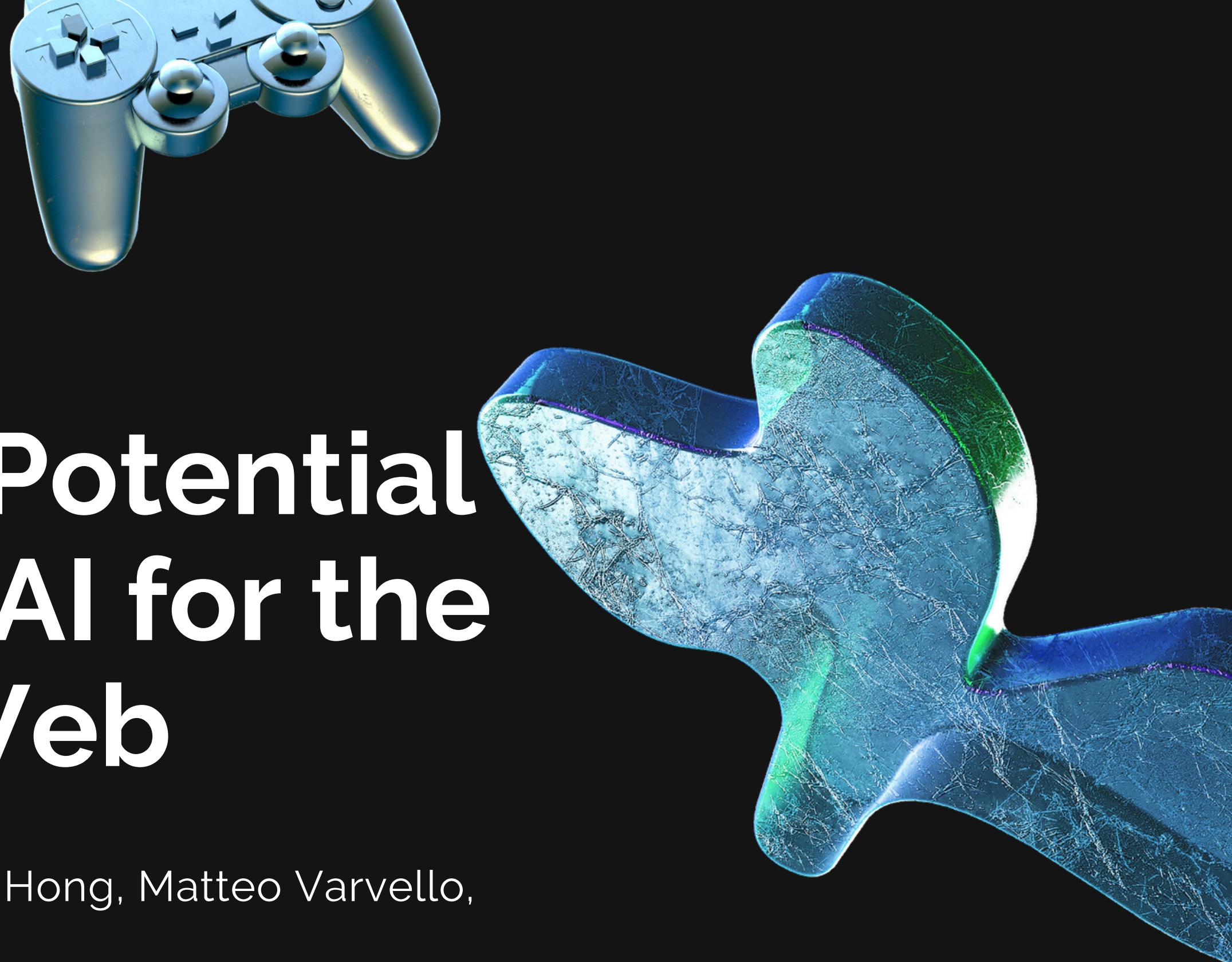


Research

Exploring the Potential of Generative AI for the World Wide Web

Researchers: Nouar AlDahoul, Joseph Hong, Matteo Varvello,
Yasir Zaki.

Presenter: Yerdos Narzhigitov 202311628





Introduction

Key point: Generative AI is revolutionizing content creation.

Applications: AI-powered movies, chatbots, medicine.

Web context:

- Web developers already using it for text and images.
- Browser vendors exploring in-browser AI (e.g., summarization).
- Future potential: Local generation of Web media like images.

Potential Benefits: Rectify broken pages, optimize bandwidth, enhance privacy.

Focus on Images: Why images are a good starting point (large part of webpages, minimal Web compatibility impact)



Will Smith eating spaghetti.

2023



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Will Smith eating spaghetti.

2025



What is the problem
that paper mainly
discuss?

Generating images on the fly.

This paper discusses about generative AI being used to generate content, particularly images. And this paper talks about Stable Diffusion that would generate images based on the "alt" text of the "" tag in the html file.

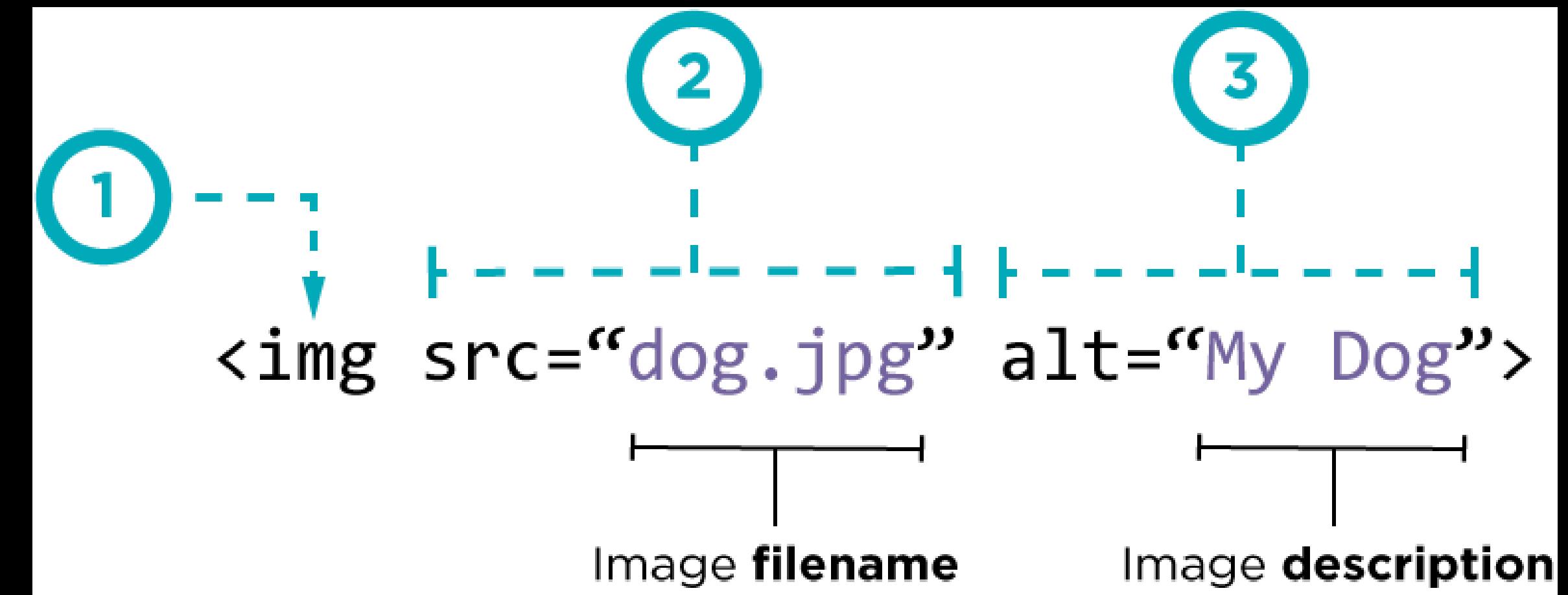
WHY?

The median webpage consists of 900KB of images, which is about 44% of the total size. And image generation has no impact on WebCompat, which means no matter what browser.



ALT in

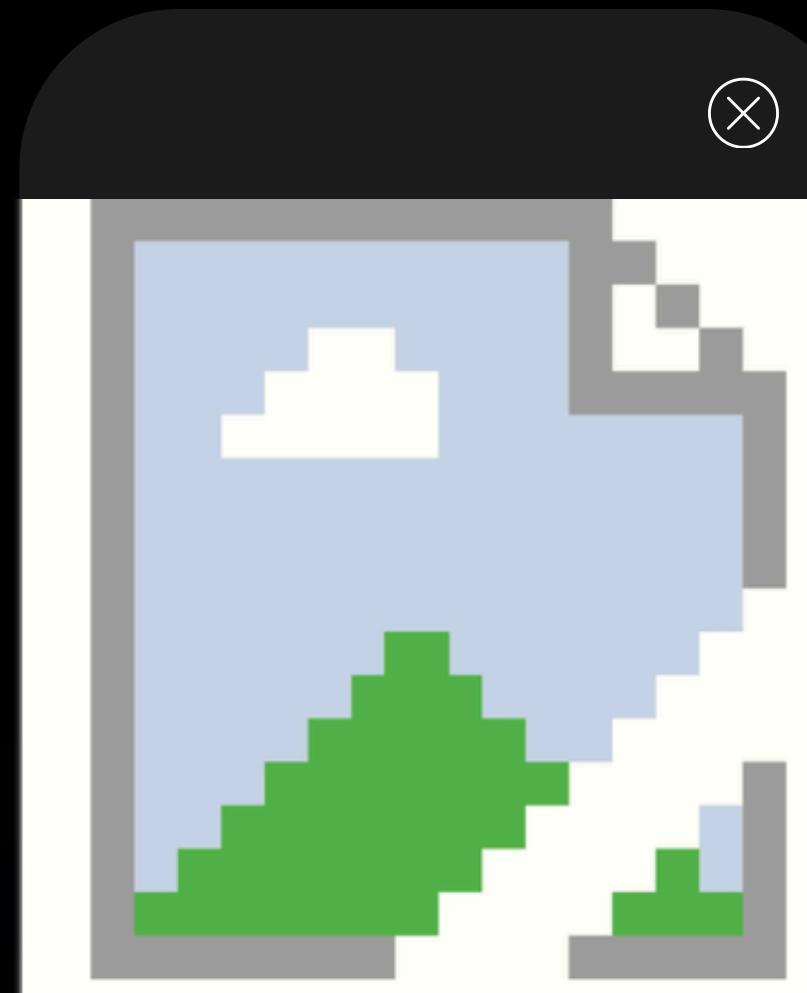
Just in case, if you don't know what "alt" text inside "" is.



Why is the problem
important?

...

Benefits



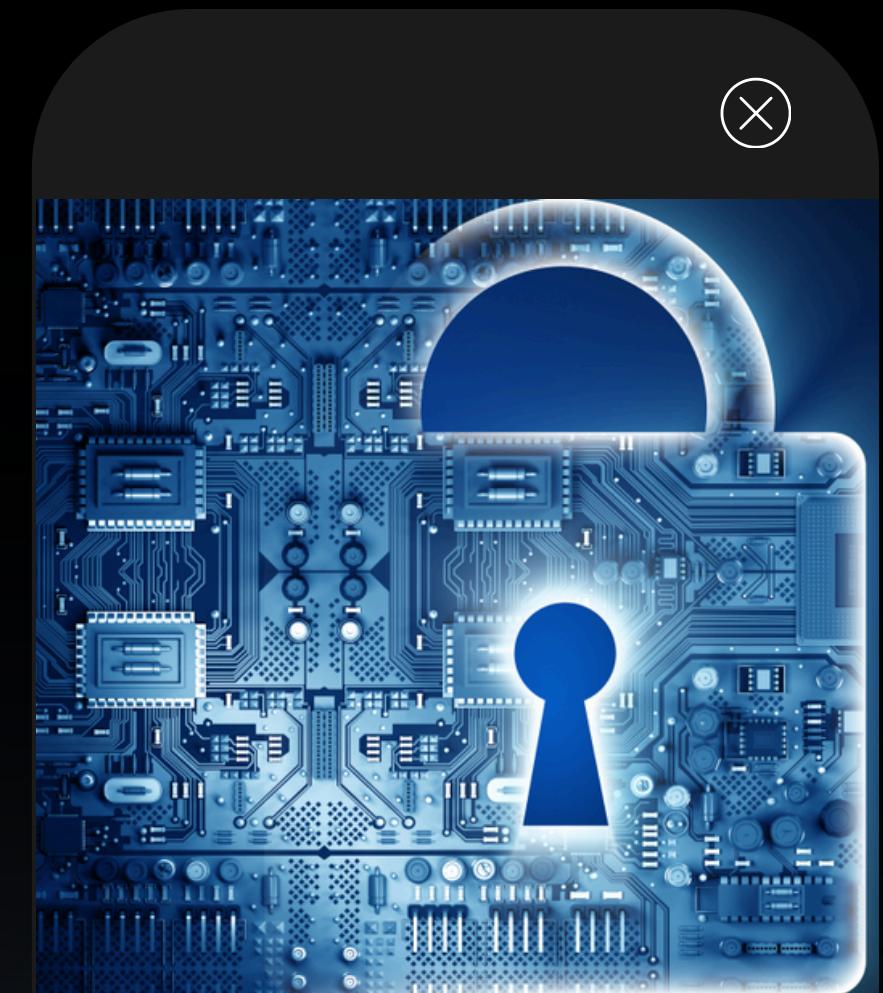
REPAIRING BROKEN WEBPAGES

If a picture file is missing or the link is broken, AI can generate an image based on description.



CONSERVING BANDWIDTH

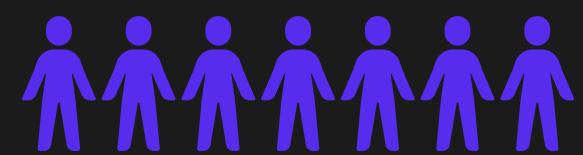
Generating images locally could potentially save the website's server and user connection from transferring large files



ENHANCING PRIVACY

AI can generate images, no information will be shared downloading a specific image. So no info for ads.

Why is the problem
difficult to solve?



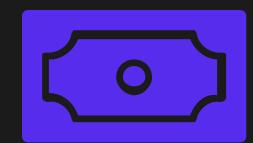
text/face

Stable Diffusion has difficulties generating images that contain text and faces, also hands.



PLT

Though the Tesla GPUs are powerful, downloading is still faster. Also Tesla GPUs are not for regular users. Mobile phones are even slower.
(iPhone 13 - 15.6s)



Price

As of 2025 May, the price for the strongest consumer based GPUs:
RTX 5090 - 4.7 mln won
RTX 4090 - 3.9 mln won
RX 9070XT - 1.2 mln won



Info

Out of 500 webpages, 25% failed to load. And for the 75%, 70% success rate (260). Fails due to page formatting, lack of "img" tags, no "alt" nor "background-image" attributes.

The Tool - WebDiffusion



Crawler

Crawler collects data from webpages.

Client-based - it collects data about the image without looking at the image, by reading nearby content about the image.

Server-based - it collects textual prompts after looking at image using **GenerativeImage2Text** by Microsoft.

Proxy

Catches two kinds of requests: image and non-image.

For **non-image request**, it returns just the content to be served.

For **image request** it returns textual prompt for image generation. After it tell Stable Diffusion server what to generate.

SD Server

Stable Diffusion Server is a server that is designed to generate images from the textual prompts. For the experiment it consists of powerful Tesla GPUs (A40, A100)

WebInterface

It is designed to collect user feedback. Users can look at generated image and original image, and compare them side by side.

What is the Quality of
AI-Generated
WebPages?

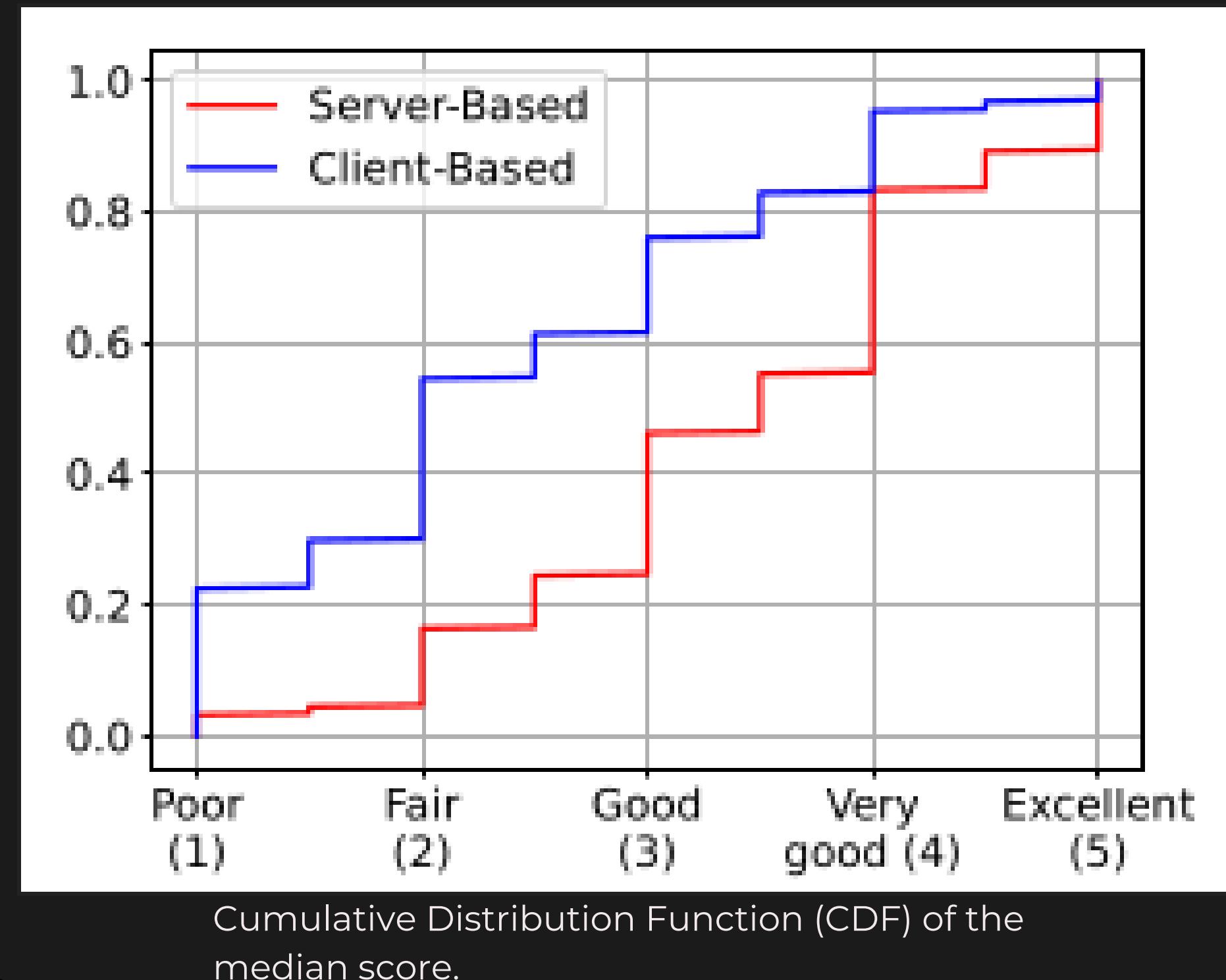
QUALITY

User Feedback

The figure shows regardless of the approach (client-based/server-based), the majority of scores are **positive**, which is equal or higher than “**fair**”.

95% of the median score for the **server-based** approach is better or equal to “**fair**”.

70% for the **client-based** approach.



QUALITY

User Feedback

As can be seen from the graph, most of the sets are evaluated as “**good**” or even higher.

The most difficult content to generate is images that contain “**text**”. But still median is kept above “**fair**”.

After text containing images comes “**face**”.
But median of faces is at “**good**”.

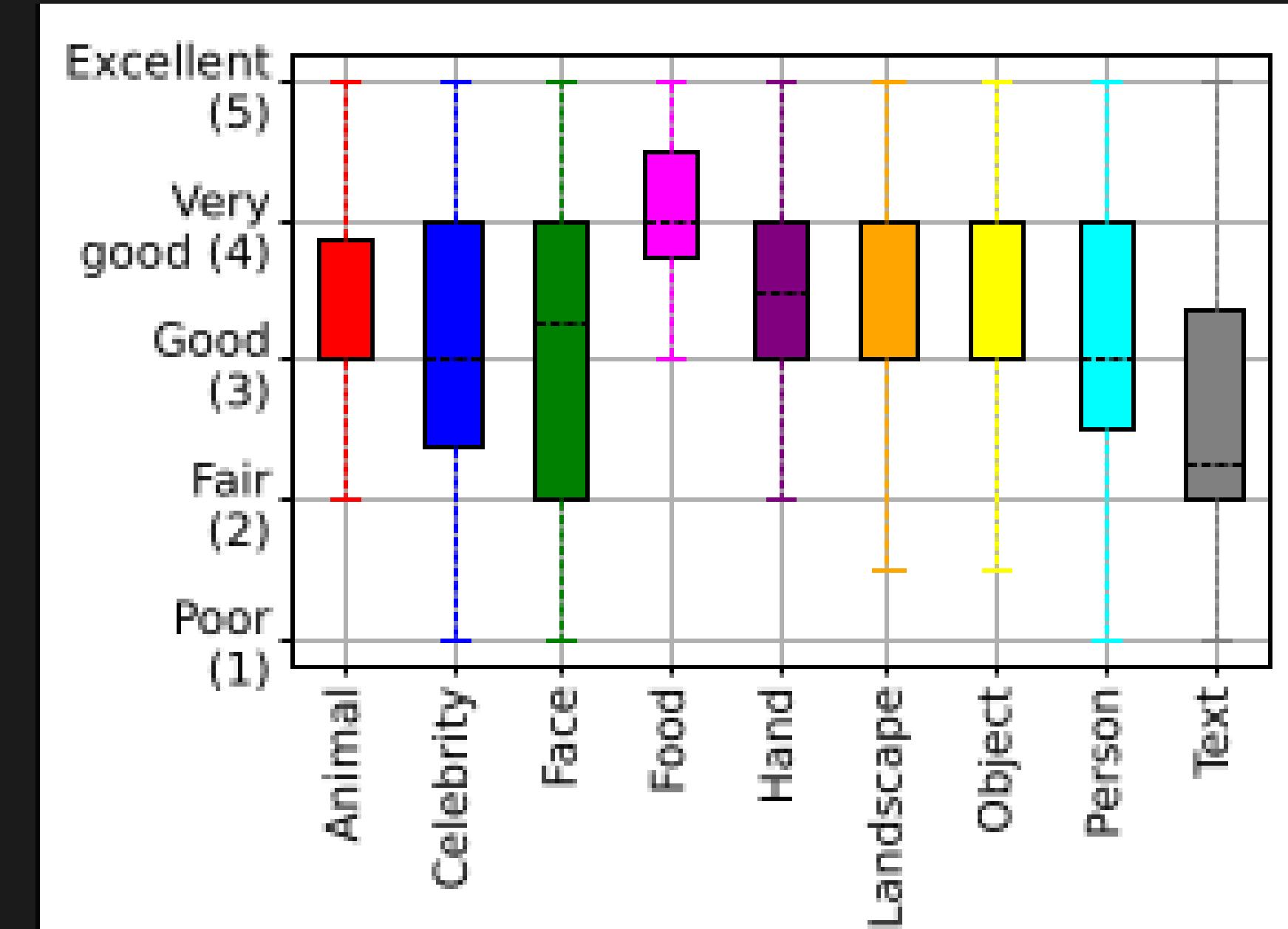


Image evaluation for each type of content

The evaluation was based on 409 images extracted from 60 webpages. And also collected 10 user feedbacks for two versions of each webpage, for a total of 9400 user feedback.

Among 940 study participants, the minimum approval rate was 94%, with 80% of the participants having an approval rate of 99-100%.

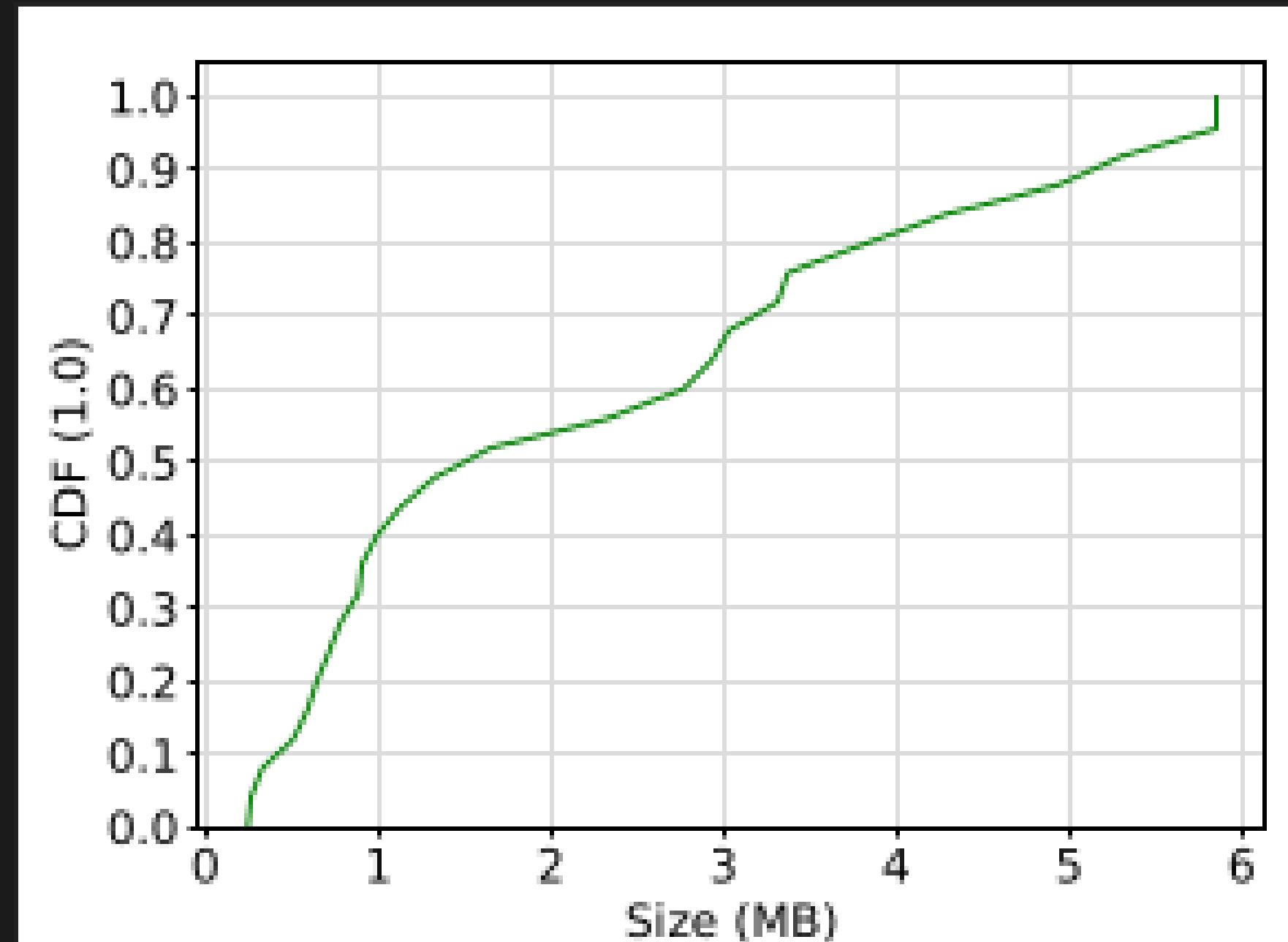
Resource Usage?

USAGE:

Resource Usage:

Overall, the majority of webpages enjoy multiple MBs of savings, with median of 1.3MB, and for 10% heaviest webpages more than 5MBs savings.

This means content providers with a million daily viewers will save up to 1.3TB everyday.



BandWidth savings

...



Thank you!

If you have any questions, feel free to ask

