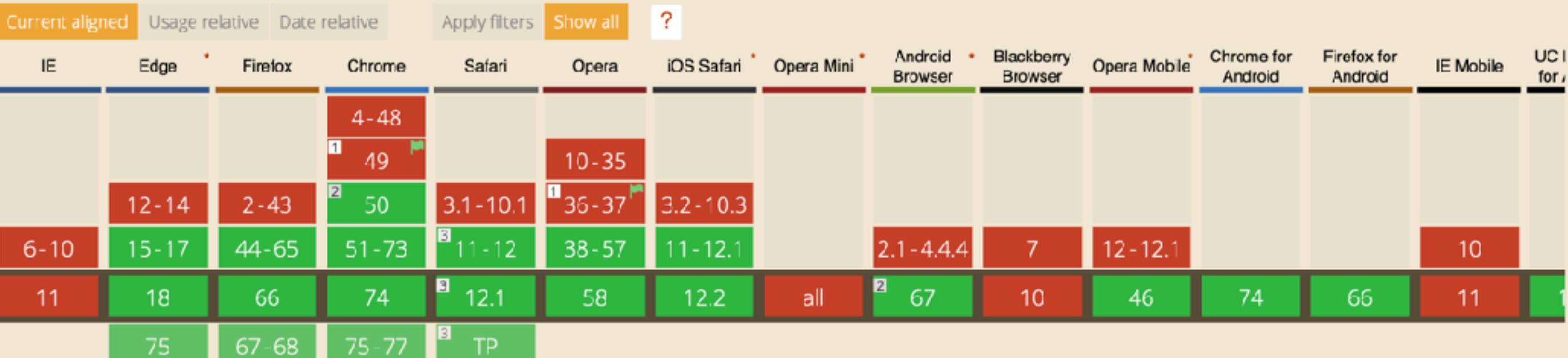
Usage % of all users



Global

90.06%

More effective lossless compression algorithm than gzip and deflate.

<https://caniuse.com/#search=brotli>



22 April, 2020

# Real-World Effectiveness of Brotli

## ► Table of Contents

One of the more fundamental rules of building fast websites is to optimise your assets, and where text content such as HTML, CSS, and JS are concerned, we're talking about *compression*.

The de facto text-compression of the web is Gzip, with around 80% of compressed responses favouring that algorithm, and the remaining 20% use the much newer *Brotli*.

Of course, this total of 100% only measures compressible responses that actually were compressed—there are still many millions of resources that could or should have been compressed but were not. For a more detailed breakdown of the numbers, see the [Compression](#) section of the Web Almanac.

Gzip is tremendously effective. The entire works of Shakespeare weigh in at 5.3MB in plain-text format; after Gzip (compression level 6), that number comes down to 1.9MB. That's a 2.8x decrease in file-size with zero loss of data. Nice!



Hi there, I'm Harry. I am an [award-winning Consultant Web Performance Engineer, designer, developer, writer, and speaker](#) from the UK. I [write](#), [Tweet](#), [speak](#), and [share code](#) about measuring and improving site-speed. You [should hire me](#).

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# More Weight != More Wait

3.9 secs

