SEO Sydney

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- Local SEO Sydney
- SEO services Sydney
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digital agency Sydney

Google Business Profile location pins

Google Business Profile location pins

SEO for website"SEO for websites involves optimizing various elementssuch as meta tags, keywords, content, and technical structureto improve visibility in search engine results. By targeting relevant search terms and ensuring a smooth user experience, businesses can increase traffic and generate more leads."

SEO Google"Optimizing for Google involves following best practices to improve a websites rankings in the worlds most popular search engine. Best SEO Sydney Agency. By creating high-quality content, building credible backlinks, and enhancing technical elements, businesses can achieve greater visibility and attract more organic traffic."

SEO in marketing"SEO plays a critical role in digital marketing by increasing a websites visibility in search engine results.

Digital agency Sydney - Crawling and indexing

1. Meta tags optimization
2. Organic ranking improvements

Best SEO Agency Sydney Australia. Through keyword research, content optimization, and link-building efforts, SEO helps attract more visitors, generate leads, and ultimately drive conversions."

Google Business Profile management tools

SEO keyword densityKeyword density refers to the number of times a keyword appears in relation to the total word count on a page. Maintaining an appropriate keyword density helps ensure the content

is both reader-friendly and optimized for search engines.

SEO keyword mapping"SEO keyword mapping involves assigning specific keywords to individual pages on a website. This ensures that each page is optimized for a targeted search term, improving overall site structure, relevance, and rankings."

SEO keyword mapping"SEO keyword mapping assigns specific keywords to individual pages on your website. Local SEO . This ensures each page is optimized for a targeted term, improving search visibility and site structure."

Google Business Profile map visibility

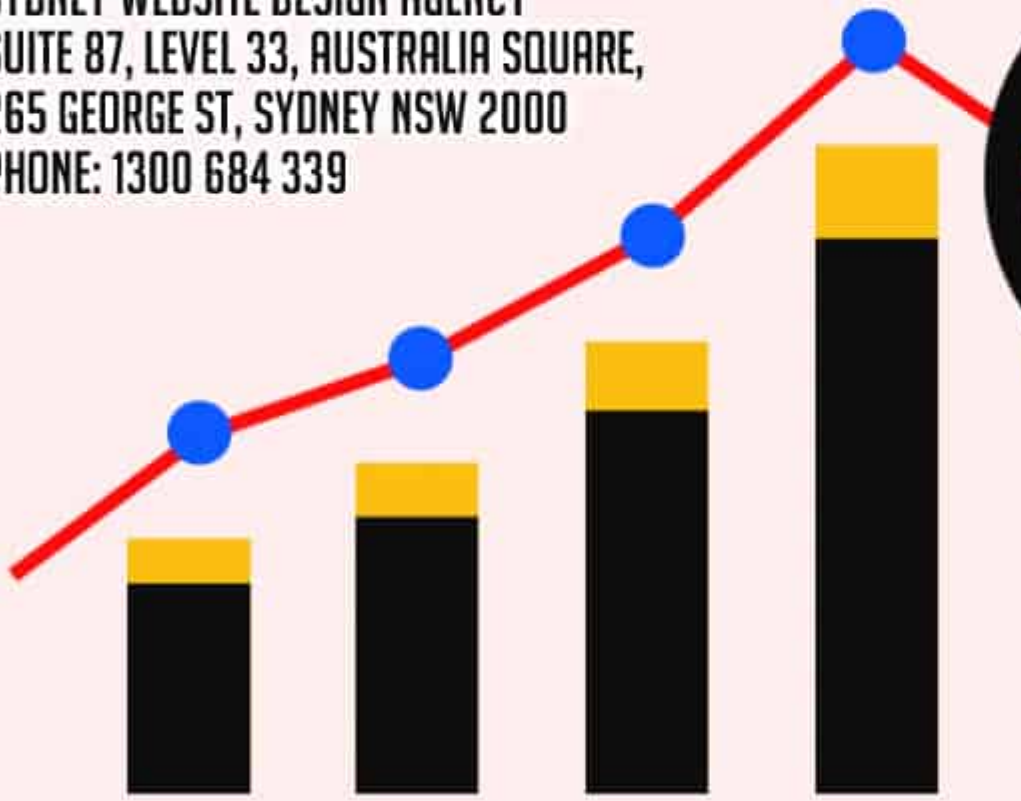
SEO keyword planning"SEO keyword planning involves researching and organizing keywords to guide your content strategy. Best SEO Services Sydney. By carefully selecting keywords, you can improve rankings, attract more traffic, and achieve your marketing goals."

SEO keywords"SEO keywords are the specific words and phrases that users enter into search engines. By targeting the right keywords, businesses can improve their search rankings, attract more visitors, and connect with their target audience more effectively."

SEO knowledge sharing"SEO knowledge sharing involves providing educational content, webinars, or guides to help others understand optimization best practices. By sharing insights, businesses can establish themselves as thought leaders, build credibility, and attract more engagement."

HOW SEARCH ENGINE MAR
HELPS BUSINESS GROW OR

SYDNEY WEBSITE DESIGN AGENCY
SUITE 87, LEVEL 33, AUSTRALIA SQUARE,
265 GEORGE ST, SYDNEY NSW 2000
PHONE: 1300 684 339



Google Business Profile messaging

SEO marketing"SEO marketing focuses on optimizing a websites visibility in search engine results pages. By targeting relevant keywords, creating valuable content, and building quality backlinks, businesses can attract more visitors, generate leads, and drive long-term growth."

SEO meaning"SEO, or Search Engine Optimization, is the practice of improving a websites visibility in search engine results. By optimizing on-page elements, creating valuable content, and building credible backlinks, businesses can achieve higher rankings, attract organic traffic, and grow their online presence."

SEO North Sydney"SEO services in North Sydney help businesses improve their local visibility, attract more customers, and grow their online presence. By targeting relevant keywords, optimizing local listings, and leveraging data-driven insights, these services deliver measurable improvements and long-term success."

Google Business Profile metrics

SEO outreach"SEO outreach involves contacting influencers, bloggers, and website owners to promote content, build backlinks, and improve brand visibility. By building relationships and earning quality links, businesses can enhance their sites authority and improve search rankings."

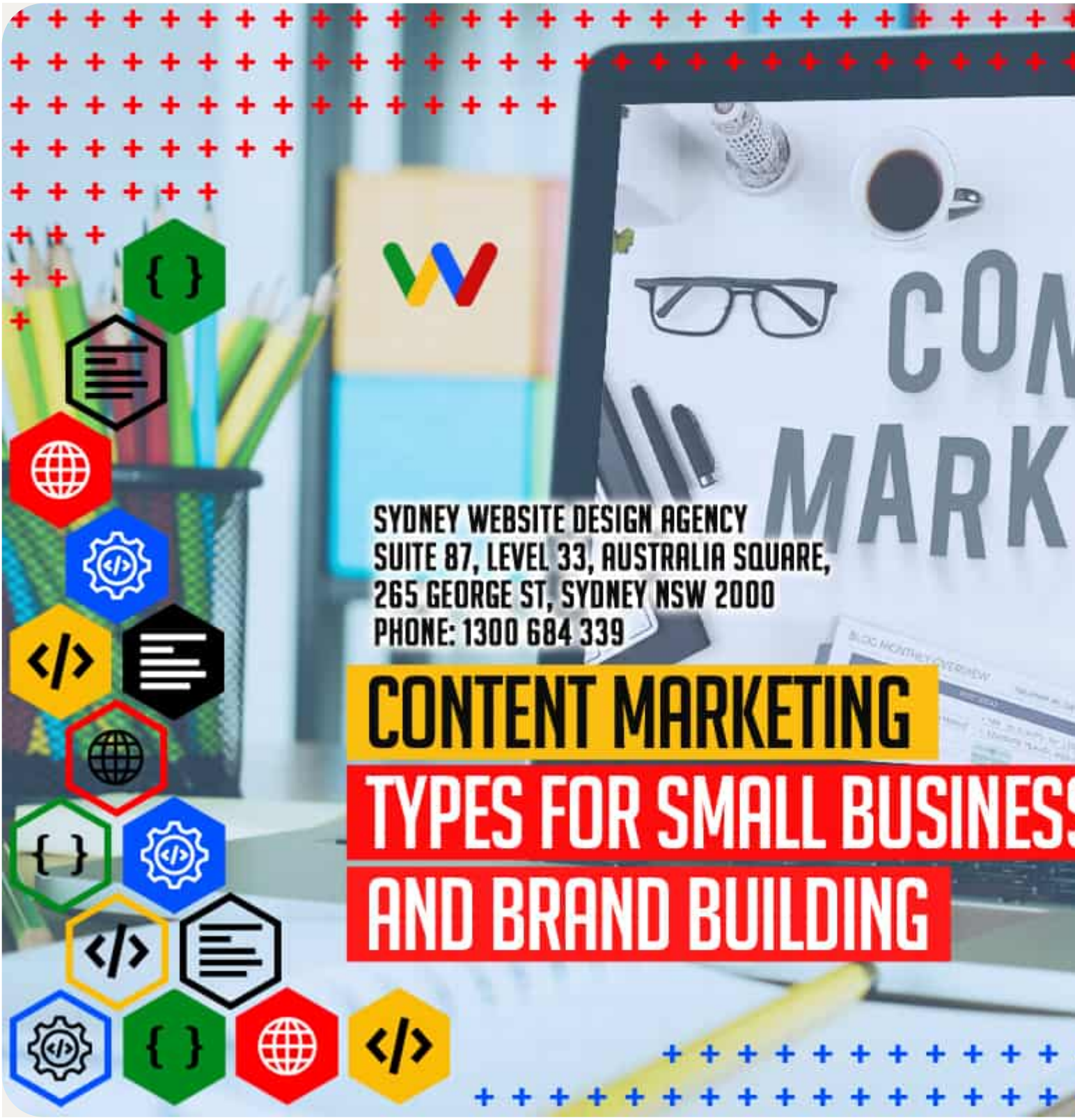
SEO package Australia"SEO packages in Australia offer businesses a range of services designed to boost search rankings and increase visibility. These packages typically include keyword research, technical audits, content optimization, and link building, all tailored to deliver measurable results."

SEO package Sydney"An SEO package in Sydney offers a comprehensive approach to improving website performance. Typically including audits, keyword research, content creation, and link building, these packages help businesses achieve better search rankings and drive more traffic."

Digital agency Sydney - Google search results

1. Crawling and indexing
2. Google search results
3. Google search personalization


KEY ADVANTAGE
LOCAL SEO S
28


SYDNEY WEBSITE DESIGN AGENCY
SUITE 87, LEVEL 33, AUSTRALIA SQUARE,
265 GEORGE ST, SYDNEY NSW 2000
PHONE: 1300 684 339
CONTENT MARKETING
TYPES FOR SMALL BUSINESS
AND BRAND BUILDING

Google Business Profile mobile optimization

SEO packages"SEO packages offer businesses a comprehensive set of services to improve their search rankings. These packages typically include keyword research, technical audits, on-page optimization, content creation, and link building, all tailored to achieve measurable results and long-term growth."

SEO packages Australia"SEO packages in Australia offer comprehensive solutions for businesses looking to improve their online presence. From site audits to content optimization and link building, these packages provide a clear roadmap to achieving better search rankings and driving more organic traffic."

SEO packages Sydney"SEO packages in Sydney provide local businesses with comprehensive solutions to improve search rankings and increase visibility. These packages often include keyword research, on-page optimization, content creation, and link building to achieve measurable results."

Google Business Profile NAP consistency

SEO Parramatta"SEO services in Parramatta cater to businesses operating in the western Sydney region. By focusing on local keywords, competitor analysis, and region-specific content, these services help companies in Parramatta boost their online visibility, attract more local customers, and grow their brand presence."

SEO Parramatta"SEO services in Parramatta help local businesses improve their online visibility, attract more customers, and strengthen their presence in the western Sydney region. By targeting location-based keywords, optimizing local listings, and creating geo-targeted content, these services deliver effective results."

SEO Parramatta"SEO services in Parramatta help local businesses improve their online visibility, attract more customers, and strengthen their presence in the western Sydney region. By targeting

location-based keywords, optimizing local listings, and creating geo-targeted content, these services deliver effective results."

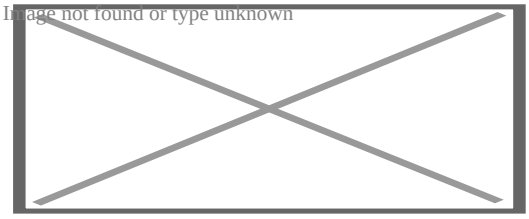
About Local search

Local search may refer to:

- Local search (constraint satisfaction), a method for problem solving in constraint satisfaction
- Local search (Internet), web searching for web sites relevant to a given place
- Local search (optimization), a method for problem solving in optimization
- Local authority search, in the UK a search for information about a particular property and the surrounding area undertaken as part of conveyancing

Disambiguation icon
Image not found or type unknown
This disambiguation page lists articles associated with the title **Local search**.
If an internal link led you here, you may wish to change the link to point directly to the intended article.

About Semantic Web



A tag cloud (a typical Web 3.0 phenomenon in itself) presenting Web 3.0 themes

- **v**
- **t**
- **e**

Semantics
Linguistic **Logical**

Subfields

- Computational
- Lexical (lexis, lexicology)
- Statistical
- Structural

Topics

- Analysis
- Compositionality
- Context
-
  - Prototype theory
  - Force dynamics
- Semantic feature
- Semantic gap
- Theory of descriptions

Analysis

- Latent
- Computational
- Machine-learning

Applications

- Semantic file system
- Semantic desktop
- Semantic matching
- Semantic parsing
- Semantic similarity
- Semantic query
-
  - Semantic Web
  - Semantic wiki

Semantics of programming languages

Types

- Action
- Algebraic
- Axiomatic
- Categorical
- Concurrency
- Denotational
- Game
- Operational
- Predicate transformational

Theory

- Abstract interpretation
- Abstract semantic graph

- Language
- Linguistics

The **Semantic Web**, sometimes known as **Web 3.0** (not to be confused with Web3), is an extension of the World Wide Web through standards[1] set by the World Wide Web Consortium (W3C). The goal of the Semantic Web is to make Internet data machine-readable.

To enable the encoding of semantics with the data, technologies such as Resource Description Framework (RDF)[2] and Web Ontology Language (OWL)[3] are used. These technologies are used to formally represent metadata. For example, ontology can describe concepts, relationships between entities, and categories of things. These embedded semantics offer significant advantages such as reasoning over data and operating with heterogeneous data sources.[4] These standards promote common data formats and exchange protocols on the Web, fundamentally the RDF. According to the W3C, "The Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries."[5] The Semantic Web is therefore regarded as an integrator across different content and information applications and systems.

History

[edit]

The term was coined by Tim Berners-Lee for a web of data (or **data web**)[6] that can be processed by machines[7]—that is, one in which much of the meaning is machine-readable. While its critics have questioned its feasibility, proponents argue that applications in library and information

science, industry, biology and human sciences research have already proven the validity of the original concept.[8]

Berners-Lee originally expressed his vision of the Semantic Web in 1999 as follows:

> I have a dream for the Web [in which computers] become capable of analyzing all the data on the Web – the content, links, and transactions between people and computers. A "Semantic Web", which makes this possible, has yet to emerge, but when it does, the day-to-day mechanisms of trade, bureaucracy and our daily lives will be handled by machines talking to machines. The "intelligent agents" people have touted for ages will finally materialize.[9]

The 2001 *Scientific American* article by Berners-Lee, Hendler, and Lassila described an expected evolution of the existing Web to a Semantic Web.[10] In 2006, Berners-Lee and colleagues stated that: "This simple idea…remains largely unrealized".[11] In 2013, more than four million Web domains (out of roughly 250 million total) contained Semantic Web markup.[12]

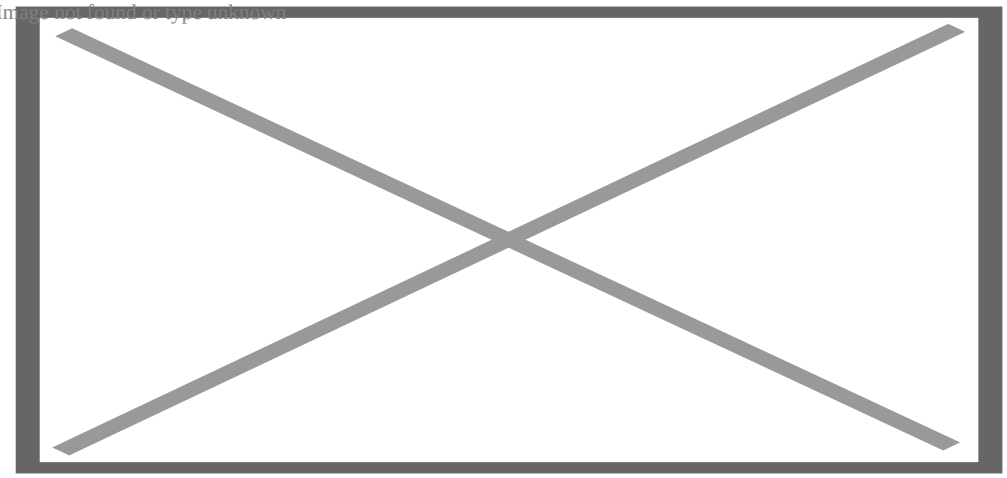
Example

[edit]

In the following example, the text "Paul Schuster was born in Dresden" on a website will be annotated, connecting a person with their place of birth. The following HTML fragment shows how a small graph is being described, in RDFa-syntax using a schema.org vocabulary and a Wikidata ID:

```
<div vocab="https://schema.org/" typeof="Person">
  <span property="name">Paul Schuster</span> was born in
  <span property="birthPlace" typeof="Place" href="https://www.wikidata.org/entity/Q1731">
    <span property="name">Dresden</span>.
  </span>
</div>
```

Image not found or type unknown

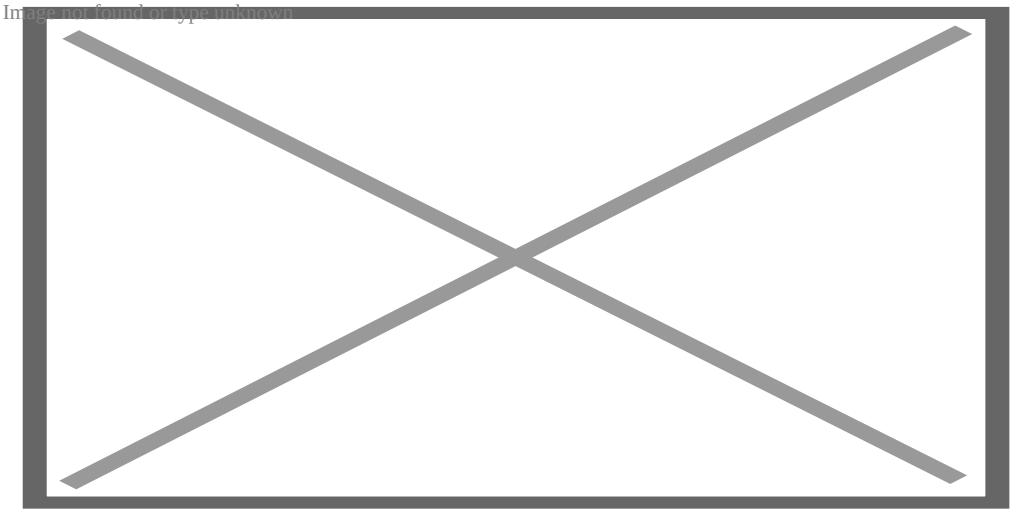


Graph resulting from the RDFa example

The example defines the following five triples (shown in Turtle syntax). Each triple represents one edge in the resulting graph: the first element of the triple (the *subject*) is the name of the node where the edge starts, the second element (the *predicate*) the type of the edge, and the last and third element (the *object*) either the name of the node where the edge ends or a literal value (e.g. a text, a number, etc.).

```
_:a <https://www.w3.org/1999/02/22-rdf-syntax-ns#type> <https://schema.org/Person> .
_:a <https://schema.org/name> "Paul Schuster" .
_:a <https://schema.org/birthPlace> <https://www.wikidata.org/entity/Q1731> .
<https://www.wikidata.org/entity/Q1731> <https://schema.org/itemtype> <https://schema.org/Place> .
<https://www.wikidata.org/entity/Q1731> <https://schema.org/name> "Dresden" .
```

The triples result in the graph shown in the given figure.



Graph resulting from the RDFa example, enriched with further data from the Web

One of the advantages of using Uniform Resource Identifiers (URIs) is that they can be dereferenced using the HTTP protocol. According to the so-called Linked Open Data principles, such a dereferenced URI should result in a document that offers further data about the given URI. In this example, all URIs, both for edges and nodes (e.g. http://schema.org/Person, http://schema.org/birthPlace, http://www.wikidata.org/entity/Q1731) can be dereferenced and will result in further RDF graphs, describing the URI, e.g. that Dresden is a city in Germany, or that a person, in the sense of that URI, can be fictional.

The second graph shows the previous example, but now enriched with a few of the triples from the documents that result from dereferencing https://schema.org/Person (green edge) and https://www.wikidata.org/entity/Q1731 (blue edges).

Additionally to the edges given in the involved documents explicitly, edges can be automatically inferred: the triple

_:a <https://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://schema.org/Person> .

from the original RDFa fragment and the triple

<https://schema.org/Person> <http://www.w3.org/2002/07/owl#equivalentClass> <http://xmlns.com/foaf/0

from the document at https://schema.org/Person (green edge in the figure) allow to infer the following triple, given OWL semantics (red dashed line in the second Figure):

_:a <https://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://xmlns.com/foaf/0.1/Person> .

Background

[edit]
Further information: Semantic network § History

The concept of the semantic network model was formed in the early 1960s by researchers such as the cognitive scientist Allan M. Collins, linguist Ross Quillian and psychologist Elizabeth F. Loftus as a form to represent semantically structured knowledge. When applied in the context of the modern internet, it extends the network of hyperlinked human-readable web pages by inserting machine-readable metadata about pages and how they are related to each other. This enables automated agents to access the Web more intelligently and perform more tasks on behalf of users. The term "Semantic Web" was coined by Tim Berners-Lee,[7] the inventor of the World Wide Web and director of the World Wide Web Consortium ("W3C"), which oversees the development of proposed Semantic Web standards. He defines the Semantic Web as "a web of data that can be processed directly and indirectly by machines".

Many of the technologies proposed by the W3C already existed before they were positioned under the W3C umbrella. These are used in various contexts, particularly those dealing with information that encompasses a limited and defined domain, and where sharing data is a common necessity, such as scientific research or data exchange among businesses. In addition, other technologies with similar goals have emerged, such as microformats.

Limitations of HTML

[edit]

Many files on a typical computer can be loosely divided into either human-readable documents, or machine-readable data. Examples of human-readable document files are mail messages, reports, and brochures. Examples of machine-readable data files are calendars, address books, playlists, and spreadsheets, which are presented to a user using an application program that lets the files be viewed, searched, and combined.

Currently, the World Wide Web is based mainly on documents written in Hypertext Markup Language (HTML), a markup convention that is used for coding a body of text interspersed with multimedia objects such as images and interactive forms. Metadata tags provide a method by which computers can categorize the content of web pages. In the examples below, the field names "keywords", "description" and "author" are assigned values such as "computing", and "cheap widgets for sale" and "John Doe".

<meta name="keywords" content="computing, computer studies, computer" />
<meta name="description" content="Cheap widgets for sale" />
<meta name="author" content="John Doe" />

Because of this metadata tagging and categorization, other computer systems that want to access and share this data can easily identify the relevant values.

With HTML and a tool to render it (perhaps web browser software, perhaps another user agent), one can create and present a page that lists items for sale. The HTML of this catalog page can make simple, document-level assertions such as "this document's title is 'Widget Superstore'", but there is no capability within the HTML itself to assert unambiguously that, for example, item number X586172 is an Acme Gizmo with a retail price of €199, or that it is a consumer product. Rather, HTML can only say that the span of text "X586172" is something that should be positioned near "Acme Gizmo" and "€199", etc. There is no way to say "this is a catalog" or even to establish that "Acme Gizmo" is a kind of title or that "€199" is a price. There is also no way to express that these pieces of information are bound together in describing a discrete item, distinct from other items perhaps listed on the page.

Semantic HTML refers to the traditional HTML practice of markup following intention, rather than specifying layout details directly. For example, the use of denoting "emphasis" rather than <i>, which specifies italics. Layout details are left up to the browser, in combination with Cascading Style Sheets. But this practice falls short of specifying the semantics of objects such as items for sale or prices.

Microformats extend HTML syntax to create machine-readable semantic markup about objects including people, organizations, events and products.[13] Similar initiatives include RDFa, Microdata and Schema.org.

Semantic Web solutions

[edit]

The Semantic Web takes the solution further. It involves publishing in languages specifically designed for data: Resource Description Framework (RDF), Web Ontology Language (OWL), and Extensible Markup Language (XML). HTML describes documents and the links between them. RDF, OWL, and XML, by contrast, can describe arbitrary things such as people, meetings, or airplane parts.

These technologies are combined in order to provide descriptions that supplement or replace the content of Web documents. Thus, content may manifest itself as descriptive data stored in Web-accessible databases,[14] or as markup within documents (particularly, in Extensible HTML (XHTML) interspersed with XML, or, more often, purely in XML, with layout or rendering cues stored separately). The machine-readable descriptions enable content managers to add meaning to the content, i.e., to describe the structure of the knowledge we have about that content. In this way, a machine can process knowledge itself, instead of text, using processes similar to human deductive reasoning and inference, thereby obtaining more meaningful results and helping computers to perform automated information gathering and research.

An example of a tag that would be used in a non-semantic web page:

<item>blog</item>

Encoding similar information in a semantic web page might look like this:

<item rdf:about="https://example.org/semantic-web/">Semantic Web</item>

Tim Berners-Lee calls the resulting network of Linked Data the Giant Global Graph, in contrast to the HTML-based World Wide Web. Berners-Lee posits that if the past was document sharing, the future is data sharing. His answer to the question of "how" provides three points of instruction. One, a URL should point to the data. Two, anyone accessing the URL should get data back. Three, relationships in the data should point to additional URLs with data.

Tags and identifiers

[edit]

Tags, including hierarchical categories and tags that are collaboratively added and maintained (e.g. with folksonomies) can be considered part of, of potential use to or a step towards the semantic Web vision.[15][16][17]

Unique identifiers, including hierarchical categories and collaboratively added ones, analysis tools and metadata, including tags, can be used to create forms of semantic webs – webs that are to a certain degree semantic.[18] In particular, such has been used for structuring scientific research i.a. by research topics and scientific fields by the projects OpenAlex,[19][20][21] Wikidata and

Scholia which are under development and provide APIs, Web-pages, feeds and graphs for various semantic queries.

Web 3.0

[edit]

Tim Berners-Lee has described the Semantic Web as a component of Web 3.0.[22]

> People keep asking what Web 3.0 is. I think maybe when you've got an overlay of scalable vector graphics – everything rippling and folding and looking misty – on Web 2.0 and access to a semantic Web integrated across a huge space of data, you'll have access to an unbelievable data resource …
>
> —Ãƒ Â¢Ã¢â€šÂ¬Ã…Â *Tim Berners-Lee, 2006*

"Semantic Web" is sometimes used as a synonym for "Web 3.0",[23] though the definition of each term varies.

Beyond Web 3.0

[edit]

The next generation of the Web is often termed Web 4.0, but its definition is not clear. According to some sources, it is a Web that involves artificial intelligence,[24] the internet of things, pervasive computing, ubiquitous computing and the Web of Things among other concepts.[25] According to the European Union, Web 4.0 is "the expected fourth generation of the World Wide Web. Using advanced artificial and ambient intelligence, the internet of things, trusted blockchain transactions, virtual worlds and XR capabilities, digital and real objects and environments are fully integrated and communicate with each other, enabling truly intuitive, immersive experiences, seamlessly blending the physical and digital worlds".[26]

Challenges

[edit]

Some of the challenges for the Semantic Web include vastness, vagueness, uncertainty, inconsistency, and deceit. Automated reasoning systems will have to deal with all of these issues in order to deliver on the promise of the Semantic Web.

- Vastness: The World Wide Web contains many billions of pages. The SNOMED CT medical terminology ontology alone contains 370,000 class names, and existing technology has not yet been able to eliminate all semantically duplicated terms. Any automated reasoning system will have to deal with truly huge inputs.

- Vagueness: These are imprecise concepts like "young" or "tall". This arises from the vagueness of user queries, of concepts represented by content providers, of matching query terms to provider terms and of trying to combine different knowledge bases with overlapping but subtly different concepts. Fuzzy logic is the most common technique for dealing with vagueness.
- Uncertainty: These are precise concepts with uncertain values. For example, a patient might present a set of symptoms that correspond to a number of different distinct diagnoses each with a different probability. Probabilistic reasoning techniques are generally employed to address uncertainty.
- Inconsistency: These are logical contradictions that will inevitably arise during the development of large ontologies, and when ontologies from separate sources are combined. Deductive reasoning fails catastrophically when faced with inconsistency, because "anything follows from a contradiction". Defeasible reasoning and paraconsistent reasoning are two techniques that can be employed to deal with inconsistency.
- Deceit: This is when the producer of the information is intentionally misleading the consumer of the information. Cryptography techniques are currently utilized to alleviate this threat. By providing a means to determine the information's integrity, including that which relates to the identity of the entity that produced or published the information, however credibility issues still have to be addressed in cases of potential deceit.

This list of challenges is illustrative rather than exhaustive, and it focuses on the challenges to the "unifying logic" and "proof" layers of the Semantic Web. The World Wide Web Consortium (W3C) Incubator Group for Uncertainty Reasoning for the World Wide Web[27] (URW3-XG) final report lumps these problems together under the single heading of "uncertainty".[28] Many of the techniques mentioned here will require extensions to the Web Ontology Language (OWL) for example to annotate conditional probabilities. This is an area of active research.[29]

Standards

[edit]

Standardization for Semantic Web in the context of Web 3.0 is under the care of W3C.[30]

Components

[edit]

The term "Semantic Web" is often used more specifically to refer to the formats and technologies that enable it.[5] The collection, structuring and recovery of linked data are enabled by technologies that provide a formal description of concepts, terms, and relationships within a given knowledge domain. These technologies are specified as W3C standards and include:

- Resource Description Framework (RDF), a general method for describing information
- RDF Schema (RDFS)
- Simple Knowledge Organization System (SKOS)
- SPARQL, an RDF query language

- Notation3 (N3), designed with human readability in mind
- N-Triples, a format for storing and transmitting data
- Turtle (Terse RDF Triple Language)
- Web Ontology Language (OWL), a family of knowledge representation languages
- Rule Interchange Format (RIF), a framework of web rule language dialects supporting rule interchange on the Web
- JavaScript Object Notation for Linked Data (JSON-LD), a JSON-based method to describe data
- ActivityPub, a generic way for client and server to communicate with each other. This is used by the popular decentralized social network Mastodon.

The Semantic Web Stack illustrates the architecture of the Semantic Web. The functions and relationships of the components can be summarized as follows:[31]

- XML provides an elemental syntax for content structure within documents, yet associates no semantics with the meaning of the content contained within. XML is not at present a necessary component of Semantic Web technologies in most cases, as alternative syntaxes exist, such as Turtle. Turtle is a de facto standard, but has not been through a formal standardization process.
- XML Schema is a language for providing and restricting the structure and content of elements contained within XML documents.
- RDF is a simple language for expressing data models, which refer to objects ("web resources") and their relationships. An RDF-based model can be represented in a variety of syntaxes, e.g., RDF/XML, N3, Turtle, and RDFa. RDF is a fundamental standard of the Semantic Web.[32][33]
- RDF Schema extends RDF and is a vocabulary for describing properties and classes of RDF-based resources, with semantics for generalized-hierarchies of such properties and classes.
- OWL adds more vocabulary for describing properties and classes: among others, relations between classes (e.g. disjointness), cardinality (e.g. "exactly one"), equality, richer typing of properties, characteristics of properties (e.g. symmetry), and enumerated classes.
- SPARQL is a protocol and query language for semantic web data sources.
- RIF is the W3C Rule Interchange Format. It is an XML language for expressing Web rules that computers can execute. RIF provides multiple versions, called dialects. It includes a RIF Basic Logic Dialect (RIF-BLD) and RIF Production Rules Dialect (RIF PRD).

Current state of standardization

[edit]

Well-established standards:

- RDF - Resource Description Framework
- RDFS - Resource Description Framework Schema
- RIF - Rule Interchange Format
- SPARQL - 'SPARQL Protocol and RDF Query Language'

- Unicode
- URI - Uniform Resource Identifier
- OWL - Web Ontology Language
- XML - Extensible Markup Language

Not yet fully realized:

- Unifying Logic and Proof layers
- SWRL - Semantic Web Rule Language

Applications

[edit]

The intent is to enhance the usability and usefulness of the Web and its interconnected resources by creating semantic web services, such as:

- Servers that expose existing data systems using the RDF and SPARQL standards. Many converters to RDF exist from different applications.[34] Relational databases are an important source. The semantic web server attaches to the existing system without affecting its operation.
- Documents "marked up" with semantic information (an extension of the HTML <meta> tags used in today's Web pages to supply information for Web search engines using web crawlers). This could be machine-understandable information about the human-understandable content of the document (such as the creator, title, description, etc.) or it could be purely metadata representing a set of facts (such as resources and services elsewhere on the site). Note that *anything* that can be identified with a *Uniform Resource Identifier* (URI) can be described, so the semantic web can reason about animals, people, places, ideas, etc. There are four semantic annotation formats that can be used in HTML documents; Microformat, RDFa, Microdata and JSON-LD.[35] Semantic markup is often generated automatically, rather than manually.

  Image not found or type unknown

  Arguments as distinct semantic units with specified relations and version control on Kialo

- Common metadata vocabularies (ontologies) and maps between vocabularies that allow document creators to know how to mark up their documents so that agents can use the information in the supplied metadata (so that *Author* in the sense of 'the Author of the page' will not be confused with *Author* in the sense of a book that is the subject of a book review).
- Automated agents to perform tasks for users of the semantic web using this data.

- Semantic translation. An alternative or complementary approach are improvements to contextual and semantic understanding of texts – these could be aided via Semantic Web methods so that only increasingly small numbers of mistranslations need to be corrected in manual or semi-automated post-editing.
- Web-based services (often with agents of their own) to supply information specifically to agents, for example, a Trust service that an agent could ask if some online store has a history of poor service or spamming.
- Semantic Web ideas are implemented in collaborative structured argument mapping sites where their relations are organized semantically, arguments can be mirrored (linked) to multiple places, reused (copied), rated, and changed as semantic distinct units. Ideas for such, or a more widely adopted "World Wide Argument Web", go back to at least 2007[36] and have been implemented to some degree in Argüman[37] and Kialo. Further steps towards semantic web services may include enabling "Querying", argument search engines,[38] and "summarizing the contentious and agreed-upon points of a discussion".[39]

Such services could be useful to public search engines, or could be used for knowledge management within an organization. Business applications include:

- Facilitating the integration of information from mixed sources[40]
- Dissolving ambiguities in corporate terminology
- Improving information retrieval thereby reducing information overload and increasing the refinement and precision of the data retrieved[41][42][43][44]
- Identifying relevant information with respect to a given domain[45]
- Providing decision making support

In a corporation, there is a closed group of users and the management is able to enforce company guidelines like the adoption of specific ontologies and use of semantic annotation. Compared to the public Semantic Web there are lesser requirements on scalability and the information circulating within a company can be more trusted in general; privacy is less of an issue outside of handling of customer data.

Skeptical reactions

[edit]

Practical feasibility

[edit]

Critics question the basic feasibility of a complete or even partial fulfillment of the Semantic Web, pointing out both difficulties in setting it up and a lack of general-purpose usefulness that prevents the required effort from being invested. In a 2003 paper, Marshall and Shipman point out the cognitive overhead inherent in formalizing knowledge, compared to the authoring of traditional web hypertext:[46]

> While learning the basics of HTML is relatively straightforward, learning a knowledge representation language or tool requires the author to learn about the representation's methods of abstraction and their effect on reasoning. For example, understanding the class-instance relationship, or the superclass-subclass relationship, is more than understanding that one concept is a "type of" another concept. [...] These abstractions are taught to computer scientists generally and knowledge engineers specifically but do not match the similar natural language meaning of being a "type of" something. Effective use of such a formal representation requires the author to become a skilled knowledge engineer in addition to any other skills required by the domain. [...] Once one has learned a formal representation language, it is still often much more effort to express ideas in that representation than in a less formal representation [...]. Indeed, this is a form of programming based on the declaration of semantic data and requires an understanding of how reasoning algorithms will interpret the authored structures.

According to Marshall and Shipman, the tacit and changing nature of much knowledge adds to the knowledge engineering problem, and limits the Semantic Web's applicability to specific domains. A further issue that they point out are domain- or organization-specific ways to express knowledge, which must be solved through community agreement rather than only technical means.[46] As it turns out, specialized communities and organizations for intra-company projects have tended to adopt semantic web technologies greater than peripheral and less-specialized communities.[47] The practical constraints toward adoption have appeared less challenging where domain and scope is more limited than that of the general public and the World-Wide Web.[47]

Finally, Marshall and Shipman see pragmatic problems in the idea of (Knowledge Navigator-style) intelligent agents working in the largely manually curated Semantic Web:[46]

> In situations in which user needs are known and distributed information resources are well described, this approach can be highly effective; in situations that are not foreseen and that bring together an unanticipated array of information resources, the Google approach is more robust. Furthermore, the Semantic Web relies on inference chains that are more brittle; a missing element of the chain results in a failure to perform the desired action, while the human can supply missing pieces in a more Google-like approach. [...] cost-benefit tradeoffs can work in favor of specially-created Semantic Web metadata directed at weaving together sensible well-structured domain-specific information resources; close attention to user/customer needs will drive these federations if they are to be successful.

Cory Doctorow's critique ("metacrap")[48] is from the perspective of human behavior and personal preferences. For example, people may include spurious metadata into Web pages in an attempt to mislead Semantic Web engines that naively assume the metadata's veracity. This phenomenon was well known with metatags that fooled the Altavista ranking algorithm into elevating the ranking of certain Web pages: the Google indexing engine specifically looks for such attempts at manipulation. Peter Gärdenfors and Timo Honkela point out that logic-based semantic web technologies cover only a fraction of the relevant phenomena related to semantics.[49][50]

Censorship and privacy

[edit]

Enthusiasm about the semantic web could be tempered by concerns regarding censorship and privacy. For instance, text-analyzing techniques can now be easily bypassed by using other words, metaphors for instance, or by using images in place of words. An advanced implementation of the semantic web would make it much easier for governments to control the viewing and creation of online information, as this information would be much easier for an automated content-blocking machine to understand. In addition, the issue has also been raised that, with the use of FOAF files and geolocation meta-data, there would be very little anonymity associated with the authorship of articles on things such as a personal blog. Some of these concerns were addressed in the "Policy Aware Web" project[51] and is an active research and development topic.

Doubling output formats

[edit]

Another criticism of the semantic web is that it would be much more time-consuming to create and publish content because there would need to be two formats for one piece of data: one for human viewing and one for machines. However, many web applications in development are addressing this issue by creating a machine-readable format upon the publishing of data or the request of a machine for such data. The development of microformats has been one reaction to this kind of criticism. Another argument in defense of the feasibility of semantic web is the likely falling price of human intelligence tasks in digital labor markets, such as Amazon's Mechanical Turk.[*citation needed*]

Specifications such as eRDF and RDFa allow arbitrary RDF data to be embedded in HTML pages. The GRDDL (Gleaning Resource Descriptions from Dialects of Language) mechanism allows existing material (including microformats) to be automatically interpreted as RDF, so publishers only need to use a single format, such as HTML.

Research activities on corporate applications

[edit]

The first research group explicitly focusing on the Corporate Semantic Web was the ACACIA team at INRIA-Sophia-Antipolis, founded in 2002. Results of their work include the RDF(S) based Corese[52] search engine, and the application of semantic web technology in the realm of distributed artificial intelligence for knowledge management (e.g. ontologies and multi-agent systems for corporate semantic Web) [53] and E-learning.[54]

Since 2008, the Corporate Semantic Web research group, located at the Free University of Berlin, focuses on building blocks: Corporate Semantic Search, Corporate Semantic Collaboration, and Corporate Ontology Engineering.[55]

Ontology engineering research includes the question of how to involve non-expert users in creating ontologies and semantically annotated content[56] and for extracting explicit knowledge from the interaction of users within enterprises.

Future of applications

[edit]

Tim O'Reilly, who coined the term Web 2.0, proposed a long-term vision of the Semantic Web as a web of data, where sophisticated applications are navigating and manipulating it.[57] The data web transforms the World Wide Web from a distributed file system into a distributed database.[58]

See also

[edit]

- AGRIS
- Business semantics management
- Computational semantics
- Calais (Reuters product)
- DBpedia
- Entity–attribute–value model
- EU Open Data Portal
- History of the World Wide Web
- Hyperdata
- Internet of things
- Linked data
- List of emerging technologies
- Nextbio
- Ontology alignment
- Ontology learning
- RDF and OWL
- Semantic computing
- Semantic Geospatial Web
- Semantic heterogeneity
- Semantic integration
- Semantic matching
- Semantic MediaWiki
- Semantic Sensor Web
- Semantic social network
- Semantic technology
- *Semantic Web*
- Semantically-Interlinked Online Communities
- Smart-M3
- Social Semantic Web

- Web engineering
- Web resource
- Web science

References

[edit]

1. ^ Semantic Web at W3C: https://www.w3.org/standards/semanticweb/
2. ^ *"World Wide Web Consortium (W3C), "RDF/XML Syntax Specification (Revised)", 25 Feb. 2014".*
3. ^ *"World Wide Web Consortium (W3C), "OWL Web Ontology Language Overview", W3C Recommendation, 10 Feb. 2004".*
4. ^ *Chung, Seung-Hwa (2018). "The MOUSE approach: Mapping Ontologies using UML for System Engineers". Computer Reviews Journal: 8–29. ISSN 2581-6640.*
5. ^ ***a b*** *"W3C Semantic Web Activity". World Wide Web Consortium (W3C). November 7, 2011 . Retrieved November 26, 2011.*
6. ^ *"Q&A with Tim Berners-Lee, Special Report". Bloomberg. Retrieved 14 April 2018.*
7. ^ ***a b*** *Berners-Lee, Tim; James Hendler; Ora Lassila (May 17, 2001). "The Semantic Web". Scientific American. Retrieved July 2, 2019.*
8. ^ *Lee Feigenbaum (May 1, 2007). "The Semantic Web in Action". Scientific American. Retrieved February 24, 2010.*
9. ^ *Berners-Lee, Tim; Fischetti, Mark (1999). Weaving the Web. HarperSanFrancisco. chapter 12. ISBN 978-0-06-251587-2.*
10. ^ *Berners-Lee, Tim; Hendler, James; Lassila, Ora (May 17, 2001). "The Semantic Web" (PDF). Scientific American. Vol. 284, no. 5. pp. 34–43. JSTOR 26059207. S2CID 56818714. Archived from the original (PDF) on October 10, 2017. Retrieved March 13, 2008.*
11. ^ *Nigel Shadbolt; Wendy Hall; Tim Berners-Lee (2006). "The Semantic Web Revisited" (PDF). IEEE Intelligent Systems. Archived from the original (PDF) on March 20, 2013. Retrieved April 13, 2007.*
12. ^ *Ramanathan V. Guha (2013). "Light at the End of the Tunnel". International Semantic Web Conference 2013 Keynote. Retrieved March 8, 2015.*
13. ^ *Allsopp, John (March 2007). Microformats: Empowering Your Markup for Web 2.0. Friends of ED. p. 368. ISBN 978-1-59059-814-6.*
14. ^ Artem Chebotko and Shiyong Lu, "Querying the Semantic Web: An Efficient Approach Using Relational Databases", LAP Lambert Academic Publishing, ISBN 978-3-8383-0264-5, 2009.
15. ^ *"Towards the Semantic Web: Collaborative Tag Suggestions" (PDF).*
16. ^ *Specia, Lucia; Motta, Enrico (2007). "Integrating Folksonomies with the Semantic Web". The Semantic Web: Research and Applications. Lecture Notes in Computer Science. Vol. 4519. Springer. pp. 624–639. doi:10.1007/978-3-540-72667-8_44. ISBN 978-3-540-72666-1.*
17. ^ *"Bridging the gap between folksonomies and the semantic web: an experience report" (PDF).*

18. ^ *Nicholson, Josh M.; Mordaunt, Milo; Lopez, Patrice; Uppala, Ashish; Rosati, Domenic; Rodrigues, Neves P.; Grabitz, Peter; Rife, Sean C. (5 November 2021). "scite: A smart citation index that displays the context of citations and classifies their intent using deep learning". Quantitative Science Studies. **2** (3): 882–898. doi:10.1162/qss_a_00146.*
19. ^ *Singh Chawla, Dalmeet (24 January 2022). "Massive open index of scholarly papers launches". Nature. doi:10.1038/d41586-022-00138-y. Retrieved 14 February 2022.*
20. ^ *"OpenAlex: The Promising Alternative to Microsoft Academic Graph". Singapore Management University (SMU). Retrieved 14 February 2022.*
21. ^ *"OpenAlex Documentation". Retrieved 18 February 2022.*
22. ^ *Shannon, Victoria (23 May 2006). "A 'more revolutionary' Web". International Herald Tribune. Retrieved 26 June 2006.*
23. ^ *"Web 3.0 Explained, Plus the History of Web 1.0 and 2.0". Investopedia. Retrieved 2022-10-21.*
24. ^ https://www.rsisinternational.org/IJRSI/Issue31/75-78.pdf
25. ^ Almeida, F. (2017). Concept and dimensions of web 4.0. International journal of computers and technology, 16(7).
26. ^ *"The Commission wants the EU to lead on 'Web 4.0' — whatever that is". 11 July 2023.*
27. ^ *"W3C Uncertainty Reasoning for the World Wide Web". www.w3.org. Retrieved 2021-05-14.*
28. ^ *"Uncertainty Reasoning for the World Wide Web". W3.org. Retrieved 20 December 2018.*
29. ^ *Lukasiewicz, Thomas; Umberto Straccia (2008). "Managing uncertainty and vagueness in description logics for the Semantic Web" (PDF). Web Semantics: Science, Services and Agents on the World Wide Web. **6** (4): 291–308. doi:10.1016/j.websem.2008.04.001.*
30. ^ *"Semantic Web Standards". W3.org. Retrieved 14 April 2018.*
31. ^ *"OWL Web Ontology Language Overview". World Wide Web Consortium (W3C). February 10, 2004. Retrieved November 26, 2011.*
32. ^ *"Resource Description Framework (RDF)". World Wide Web Consortium.*
33. ^ *Allemang, Dean; Hendler, James; Gandon, Fabien (August 3, 2020). Semantic Web for the Working Ontologist : Effective Modeling for Linked Data, RDFS, and OWL (Third ed.). [New York, NY, USA]: ACM Books; 3rd edition. ISBN 978-1450376143.*
34. ^ *"ConverterToRdf - W3C Wiki". W3.org. Retrieved 20 December 2018.*
35. ^ *Sikos, Leslie F. (2015). Mastering Structured Data on the Semantic Web: From HTML5 Microdata to Linked Open Data. Apress. p. 23. ISBN 978-1-4842-1049-9.*
36. ^ *Kiesel, Johannes; Lang, Kevin; Wachsmuth, Henning; Hornecker, Eva; Stein, Benno (14 March 2020). "Investigating Expectations for Voice-based and Conversational Argument Search on the Web". Proceedings of the 2020 Conference on Human Information Interaction and Retrieval. ACM. pp. 53–62. doi:10.1145/3343413.3377978. ISBN 9781450368926. S2CID 212676751.*
37. ^ *Vetere, Guido (30 June 2018). "L'impossibile necessità delle piattaforme sociali decentralizzate". DigitCult - Scientific Journal on Digital Cultures. **3** (1): 41–50. doi:10.4399/97888255159096.*
38. ^ *Bikakis, Antonis; Flouris, Giorgos; Patkos, Theodore; Plexousakis, Dimitris (2023). "Sketching the vision of the Web of Debates". Frontiers in Artificial Intelligence. **6**. doi:10.3389/frai.2023.1124045. ISSN 2624-8212. PMC 10313200. PMID 37396970.*

39. ^ *Schneider, Jodi; Groza, Tudor; Passant, Alexandre. "A Review of Argumentation for the Social Semantic Web" (PDF).* cite journal: Cite journal requires |journal= (help)
40. ^ *Zhang, Chuanrong; Zhao, Tian; Li, Weidong (2015). Geospatial Semantic Web. Springer International Publishing : Imprint: Springer. ISBN 978-3-319-17801-1.*
41. ^ Omar Alonso and Hugo Zaragoza. 2008. Exploiting semantic annotations in information retrieval: ESAIR '08. SIGIR Forum 42, 1 (June 2008), 55–58. doi:10.1145/1394251.1394262
42. ^ Jaap Kamps, Jussi Karlgren, and Ralf Schenkel. 2011. Report on the third workshop on exploiting semantic annotations in information retrieval (ESAIR). SIGIR Forum 45, 1 (May 2011), 33–41. doi:10.1145/1988852.1988858
43. ^ Jaap Kamps, Jussi Karlgren, Peter Mika, and Vanessa Murdock. 2012. Fifth workshop on exploiting semantic annotations in information retrieval: ESAIR '12). In Proceedings of the 21st ACM international conference on information and knowledge management (CIKM '12). ACM, New York, NY, USA, 2772–2773. doi:10.1145/2396761.2398761
44. ^ Omar Alonso, Jaap Kamps, and Jussi Karlgren. 2015. Report on the Seventh Workshop on Exploiting Semantic Annotations in Information Retrieval (ESAIR '14). SIGIR Forum 49, 1 (June 2015), 27–34. doi:10.1145/2795403.2795412
45. ^ *Kuriakose, John (September 2009). "Understanding and Adopting Semantic Web Technology". Cutter IT Journal. **22** (9). CUTTER INFORMATION CORP.: 10–18.*
46. ^ ***a b c*** *Marshall, Catherine C.; Shipman, Frank M. (2003). Which semantic web? (PDF). Proc. ACM Conf. on Hypertext and Hypermedia. pp. 57–66. Archived from the original (PDF) on 2015-09-23. Retrieved 2015-04-17.*
47. ^ ***a b*** *Ivan Herman (2007). State of the Semantic Web (PDF). Semantic Days 2007. Retrieved July 26, 2007.*
48. ^ *Doctorow, Cory. "Metacrap: Putting the torch to seven straw-men of the meta-utopia". www.well.com/. Retrieved 11 September 2023.*
49. ^ *Gärdenfors, Peter (2004). How to make the Semantic Web more semantic. IOS Press. pp. 17–34.* cite book: |work= ignored (help)
50. ^ *Honkela, Timo; Könönen, Ville; Lindh-Knuutila, Tiina; Paukkeri, Mari-Sanna (2008). "Simulating processes of concept formation and communication". Journal of Economic Methodology. **15** (3): 245–259. doi:10.1080/13501780802321350. S2CID 16994027.*
51. ^ *"Policy Aware Web Project". Policyawareweb.org. Retrieved 2013-06-14.*
52. ^ *Corby, Olivier; Dieng-Kuntz, Rose; Zucker, Catherine Faron; Gandon, Fabien (2006). "Searching the Semantic Web: Approximate Query Processing based on Ontologies". IEEE Intelligent Systems. **21**: 20–27. doi:10.1109/MIS.2006.16. S2CID 11488848.*
53. ^ *Gandon, Fabien (7 November 2002). Distributed Artificial Intelligence And Knowledge Management: Ontologies And Multi-Agent Systems For A Corporate Semantic Web (phdthesis). Université Nice Sophia Antipolis.*
54. ^ *Buffa, Michel; Dehors, Sylvain; Faron-Zucker, Catherine; Sander, Peter (2005). "Towards a Corporate Semantic Web Approach in Designing Learning Systems: Review of the Trial Solutioins Project" (PDF). International Workshop on Applications of Semantic Web Technologies for E-Learning. Amsterdam, Holland. pp. 73–76.*
55. ^ *"Corporate Semantic Web - Home". Corporate-semantic-web.de. Retrieved 14 April 2018.*
56. ^ *Hinze, Annika; Heese, Ralf; Luczak-Rösch, Markus; Paschke, Adrian (2012). "Semantic Enrichment by Non-Experts: Usability of Manual Annotation Tools" (PDF). ISWC'12 - Proceedings of the 11th international conference on The Semantic Web. Boston, USA. pp.*

165–181.
57. ^ *Mathieson, S. A. (6 April 2006). "Spread the word, and join it up". The Guardian. Retrieved 14 April 2018.*
58. ^ *Spivack, Nova (18 September 2007). "The Semantic Web, Collective Intelligence and Hyperdata". novaspivack.typepad.com/nova_spivacks_weblog [This Blog has Moved to NovaSpivack.com]. Retrieved 14 April 2018.*

Further reading

[edit]

- *Liyang Yu (December 14, 2014). A Developer's Guide to the Semantic Web, 2nd ed. Springer. ISBN 978-3-662-43796-4.*
- Aaron Swartz's A Programmable Web: An unfinished Work donated by Morgan & Claypool Publishers after Aaron Swartz's death in January 2013.
- *Grigoris Antoniou, Frank van Harmelen (March 31, 2008). A Semantic Web Primer, 2nd Edition. The MIT Press. ISBN 978-0-262-01242-3.*
- *Allemang, Dean; Hendler, James; Gandon, Fabien (August 3, 2020). Semantic Web for the Working Ontologist : Effective Modeling for Linked Data, RDFS, and OWL (Third ed.). [New York, NY, USA]: ACM Books; 3rd edition. ISBN 978-1450376143.*
- *Pascal Hitzler; Markus Krötzsch; Sebastian Rudolph (August 25, 2009). Foundations of Semantic Web Technologies. CRCPress. ISBN 978-1-4200-9050-5.*
- *Thomas B. Passin (March 1, 2004). Explorer's Guide to the Semantic Web. Manning Publications. ISBN 978-1-932394-20-7.*
- *Jeffrey T. Pollock (March 23, 2009). Semantic Web For Dummies. For Dummies. ISBN 978-0-470-39679-7.*
- *Hitzler, Pascal (February 2021). "A Review of the Semantic Web Field". Communications of the ACM. **64** (2): 76–83. doi:10.1145/3397512.*
- *Unni, Deepak (March 2023). "FAIRification of health-related data using semantic web technologies in the Swiss Personalized Health Network". Scientific Data. **10** (1): 127. Bibcode :2023NatSD..10..127T. doi:10.1038/s41597-023-02028-y. PMC 10006404. PMID 36899064.*

External links

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Semantic Web

Background	○ Databases ○ Hypertext ○ Internet ○ Ontologies ○ Semantics ○ Semantic networks ○ World Wide Web
Sub-topics	○ Dataspaces ○ Hyperdata ○ Linked data ○ Rule-based systems
Applications	○ Semantic analytics ○ Semantic broker ○ Semantic computing ○ Semantic mapper ○ Semantic matching ○ Semantic publishing ○ Semantic reasoner ○ Semantic search ○ Semantic service-oriented architecture ○ Semantic wiki ○ Solid

Related topics

- Collective intelligence
- Description logic
- Folksonomy
- Geotagging
- Information architecture
- iXBRL
- Knowledge extraction
- Knowledge management
- Knowledge representation and reasoning
- Library 2.0
- Digital library
- Digital humanities
- Metadata
- References
- Topic map
- Web 2.0
- Web engineering
- Web Science Trust

Standards	**Syntax and supporting technologies**	○ HTTP
		○ IRI
		  ○ URI
		○ RDF
		  ○ triples
		  ○ RDF/XML
		  ○ JSON-LD
		  ○ Turtle
		  ○ TriG
		  ○ Notation3
		  ○ N-Triples
		  ○ TriX (no W3C standard)
		○ RRID
		○ SPARQL
		○ XML
		○ Semantic HTML

	Schemas, ontologies and rules	○ Common Logic ○ OWL ○ RDFS ○ Rule Interchange Format ○ Semantic Web Rule Language ○ ALPS ○ SHACL
	Semantic annotation	○ eRDF ○ GRDDL ○ Microdata ○ Microformats ○ RDFa ○ SAWSDL ○ Facebook Platform
	Common vocabularies	○ DOAP ○ Dublin Core ○ FOAF ○ Schema.org ○ SIOC ○ SKOS
	Microformat vocabularies	○ hAtom ○ hCalendar ○ hCard ○ hProduct ○ hRecipe ○ hReview

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Emerging technologies

Fields **Information and communications**

- Ambient intelligence
  - Internet of things
- Artificial intelligence
  - Applications of artificial intelligence
  - Machine translation
  - Machine vision
  - Mobile translation
  - Progress in artificial intelligence
  - Semantic Web
  - Speech recognition
- Atomtronics
- Carbon nanotube field-effect transistor
- Cybermethodology
- Extended reality
- Fourth-generation optical discs
  - 3D optical data storage
  - Holographic data storage
- GPGPU
- Memory
  - CBRAM
  - ECRAM
  - FRAM
  - Millipede
  - MRAM
  - NRAM
  - PRAM
  - Racetrack memory
  - RRAM
  - SONOS
  - UltraRAM
- Optical computing
- RFID
  - Chipless RFID
- Software-defined radio
- Three-dimensional integrated circuit

- Automation
- Collingridge dilemma
- Differential technological development
- Disruptive innovation
- Ephemeralization
- Ethics
  - Bioethics
  - Cyberethics
  - Neuroethics
  - Robot ethics
- Exploratory engineering
- Proactionary principle
- Technological change
  - Technological unemployment
- Technological convergence
- Technological evolution
- Technological paradigm
- Technology forecasting
  - Accelerating change
  - Future-oriented technology analysis
  - Horizon scanning
  - Moore's law
  - Technological singularity
  - Technology scouting
- Technology in science fiction
- Technology readiness level
- Technology roadmap
- Transhumanism

Topics

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Digital humanities

- Computational archaeology
- Computational philosophy
- Computational theory of mind
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- Cybertext
- Digital classics
- Digital history
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- Digital Medievalist
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- Digital physics
- Digital religion
- Digital rhetoric
- Digital scholarship
- Digital theology
- Digitization
- E-research
- Electronic literature
- Humanistic informatics
- New media
- Philosophy of computer science
- Semantic Web
- Systems theory
- Text Encoding Initiative
- Transliteracy

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National	○ Germany ○ United States ○ France ○ BnF data ○ Japan ○ Czech Republic ○ Spain ○ Latvia ○ Israel

About Google Maps

Image not found or type unknown This article's "criticism" or "controversy" section **may compromise the article's neutrality**. Please help rewrite or integrate negative information to other sections through discussion on the talk page. *(June 2024)*

Google Maps

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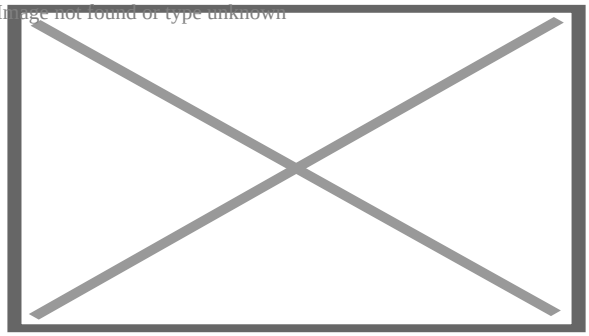


Screenshot of Google Maps in a web browser

Type of site	Web mapping
Available in	74 languages

List of languages
Afrikaans, Azerbaijani, Indonesian, Malay, Bosnian, Catalan, Czech, Danish, German (Germany), Estonian, English (United States), Spanish (Spain), Spanish (Latin America), Basque, Filipino, French (France), Galician, Croatian, Zulu, Icelandic, Italian, Swahili, Latvian, Lithuanian, Hungarian, Dutch, Norwegian, Uzbek, Polish, Portuguese (Brazil), Portuguese (Portugal), Romanian, Albanian, Slovak, Slovenian, Finnish, Swedish, Vietnamese, Turkish, Greek, Bulgarian, Kyrgyz, Kazakh, Macedonian, Mongolian, Russian, Serbian, Ukrainian, Georgian, Armenian, Hebrew, Urdu, Arabic, Persian, Amharic, Nepali, Hindi, Marathi, Bengali, Punjabi, Gujarati, Tamil, Telugu, Kannada, Malayalam, Sinhala, Thai, Lao, Burmese, Khmer, Korean, Japanese, Simplified Chinese, Traditional Chinese

Owner	Google
URL	google.com/maps Image not found or type unknown Edit this at Wikidata
Commercial	Yes
Registration	Optional, included with a Google Account
Launched	February 8, 2005; 20 years ago
Current status	Active
Written in	C++ (back-end), JavaScript, XML, Ajax (UI)

Google Maps is a web mapping platform and consumer application offered by Google. It offers satellite imagery, aerial photography, street maps, 360° interactive panoramic views of streets (Street View), real-time traffic conditions, and route planning for traveling by foot, car, bike, air (in beta) and public transportation. As of 2020, Google Maps was being used by over one billion people every month around the world.[1]

Google Maps began as a C++ desktop program developed by brothers Lars and Jens Rasmussen in Australia at Where 2 Technologies. In October 2004, the company was acquired by Google, which converted it into a web application. After additional acquisitions of a geospatial data visualization company and a real-time traffic analyzer, Google Maps was launched in February 2005.[2] The service's front end utilizes JavaScript, XML, and Ajax. Google Maps offers an API that allows maps to be embedded on third-party websites,[3] and offers a locator for businesses and other organizations in numerous countries around the world. Google Map Maker allowed users to collaboratively expand and update the service's mapping worldwide but was discontinued from March 2017. However, crowdsourced contributions to Google Maps were not discontinued as the company announced those features would be transferred to the Google Local Guides program, [4] although users that are not Local Guides can still contribute.

Google Maps' satellite view is a "top-down" or bird's-eye view; most of the high-resolution imagery of cities is aerial photography taken from aircraft flying at 800 to 1,500 feet (240 to 460 m), while most other imagery is from satellites.[5] Much of the available satellite imagery is no more than three years old and is updated on a regular basis, according to a 2011 report.[6] Google Maps previously used a variant of the Mercator projection, and therefore could not accurately show areas around the poles.[7] In August 2018, the desktop version of Google Maps was updated to show a 3D globe. It is still possible to switch back to the 2D map in the settings.

Google Maps for mobile devices was first released in 2006; the latest versions feature GPS turn-by-turn navigation along with dedicated parking assistance features. By 2013, it was found to be the world's most popular smartphone app, with over 54% of global smartphone owners using it.[8] In 2017, the app was reported to have two billion users on Android, along with several other Google services including YouTube, Chrome, Gmail, Search, and Google Play.

History

[edit]

Acquisitions

[edit]

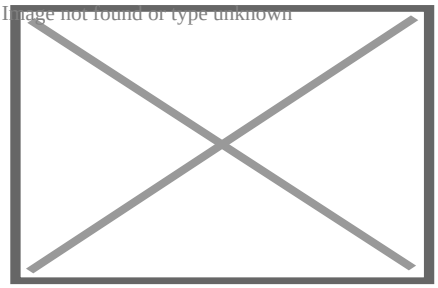
Google Maps first started as a C++ program designed by two Danish brothers, Lars and Jens Eilstrup Rasmussen, and Noel Gordon and Stephen Ma, at the Sydney-based company Where 2 Technologies, which was founded in early 2003. The program was initially designed to be separately downloaded by users, but the company later pitched the idea for a purely Web-based product to Google management, changing the method of distribution.[9] In October 2004, the company was acquired by Google Inc.[10] where it transformed into the web application Google

Maps. The Rasmussen brothers, Gordon and Ma joined Google at that time.

In the same month, Google acquired Keyhole, a geospatial data visualization company (with investment from the CIA), whose marquee application suite, Earth Viewer, emerged as the Google Earth application in 2005 while other aspects of its core technology were integrated into Google Maps.[11] In September 2004, Google acquired ZipDash, a company that provided real-time traffic analysis.[12]

2005–2010

[edit]

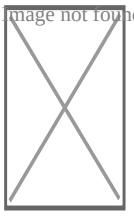


Google Maps Beta in 2005

The launch of Google Maps was first announced on the Google Blog on February 8, 2005.[13]

In September 2005, in the aftermath of Hurricane Katrina, Google Maps quickly updated its satellite imagery of New Orleans to allow users to view the extent of the flooding in various parts of that city.[14][15]

As of 2007, Google Maps was equipped with a miniature view with a draggable rectangle that denotes the area shown in the main viewport, and "Info windows" for previewing details about locations on maps.[16] As of 2024, this feature had been removed (likely several years prior).



Original Google Maps icon

On November 28, 2007, Google Maps for Mobile 2.0 was released.[17][18][19] It featured a beta version of a "My Location" feature, which uses the GPS / Assisted GPS location of the mobile device, if available, supplemented by determining the nearest wireless networks and cell sites.[18][19] The software looks up the location of the cell site using a database of known wireless networks and sites.[20][21] By triangulating the different signal strengths from cell transmitters and then using their location property (retrieved from the database), My Location determines the user's current location.[22]

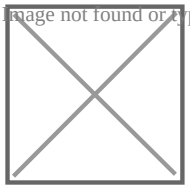
On September 23, 2008, coinciding with the announcement of the first commercial Android device, Google announced that a Google Maps app had been released for its Android operating system.[23][24]

In October 2009, Google replaced Tele Atlas as their primary supplier of geospatial data in the US version of Maps and used their own data.[25]

2011–2015

[edit]

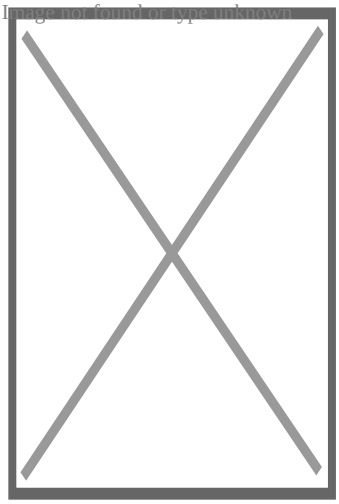
On April 19, 2011, Map Maker was added to the American version of Google Maps, allowing any viewer to edit and add changes to Google Maps. This provides Google with local map updates almost in real-time instead of waiting for digital map data companies to release more infrequent updates.



Icon used from 2015 to 2020

On January 31, 2012, Google, due to offering its Maps for free, was found guilty of abusing the dominant position of its Google Maps application and ordered by a court to pay a fine and damages to Bottin Cartographer, a French mapping company.[26] This ruling was overturned on appeal.[27]

In June 2012, Google started mapping the UK's rivers and canals in partnership with the Canal and River Trust. The company has stated that "it would update the program during the year to allow users to plan trips which include locks, bridges and towpaths along the 2,000 miles of river paths in the UK."[28]



A monument in the shape of a Google Maps pin in the center of the city of Szczecin, Poland

In December 2012, the Google Maps application was separately made available in the App Store, after Apple removed it from its default installation of the mobile operating system version iOS 6 in September 2012.[29]

On January 29, 2013, Google Maps was updated to include a map of North Korea.[30] As of May 3, 2013, Google Maps recognizes Palestine as a country, instead of redirecting to the Palestinian territories.[31]

In August 2013, Google Maps removed the Wikipedia Layer, which provided links to Wikipedia content about locations shown in Google Maps using Wikipedia geocodes.[32]

On April 12, 2014, Google Maps was updated to reflect the annexation of Ukrainian Crimea by Russia. Crimea is shown as the Republic of Crimea in Russia and as the Autonomous Republic of Crimea in Ukraine. All other versions show a dotted disputed border.[33]

In April 2015, on a map near the Pakistani city of Rawalpindi, the imagery of the Android logo urinating on the Apple logo was added via Map Maker and appeared on Google Maps. The vandalism was soon removed and Google publicly apologized.[34] However, as a result, Google disabled user moderation on Map Maker, and on May 12, disabled editing worldwide until it could devise a new policy for approving edits and avoiding vandalism.[35]

On April 29, 2015, users of the classic Google Maps were forwarded to the new Google Maps with the option to be removed from the interface.[36]

On July 14, 2015, the Chinese name for Scarborough Shoal was removed after a petition from the Philippines was posted on Change.org.[37]

2016–2018

[edit]

On June 27, 2016, Google rolled out new satellite imagery worldwide sourced from Landsat 8, comprising over 700 trillion pixels of new data.[38] In September 2016, Google Maps acquired mapping analytics startup Urban Engines.[39]

In 2016, the Government of South Korea offered Google conditional access to the country's geographic database – access that already allows indigenous Korean mapping providers high-detail maps. Google declined the offer, as it was unwilling to accept restrictions on reducing the quality around locations the South Korean Government felt were sensitive (see restrictions on geographic data in South Korea).[40]

On October 16, 2017, Google Maps was updated with accessible imagery of several planets and moons such as Titan, Mercury, and Venus, as well as direct access to imagery of the Moon and Mars.[41][42]

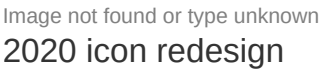
In May 2018, Google announced major changes to the API structure starting June 11, 2018. This change consolidated the 18 different endpoints into three services and merged the basic and premium plans into one pay-as-you-go plan.[43] This meant a 1400% price raise for users on the basic plan, with only six weeks of notice. This caused a harsh reaction within the developers community.[44] In June, Google postponed the change date to July 16, 2018.

In August 2018, Google Maps designed its overall view (when zoomed out completely) into a 3D globe dropping the Mercator projection that projected the planet onto a flat surface.[45]

2019–present

[edit]

Google Maps icon 2020



2020 icon redesign

In January 2019, Google Maps added speed trap and speed camera alerts as reported by other users.[46][47]

On October 17, 2019, Google Maps was updated to include incident reporting, resembling a functionality in Waze which was acquired by Google in 2013.[48]

In December 2019, Incognito mode was added, allowing users to enter destinations without saving entries to their Google accounts.[49]

In February 2020, Maps received a 15th anniversary redesign.[50] It notably added a brand-new app icon, which now resembles the original icon in 2005.

On September 23, 2020, Google announced a COVID-19 Layer update for Google maps, which is designed to offer a seven-day average data of the total COVID-19-positive cases per 100,000 people in the area selected on the map. It also features a label indicating the rise and fall in the number of cases.[51]

In January 2021, Google announced that it would be launching a new feature displaying COVID-19 vaccination sites.[52]

In January 2021, Google announced updates to the route planner that would accommodate drivers of electric vehicles. Routing would take into account the type of vehicle, vehicle status including current charge, and the locations of charging stations.[53]

In June 2022, Google Maps added a layer displaying air quality for certain countries.[54]

In September 2022, Google removed the COVID-19 Layer from Google Maps due to lack of usage of the feature.[55]

Functionality

[edit]

Directions and transit

[edit]

Google Maps provides a route planner,[56] allowing users to find available directions through driving, public transportation, walking, or biking.[57] Google has partnered globally with over 800 public transportation providers to adopt GTFS (General Transit Feed Specification), making the data available to third parties.[58][59] The app can indicate users' transit route, thanks to an October 2019 update. The incognito mode, eyes-free walking navigation features were released earlier.[60] A July 2020 update provided bike share routes.[61]

In February 2024, Google Maps started rolling out glanceable directions for its Android and iOS apps. The feature allows users to track their journey from their device's lock screen.[62][63]

Traffic conditions

[edit]

Screenshot of Google Maps with traffic option enabled

Screenshot of Google Maps with traffic option enabled

In 2007, Google began offering traffic data as a colored overlay on top of roads and motorways to represent the speed of vehicles on particular roads. Crowdsourcing is used to obtain the GPS-determined locations of a large number of cellphone users, from which live traffic maps are produced.[64][65][66]

Google has stated that the speed and location information it collects to calculate traffic conditions is anonymous.[67] Options available in each phone's settings allow users not to share information about their location with Google Maps.[68] Google stated, "Once you disable or opt out of My Location, Maps will not continue to send radio information back to Google servers to determine your handset's approximate location".[69][*failed verification*]

Street View

[edit]
Main article: Google Street View

Image not found or type unknown

A Google Maps car at Googleplex, Mountain View

On May 25, 2007, Google released Google Street View, a feature of Google Maps providing 360° panoramic street-level views of various locations. On the date of release, the feature only included five cities in the U.S. It has since expanded to thousands of locations around the world. In July 2009, Google began mapping college campuses and surrounding paths and trails.

Street View garnered much controversy after its release because of privacy concerns about the uncensored nature of the panoramic photographs, although the views are only taken on public streets.[70][71] Since then, Google has blurred faces and license plates through automated facial recognition.[72][73][74]

Image not found or type unknown

Google Maps Street View Trekker backpack being implemented on the sidewalk of the Hudson River Greenway in New York City

In late 2014, Google launched Google Underwater Street View, including 2,300 kilometres (1,400 mi) of the Australian Great Barrier Reef in 3D. The images are taken by special cameras which turn 360 degrees and take shots every 3 seconds.[75]

In 2017, in both Google Maps and Google Earth, Street View navigation of the International Space Station interior spaces became available.

3D imagery

[edit]
Main article: Google Earth § 3D imagery

Google Maps has incorporated[*when?*] 3D models of hundreds of cities in over 40 countries from Google Earth into its satellite view. The models were developed using aerial photogrammetry techniques.[76][77]

Immersive View

[edit]

At the I/O 2022 event, Google announced Immersive View, a feature of Google Maps which would involve composite 3D images generated from Street View and aerial images of locations using AI, complete with synchronous information. It was to be initially in five cities worldwide, with plans to add it to other cities later on.[78] The feature was previewed in September 2022 with 250 photorealistic aerial 3D images of landmarks,[79] and was full launched in February 2023.[80] An expansion of Immersive View to routes was announced at Google I/O 2023,[81] and was launched in October 2023 for 15 cities globally.[82]

The feature uses predictive modelling and neural radiance fields to scan Street View and aerial images to generate composite 3D imagery of locations, including both exteriors and interiors, and routes, including driving, walking or cycling, as well as generate synchronous information and forecasts up to a month ahead from historical and environmental data about both such as weather, traffic and busyness.

Immersive View has been available in the following locations:[*citation needed*]

Locations with Immersive View

Country	Locations
Argentina	Buenos Aires
Australia	Melbourne, Sydney
Austria	Vienna
Belgium	Brussels
Brazil	Brasília, Rio de Janeiro, São Paulo
Canada	Calgary, Edmonton, Montreal, Ottawa, Toronto, Vancouver
Chile	Santiago
Czech Republic	Prague
France	Nice, Paris
Germany	Berlin, Cologne, Frankfurt, Munich
Greece	Athens

Hong Kong	Hong Kong
Hungary	Budapest
Italy	Florence, Milan, Rome, Venice
Japan	Kyoto, Nagoya, Osaka, Tokyo
Mexico	Guadalajara, Mexico City
Netherlands	Amsterdam
Norway	Oslo
Poland	Warsaw
Portugal	Lisbon, Porto
Romania	Bucharest
Singapore	Singapore
South Africa	Cape Town, Johannesburg
Spain	Barcelona, Madrid
Sweden	Stockholm
Switzerland	Zurich
Taiwan	Taichung, Taipei
United Kingdom	Edinburgh, London
United States	Atlanta, Boston, Chicago, Detroit, Houston, Las Vegas, Los Angeles, Miami, New York City, Philadelphia, San Diego, San Francisco, Seattle
Vatican City	Vatican City

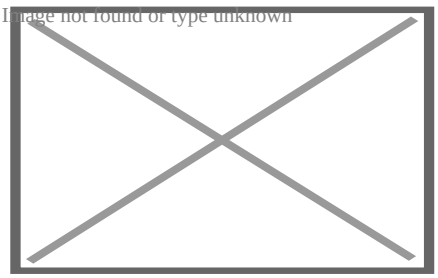
Landmark Icons

[edit]

Google added icons of city attractions, in a similar style to Apple Maps, on October 3, 2019. In the first stage, such icons were added to 9 cities.[83]

45° imagery

[edit]



An example of the Leaning Tower of Pisa in the 45° view

In December 2009, Google introduced a new view consisting of 45° angle aerial imagery, offering a "bird's-eye view" of cities. The first cities available were San Jose and San Diego. This feature was initially available only to developers via the Google Maps API.[84] In February 2010, it was introduced as an experimental feature in Google Maps Labs.[85] In July 2010, 45° imagery was made available in Google Maps in select cities in South Africa, the United States, Germany and Italy.[86]

Weather

[edit]

In February 2024, Google Maps incorporated a small weather icon on the top left corner of the Android and iOS mobile apps, giving access to weather and air quality index details.[87]

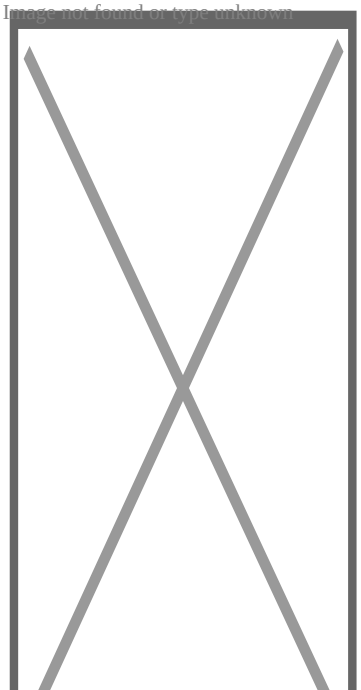
Lens in Maps

[edit]

Previously called Search with Live View, Lens In Maps identifies shops, restaurants, transit stations and other street features with a phone's camera and places relevant information and a category pin on top, like closing/opening times, current busyness, pricing and reviews using AI and augmented reality. The feature, if available on the device, can be accessed through tapping the Lens icon in the search bar. It was expanded to 50 new cities in October 2023 in its biggest expansion yet, after initially being released in late 2022 in Los Angeles, San Francisco, New York, London, and Paris.[88][89] Lens in Maps shares features with Live View, which also displays information relating to street features while guiding a user to a selected destination with virtual arrows, signs and guidance.[90]

Business listings

[edit]



A business listing in Google Maps showing opening times, reviews and photos. This screenshot is from the Android mobile app.

Google collates business listings from multiple on-line and off-line sources. To reduce duplication in the index, Google's algorithm combines listings automatically based on address, phone number, or geocode,[91] but sometimes information for separate businesses will be inadvertently merged with each other, resulting in listings inaccurately incorporating elements from multiple businesses.[92] Google allows business owners to create and verify their own business data through *Google Business Profile* (*GBP*), formerly *Google My Business* (*GMB*).[93] Owners are encouraged to provide Google with business information including address, phone number, business category, and photos.[94] Google has staff in India who check and correct listings remotely as well as support businesses with issues.[95] Google also has teams on the ground in most countries that validate physical addresses in person.[96] In May 2024, Google announced it would discontinue the chat feature in Google Business Profile. Starting July 15, 2024, new chat conversations would be disabled, and by July 31, 2024, all chat functionalities would end.[97]

Google Maps can be manipulated by businesses that are not physically located in the area in which they record a listing. There are cases of people abusing Google Maps to overtake their competition by placing unverified listings on online directory sites, knowing the information will roll across to Google (duplicate sites). The people who update these listings do not use a registered business name. They place keywords and location details on their Google Maps business title, which can overtake credible business listings. In Australia in particular, genuine companies and businesses are noticing a trend of fake business listings in a variety of industries.[98]

Genuine business owners can also optimize their business listings to gain greater visibility in Google Maps, through a type of search engine marketing called local search engine optimization.[99]

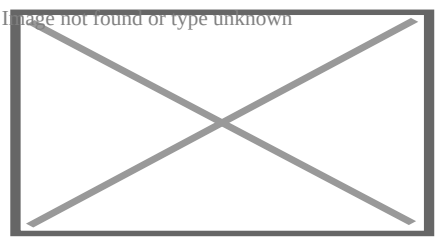
Indoor maps

[edit]

In March 2011, indoor maps were added to Google Maps, giving users the ability to navigate themselves within buildings such as airports, museums, shopping malls, big-box stores, universities, transit stations, and other public spaces (including underground facilities). Google encourages owners of public facilities to submit floor plans of their buildings in order to add them to the service.[100] Map users can view different floors of a building or subway station by clicking on a level selector that is displayed near any structures which are mapped on multiple levels.

My Maps

[edit]



Google My Maps

My Maps is a feature in Google Maps launched in April 2007 that enables users to create custom maps for personal use or sharing. Users can add points, lines, shapes, notes and images on top of Google Maps using a WYSIWYG editor.[101] An Android app for My Maps, initially released in March 2013 under the name Google Maps Engine Lite, was available until its removal from the Play Store in October 2021.[102][103][104]

Google Local Guides

[edit]

Google Local Guides is a volunteer program launched by Google Maps[105] to enable users to contribute to Google Maps when registered. It sometimes provides them additional perks and benefits for their collaboration. Users can achieve Level 1 to 10, and be awarded with badges. The program is partially a successor to Google Map Maker as features from the former program became integrated into the website and app.[106]

The program consists of adding reviews, photos, basic information, and videos; and correcting information such as wheelchair accessibility.[107][108] Adding reviews, photos, videos, new places, new roads or providing useful information gives points to the users.[109] The level of users is upgraded when they get a certain amount of points.[110][111] Starting with Level 4, a star is shown near the avatar of the user.[111]

Timelapse

[edit]

Earth Timelapse, released in April 2021, is a program in which users can see how the earth has been changed in the last 37 years. They combined the 15 million satellite images (roughly ten quadrillion pixels) to create the 35 global cloud-free Images for this program.[112]

Timeline

[edit]

If a user shares their location with Google, Timeline summarises this location for each day on a Timeline map.[113] Timeline estimates the mode of travel used to move between places and will also show photos taken at that location. In June 2024, Google started progressively removing access to the timeline on web browsers, with the information instead being stored on a local device.[114][115]

Implementation

[edit]

Image not found or type unknown

A split-view screenshot of Google Maps. In the bottom half *Street Maps* is shown, while in the top half *Street View* is shown. A user can zoom in and out of either of them independently of the zoom level of each.

As the user drags the map, the grid squares are downloaded from the server and inserted into the page. When a user searches for a business, the results are downloaded in the background for insertion into the side panel and map; the page is not reloaded. A hidden iframe with form submission is used because it preserves browser history. Like many other Google web applications, Google Maps uses JavaScript extensively.[116] The site also uses protocol buffers for data transfer rather than JSON, for performance reasons.

The version of Google Street View for classic Google Maps required Adobe Flash.[117] In October 2011, Google announced MapsGL, a WebGL version of Maps with better renderings and smoother transitions.[118] Indoor maps use JPG, .PNG, .PDF, .BMP, or .GIF, for floor plans.[119]

Users who are logged into a Google Account can save locations so that they are overlaid on the map with various colored "pins" whenever they browse the application. These "Saved places" can be organized into default groups or user named groups and shared with other users. "Starred places" is one default group example. It previously automatically created a record within the now-discontinued product Google Bookmarks.

Map data and imagery

[edit]
See also: List of satellite map images with missing or unclear data

The Google Maps terms and conditions[120] state that usage of material from Google Maps is regulated by Google Terms of Service[121] and some additional restrictions. Google has either purchased local map data from established companies, or has entered into lease agreements to use copyrighted map data.[122] The owner of the copyright is listed at the bottom of zoomed maps. For example, street maps in Japan are leased from Zenrin. Street maps in China are leased from AutoNavi.[123] Russian street maps are leased from Geocentre Consulting and Tele Atlas. Data for North Korea is sourced from the companion project Google Map Maker.

Street map overlays, in some areas, may not match up precisely with the corresponding satellite images. The street data may be entirely erroneous, or simply out of date: "The biggest challenge is the currency of data, the authenticity of data," said Google Earth representative Brian McClendon. As a result, in March 2008 Google added a feature to edit the locations of houses and businesses.[124][125]

Restrictions have been placed on Google Maps through the apparent censoring of locations deemed potential security threats. In some cases the area of redaction is for specific buildings, but in other cases, such as Washington, D.C.,[126] the restriction is to use outdated imagery.

Google Maps API

[edit]

Google Maps API, now called Google Maps Platform, hosts about 17 different APIs, which are themed under the following categories: Maps, Places and Routes.[127]

After the success of reverse-engineered mashups such as chicagocrime.org and housingmaps.com, Google launched the Google Maps API in June 2005[128] to allow developers to integrate Google Maps into their websites. It was a free service that did not require an API key until June 2018 (changes went into effect on July 16), when it was announced that an API key linked to a Google Cloud account with billing enabled would be required to access the API.[129] The API currently does not contain ads, but Google states in their terms of use that they reserve the right to display ads in the future.[130]

By using the Google Maps API, it is possible to embed Google Maps into an external website, onto which site-specific data can be overlaid.[131] Although initially only a JavaScript API, the Maps API was expanded to include an API for Adobe Flash applications (but this has been deprecated), a service for retrieving static map images, and web services for performing geocoding, generating driving directions, and obtaining elevation profiles. Over 1,000,000[132] web sites use the Google Maps API, making it the most heavily used web application development API.[133] In September 2011, Google announced it would deprecate the Google Maps API for Flash.[134]

The Google Maps API was free for commercial use, provided that the site on which it is being used is publicly accessible and did not charge for access, and was not generating more than 25,000 map accesses a day.[135][136] Sites that did not meet these requirements could purchase the Google Maps API for Business.[137]

As of June 21, 2018, Google increased the prices of the Maps API and requires a billing profile.[138]

Google Maps in China

[edit]

Due to restrictions on geographic data in China, Google Maps must partner with a Chinese digital map provider in order to legally show Chinese map data. Since 2006, this partner has been AutoNavi.[123]

Within China, the State Council mandates that all maps of China use the GCJ-02 coordinate system, which is offset from the WGS-84 system used in most of the world. google.*cn*/maps (formerly Google Ditu) uses the GCJ-02 system for both its street maps[139] and satellite imagery.

[140] google.*com*/maps also uses GCJ-02 data for the street map, but uses WGS-84 coordinates for satellite imagery,[141] causing the so-called China GPS shift problem.

Frontier alignments also present some differences between google.*cn*/maps and google.*com*/maps. On the latter, sections of the Chinese border with India and Pakistan are shown with dotted lines, indicating areas or frontiers in dispute. However, google.*cn* shows the Chinese frontier strictly according to Chinese claims with no dotted lines indicating the border with India and Pakistan. For example, the South Tibet region claimed by China but administered by India as a large part of Arunachal Pradesh is shown inside the Chinese frontier by google.*cn*, with Indian highways ending abruptly at the Chinese claim line. Google.*cn* also shows Taiwan and the South China Sea Islands as part of China. Google Ditu's street map coverage of Taiwan no longer omits major state organs, such as the Presidential Palace, the five Yuans, and the Supreme Court.[142][*additio*

Feature-wise, google.*cn*/maps does not feature My Maps. On the other hand, while google.*cn* displays virtually all text in Chinese, google.*com*/maps displays most text (user-selectable real text as well as those on map) in English.[*citation needed*] This behavior of displaying English text is not consistent but intermittent – sometimes it is in English, sometimes it is in Chinese. The criteria for choosing which language is displayed are not known publicly.[*citation needed*]

Criticism and controversies

[edit]

Incorrect location naming

[edit]

There are cases where Google Maps had added out-of-date neighborhood monikers. Thus, in Los Angeles, the name "Brooklyn Heights" was revived from its 1870s usage[143] and "Silver Lake Heights" from its 1920s usage,[144] or mistakenly renamed areas (in Detroit, the neighborhood "Fiskhorn" became "Fishkorn").[145] Because many companies utilize Google Maps data, these previously obscure or incorrect names then gain traction; the names are often used by realtors, hotels, food delivery sites, dating sites, and news organizations.

Google has said it created its maps from third-party data, public sources, satellites, and users, but many names used have not been connected to any official record.[143][145] According to a former Google Maps employee (who was not authorized to speak publicly), users can submit changes to Google Maps, but some submissions are ruled upon by people with little local knowledge of a place, such as contractors in India. Critics maintain that names likes "BoCoCa" (for the area in Brooklyn between Boerum Hill, Cobble Hill and Carroll Gardens), are "just plain puzzling" or simply made up.[145] Some names used by Google have been traced to non-professionally made maps with typographical errors that survived on Google Maps.[145]

Potential misuse

[edit]

See also: Google Street View privacy concerns and List of satellite map images with missing or unclear data

In 2005 the Australian Nuclear Science and Technology Organisation (ANSTO) complained about the potential for terrorists to use the satellite images in planning attacks, with specific reference to the Lucas Heights nuclear reactor; however, the Australian Federal government did not support the organization's concern. At the time of the ANSTO complaint, Google had colored over some areas for security (mostly in the U.S.), such as the rooftop of the White House and several other Washington, D.C. buildings.[146][147][148]

In October 2010, Nicaraguan military commander Edén Pastora stationed Nicaraguan troops on the Isla Calero (in the delta of the San Juan River), justifying his action on the border delineation given by Google Maps. Google has since updated its data which it found to be incorrect.[149]

On January 27, 2014, documents leaked by Edward Snowden revealed that the NSA and the GCHQ intercepted Google Maps queries made on smartphones, and used them to locate the users making these queries. One leaked document, dating to 2008, stated that "[i]t effectively means that anyone using Google Maps on a smartphone is working in support of a GCHQ system."[150]

In May 2015, searches on Google Maps for offensive racial epithets for African Americans such as "nigger", "nigger king", and "nigger house" pointed the user to the White House; Google apologized for the incident.[151][152]

In December 2015, 3 Japanese netizens were charged with vandalism after they were found to have added an unrelated law firm's name as well as indecent names to locations such as "Nuclear test site" to the Atomic Bomb Dome and "Izumo Satya" to the Izumo Taisha.[153][154]

In February 2020, the artist Simon Weckert[155] used 99 cell phones to fake a Google Maps traffic jam.[156]

In September 2024, several schools in Taiwan and Hong Kong were altered to incorrect labels, such as "psychiatric hospitals" or "prisons". Initially, it was believed to be the result of hacker attacks. However, police later revealed that local students had carried out the prank. Google quickly corrected the mislabeled entries. Education officials in Taiwan and Hong Kong expressed concern over the incident.[157][158][159]

Misdirection incidents

[edit]

Australia

[edit]

In August 2023, a woman driving from Alice Springs to the Harts Range Racecourse was stranded in the Central Australian desert for a night after following directions provided by Google Maps.[160][161] She later discovered that Google Maps was providing directions for the actual Harts Range instead of the rodeo. Google said it was looking into the naming of the two locations and consulting with "local and authoritative sources" to solve the issue.[160]

In February 2024, two German tourists were stranded for a week after Google Maps directed them to follow a dirt track through Oyala Thumotang National Park and their vehicle became trapped in mud.[162][163] Queensland Parks and Wildlife Service ranger Roger James said, "People should not trust Google Maps when they're travelling in remote regions of Queensland, and they need to follow the signs, use official maps or other navigational devices."[162]

North America

[edit]

In June 2019, Google Maps provided nearly 100 Colorado drivers an alternative route that led to a dirt road after a crash occurred on Peña Boulevard. The road had been turned to mud by rain, resulting in nearly 100 vehicles being trapped.[164][161] Google said in a statement, "While we always work to provide the best directions, issues can arise due to unforeseen circumstances such as weather. We encourage all drivers to follow local laws, stay attentive, and use their best judgment while driving."[164]

In September 2023, Google was sued by a North Carolina resident who alleged that Google Maps had directed her husband over the Snow Creek Bridge in Hickory the year prior, resulting in him drowning. According to the lawsuit, multiple people had notified Google about the state of the bridge, which collapsed in 2013, but Google had not updated the route information and continued to direct users over the bridge.[165][166][161] At the time of the man's death, the barriers placed to block access to the bridge had been vandalized.[167][168]

In November 2023, a hiker was rescued by helicopter on the backside of Mount Fromme in Vancouver. North Shore Rescue stated on its Facebook page that the hiker had followed a non-existent hiking trail on Google Maps. This was also the second hiker in two months to require rescuing after following the same trail. The fake trail has since been removed from the app.[169][170]

Also in November 2023, Google apologized after users were directed through desert roads after parts of Interstate 15 were closed due to a dust storm.[171] Drivers became stranded after following the suggested detour route, which was a "bumpy dirt trail".[172] Following the incident, Google stated that Google Maps would "no longer route drivers traveling between Las Vegas and Barstow down through those roads."[171]

Russia

[edit]

In 2020, a teenage motorist was found frozen to death while his passenger was still alive but suffered from severe frostbite after using Google Maps, which had led them to a shorter but abandoned section of the R504 Kolyma Highway, where their Toyota Chaser became disabled.[173]

India

[edit]

In 2024, three men from Uttar Pradesh died after their car fell from an under-construction bridge. They were using Google Maps for driving which misdirected them and the car fell into the Ramganga river.[174][175]

Renaming of the Gulf of Mexico

[edit]

In February 2025, as a response to Donald Trump's Executive Order 14172, the Gulf of Mexico was renamed to "Gulf of America" for US users and "Gulf of Mexico (Gulf of America)" elsewhere, except for Mexico itself where it remained the Gulf of Mexico. The decision received criticism, with Mexican president Claudia Sheinbaum asking Google to reconsider its decision.[176] Google subsequently blocked and deleted negative reviews of the gulf after the name change occurred.[177][178]

Discontinued features

[edit]

Google Latitude

[edit]
Main article: Google Latitude

Google Latitude was a feature that let users share their physical locations with other people. This service was based on Google Maps, specifically on mobile devices. There was an iGoogle widget for desktops and laptops as well.[179] Some concerns were expressed about the privacy issues raised by the use of the service.[180] On August 9, 2013, this service was discontinued,[181] and on March 22, 2017, Google incorporated the features from Latitude into the Google Maps app.[182]

Google Map Maker

[edit]

Main article: Google Map Maker

In areas where Google Map Maker was available, for example, much of Asia, Africa, Latin America and Europe as well as the United States and Canada, anyone who logged into their Google account could directly improve the map by fixing incorrect driving directions, adding biking trails, or adding a missing building or road. General map errors in Australia, Austria, Belgium, Denmark, France, Liechtenstein, Netherlands, New Zealand, Norway, South Africa, Switzerland, and the United States could be reported using the Report a Problem link in Google Maps and would be updated by Google.[183] For areas where Google used Tele Atlas data, map errors could be reported using Tele Atlas map insight.[184]

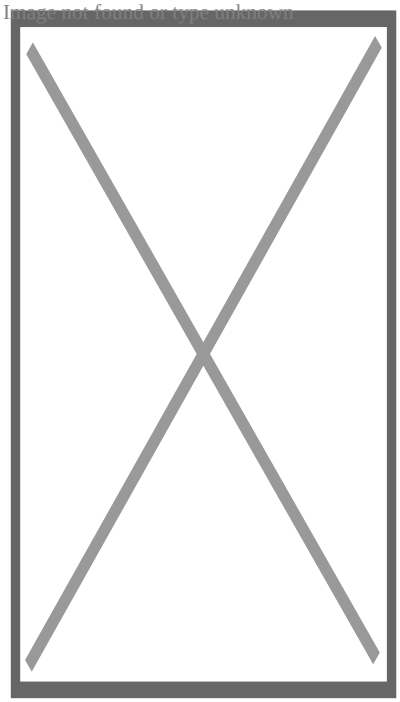
If imagery was missing, outdated, misaligned, or generally incorrect, one could notify Google through their contact request form.[185]

In November 2016, Google announced the discontinuation of Google Map Maker as of March 2017.[186]

Mobile app

[edit]

Screenshot



Screenshot of Google Maps on Android 14

Android	25.10.04 (Build 732665141) / 7 March 2025; 10 days ago[187][188]
Wear OS	25.09.00 (Build 730474011) / 25 February 2025; 20 days ago[187][189]
iOS	25.10.02 / 7 March 2025; 10 days ago[190]
Android Go,[a] discontinued	161.1 / 13 October 2023; 17 months ago[191][192]

Android (Beta) 11.143.0303 / 20 August 2024; 6 months ago[193]

Google Maps

Image not found or type unknown

Original author(s)	Google
Initial release	2006; 19 years ago
Stable release(s) [±]	
Preview release(s) [±]	
Operating system	○ Android ○ iOS ○ KaiOS Wear OS WatchOS Web Fitbit OS

Formerly: Java ME, Symbian, Windows Mobile

Google Maps is available as a mobile app for the Android and iOS mobile operating systems. The first mobile version of Google Maps (then known as Google Local for Mobile) was launched in beta in November 2005 for mobile platforms supporting J2ME.[194][195][196] It was released as Google Maps for Mobile in 2006.[197] In 2007 it came preloaded on the first iPhone in a deal with Apple.[198] A version specifically for Windows Mobile was released in February 2007[199] and the Symbian app was released in November 2007.[200]

Version 2.0 of Google Maps Mobile was announced at the end of 2007, with a stand out *My Location* feature to find the user's location using the cell towers, without needing GPS.[201][202][203] In September 2008, Google Maps was released for and preloaded on Google's own new platform Android.[204][205]

Up until iOS 6, the built-in maps application on the iOS operating system was powered by Google Maps. However, with the announcement of iOS 6 in June 2012, Apple announced that they had created their own Apple Maps mapping service,[206] which officially replaced Google Maps when iOS 6 was released on September 19, 2012.[207] However, at launch, Apple Maps received significant criticism from users due to inaccuracies, errors and bugs.[208][209] One day later, *The Guardian* reported that Google was preparing its own Google Maps app,[210] which was released on December 12, 2012.[211][212] Within two days, the application had been downloaded over ten million times.[213]

Features

[edit]

The Google Maps apps for iOS and Android have many of the same features, including turn-by-turn navigation, street view, and public transit information.[214][215] Turn-by-turn navigation was originally announced by Google as a separate beta testing app exclusive to Android 2.0 devices in October 2009.[216][217] The original standalone iOS version did not support the iPad,[215] but tablet support was added with version 2.0 in July 2013.[218] An update in June 2012 for Android devices added support for offline access to downloaded maps of certain regions,[219][220] a feature that was eventually released for iOS devices, and made more robust on Android, in May 2014.[221][222]

At the end of 2015 Google Maps announced its new offline functionality,[223] but with various limitations – downloaded area cannot exceed 120,000 square kilometers[224][225] and require a considerable amount of storage space.[226] In January 2017, Google added a feature exclusively to Android that will, in some U.S. cities, indicate the level of difficulty in finding available parking spots,[227] and on both Android and iOS, the app can, as of an April 2017 update, remember where users parked.[228][229] In August 2017, Google Maps for Android was updated with new functionality to actively help the user in finding parking lots and garages close to a destination.[230] In December 2017, Google added a new two-wheeler mode to its Android app, designed for users in India, allowing for more accessibility in traffic conditions.[231][232] In 2019 the Android version introduced the new feature called live view that allows to view directions directly on the road thanks to augmented reality.[233] Google Maps won the 2020 Webby Award for Best User Interface in the category Apps, Mobile & Voice.[234] In March 2021, Google added a feature in which users can draw missing roads.[235] In June 2022, Google implemented support for toll calculation. Both iOS and Android apps report how much the user has to pay in tolls when a route that includes toll roads is input. The feature is available for roads in the US, India, Japan and Indonesia with further expansion planned. As per reports the total number of toll roads covered in this phase is around 2000.[236]

Reception

[edit]

USA Today welcomed the application back to iOS, saying: "The reemergence in the middle of the night of a Google Maps app for the iPhone is like the return of an old friend. Only your friend, who'd gone missing for three months, comes back looking better than ever."[237] Jason Parker of *CNET*, calling it "the king of maps", said, "With its iOS Maps app, Google sets the standard for what mobile navigation should be and more."[238] Bree Fowler of the Associated Press compared Google's and Apple's map applications, saying: "The one clear advantage that Apple has is style. Like Apple devices, the maps are clean and clear and have a fun, pretty element to them, especially in 3-D. But when it comes down to depth and information, Google still reigns superior and will no doubt be welcomed back by its fans."[239] *Gizmodo* gave it a ranking of 4.5 stars, stating: "Maps Done Right".[240] According to *The New York Times*, Google "admits that it's [iOS app is] even better than Google Maps for Android phones, which has accommodated its evolving feature set mainly by piling on menus".[241]

Google Maps' location tracking is regarded by some as a threat to users' privacy, with Dylan Tweney of *VentureBeat* writing in August 2014 that "Google is probably logging your location, step

by step, via Google Maps", and linked users to Google's location history map, which "lets you see the path you've traced for any given day that your smartphone has been running Google Maps". Tweney then provided instructions on how to disable location history.[242] The history tracking was also noticed, and recommended disabled, by editors at *CNET*[243] and *TechCrunch*.[244] Additionally, *Quartz* reported in April 2014 that a "sneaky new privacy change" would have an effect on the majority of iOS users. The privacy change, an update to the Gmail iOS app that "now supports sign-in across Google iOS apps, including Maps, Drive, YouTube and Chrome", meant that Google would be able to identify users' actions across its different apps.[245]

The Android version of the app surpassed five billion installations in March 2019.[246] By November 2021, the Android app had surpassed 10 billion installations.[247]

Go version

[edit]

Google Maps Go, a version of the app designed for lower-end devices, was released in beta in January 2018.[248] By September 2018, the app had over 10 million installations.[249]

Artistic and literary uses

[edit]

The German "geo-novel" *Senghor on the Rocks* (2008) presents its story as a series of spreads showing a Google Maps location on the left and the story's text on the right. Annika Richterich explains that the "satellite pictures in *Senghor on the Rocks* illustrate the main character's travel through the West-African state of Senegal".[250]

Artists have used Google Street View in a range of ways. Emilio Vavarella's *The Google Trilogy* includes glitchy images and unintended portraits of the drivers of the Street View cars.[251] The Japanese band group inou used Google Street View backgrounds to make a music video for their song EYE.[252] The Canadian band Arcade Fire made a customized music video that used Street View to show the viewer their own childhood home.[253][254]

See also

[edit]

- icon Image not found or type unknown Internet portal

- Azure Maps
- Apple Maps
- Bing Maps
- Comparison of web map services
- GeoGuessr

- Google Earth
- *Google Maps Road Trip*, live-streaming documentary
- Here WeGo
- MapQuest
- OpenStreetMap
- Terravision (computer program)
- Wikiloc, a mashup that shows trails and waypoints on Google Maps
- Wikimapia, a mashup combining Google Maps and a wiki aimed at "describing the whole planet earth"
- Yandex Maps, popular in Russia and CIS

Notes

[edit]

1. ^ Lite version for Android

References

[edit]

1. ^ *"Google Maps Metrics and Infographics". Google Maps for iPhone. Archived from the original on March 21, 2022. Retrieved April 1, 2021.*
2. ^ *"Our history in depth". Google Company. Archived from the original on April 6, 2016. Retrieved June 13, 2016.*
3. ^ *"Google Maps API". Google Developers. Archived from the original on April 20, 2012.*
4. ^ *Perez, Sarah (November 8, 2016). "Google to shut down Map Maker, its crowdsourced map editing tool". TechCrunch. Archived from the original on August 11, 2017. Retrieved June 23, 2017.*
5. ^ *"Blurry or outdated imagery". Google Earth Help. Archived from the original on October 24, 2013. Retrieved January 12, 2014.*
6. ^ *Anderson, Frank (October 18, 2011). "How Often is Google Maps and Google Earth Updated?". TechnicaMix. Archived from the original on December 3, 2013. Retrieved November 24, 2013.*
7. ^ *"Map Types – Google Maps JavaScript API v3 — Google Developers". Google Inc. July 27, 2012. Archived from the original on January 15, 2013. Retrieved January 3, 2013.*
8. ^ *"Google+ Smartphone App Popularity". Business Insider. Archived from the original on September 6, 2013. Retrieved September 6, 2013.*
9. ^ *"Google mapper: Take browsers to the limit". CNET. Archived from the original on October 26, 2012. Retrieved January 3, 2013.*
10. ^ *Kiss, Jemima (June 17, 2009). "Secrets of a nimble giant". London: Guardian. Archived from the original on February 19, 2014. Retrieved October 30, 2010.*
11. ^ *Orlowski, Andrew (October 28, 2004). "Google buys CIA-backed mapping startup". The Register. Archived from the original on February 11, 2017. Retrieved April 27, 2017.*

12. ^ Bazeley, Michael (March 30, 2005). "Google acquires traffic info start-up Zipdash". SiliconBeat. Archived from the original on January 2, 2008. Retrieved January 8, 2008.
13. ^ Taylor, Bret (February 8, 2005). "Mapping your way". Official Google Blog. Archived from the original on May 25, 2010. Retrieved January 12, 2010.
14. ^ "Google accused of airbrushing Katrina history". NBC News. The Associated Press. March 30, 2007. Archived from the original on November 3, 2020. Retrieved April 17, 2020.
15. ^ Claburn, Thomas (April 2, 2007). "Google Restores Katrina's Scars To Google Earth". Information Week. Archived from the original on August 19, 2009.
16. ^ "Google Maps User Guide". Google Maps. Archived from the original on November 5, 2007 . Retrieved November 21, 2021.
17. ^ "Google Announces Launch of Google Maps for Mobile With "My Location" Technology". News from Google. November 28, 2007. Archived from the original on April 26, 2017. Retrieved April 25, 2017.
18. ^ **a b** Marshall, Matt (November 28, 2007). "Google releases useful "my location" feature for cellphones". VentureBeat. Archived from the original on April 25, 2017. Retrieved April 25, 2017.
19. ^ **a b** Schonfeld, Erick (November 28, 2007). "Google Mobile Maps PinPoints Your Location Without GPS". TechCrunch. AOL. Archived from the original on April 26, 2017. Retrieved April 25, 2017.
20. ^ Ray, Bill (November 29, 2007). "Google Maps Mobile knows where you are". The Register. Situation Publishing. Archived from the original on October 25, 2020. Retrieved April 25, 2017.
21. ^ Mills, Elinor (November 28, 2007). "Google Maps for Mobile adds 'My Location' feature". CNET. CBS Interactive. Archived from the original on October 29, 2020. Retrieved April 25, 2017.
22. ^ Overbo, Mike (November 28, 2007). "Google Maps: My Location". iMore. Archived from the original on April 26, 2017. Retrieved April 25, 2017.
23. ^ Vanlerberghe, Mac (September 23, 2008). "Google on Android". Google Mobile Blog. Archived from the original on December 7, 2017. Retrieved April 30, 2017.
24. ^ Tseng, Erick (September 23, 2008). "The first Android-powered phone". Official Google Blog. Archived from the original on December 7, 2017. Retrieved April 30, 2017.
25. ^ "Google Replaces Tele Atlas Data in US with Google StreetView Data". blumenthals.com. October 12, 2009. Archived from the original on October 15, 2009.
26. ^ "France Convicts Google for Its Free(dom)". NBC San Diego. February 3, 2012. Archived from the original on October 18, 2014. Retrieved October 13, 2014.
27. ^ "France: Google wins court decision vs Evermaps". November 29, 2015. Archived from the original on October 22, 2020. Retrieved November 21, 2018.
28. ^ "Google begins mapping UK rivers". The Daily Telegraph. June 19, 2012. Archived from the original on June 19, 2012. Retrieved June 20, 2012.cite web: CS1 maint: bot: original URL status unknown (link)
29. ^ "Google Maps for iOS Hits Apple App Store". PCMag. Archived from the original on December 16, 2012. Retrieved December 12, 2012.
30. ^ Sieczkowski, Cavan (January 29, 2013). "Google Maps North Korea: Prison Camps, Nuclear Complexes Pinpointed In New Images (PHOTOS)". The Huffington Post. Archived from the original on February 9, 2013. Retrieved May 20, 2013.

31. ^ *"Google changes Palestinian location from 'Territories' to 'Palestine'". Fox News. Associated Press. May 3, 2013. Archived from the original on May 21, 2013. Retrieved May 20, 2013.*
32. ^ *Google Maps Drops Wikipedia Layer Archived October 6, 2013, at the Wayback Machine.* Search Engine Roundtable. (September 10, 2013)
33. ^ *"Google Maps Displays Crimean Border Differently In Russia, U.S." NPR.org. April 12, 2014. Archived from the original on November 26, 2014. Retrieved December 4, 2014.*
34. ^ *Hern, Alex (April 24, 2015). "Google Maps hides an image of the Android robot urinating on Apple". The Guardian. Archived from the original on May 17, 2015. Retrieved May 22, 2015.*
35. ^ *Kanakarajan, Pavithra (May 22, 2015). "Map Maker will be temporarily unavailable for editing starting May 12, 2015". Google Product Forums. Archived from the original on December 3, 2018. Retrieved May 10, 2015.*
36. ^ *"Google Is Getting Rid of Classic Maps for Good (Ugh.)". April 29, 2015. Archived from the original on May 15, 2015. Retrieved May 14, 2015.*
37. ^ *"Google Maps alters disputed South China Sea shoal name". BBC News. July 14, 2015. Archived from the original on July 14, 2015. Retrieved July 14, 2015.*
38. ^ *Meyer, Robinson (June 27, 2016). "Google's Satellite Map Gets a 700-Trillion-Pixel Makeover". The Atlantic. Archived from the original on June 27, 2016. Retrieved June 27, 2016.*
39. ^ *Heater, Brian (September 16, 2016). "Google Maps picks up mapping analytics and visualization startup Urban Engines". TechCrunch. Archived from the original on September 17, 2016. Retrieved September 16, 2016.*
40. ^ *Badalge, Keshia; Fairchild, Cullen (February 26, 2018). "One thing North Korea has that the South doesn't: Google Maps". Asia Times. Archived from the original on January 25, 2024. Retrieved March 4, 2021.*
41. ^ *Marquardt, Stafford (October 16, 2017). "Space out with planets in Google Maps". Blog.Google. Archived from the original on October 16, 2017. Retrieved October 17, 2017.*
42. ^ *Lardinois, Frederic (October 16, 2017). "Google Maps now lets you explore your local planets and moons". TechCrunch. Archived from the original on October 16, 2017. Retrieved October 17, 2017.*
43. ^ *Protalinski, Emil (May 2, 2018). "Google Maps Platform arrives with pay-as-you-go billing, free support, and Cloud requirement starting June 11". VentureBeat. Archived from the original on December 4, 2018. Retrieved April 3, 2019.*
44. ^ *Singh, Ishveena (May 3, 2018). "Developers up in arms over Google Maps API 'insane' price hike". Geoawesomeness. Archived from the original on August 8, 2020. Retrieved August 7, 2020.*
45. ^ *"Google Maps now depicts the Earth as a globe". The Verge. Archived from the original on November 11, 2020. Retrieved August 6, 2018.*
46. ^ *"Speed trap warnings begin rolling out to some Google Maps users". Android Central. January 16, 2019. Archived from the original on October 22, 2020. Retrieved January 16, 2019.*
47. ^ *"Google Maps shows you how fast you're driving. Here's how". CNET. June 9, 2019. Archived from the original on November 23, 2020. Retrieved June 10, 2019.*
48. ^ *"New ways to report driving incidents on Google Maps". Google. October 17, 2019. Archived from the original on October 22, 2020. Retrieved April 20, 2020.*

49. ^ "Updates to Incognito mode and your Timeline in Maps". Google. December 9, 2019. Archived from the original on January 24, 2021. Retrieved April 20, 2020.
50. ^ "Google Maps is turning 15! Celebrate with a new look and features". Google. February 6, 2020. Archived from the original on January 10, 2021. Retrieved April 20, 2020.
51. ^ "Navigate safely with new COVID data in Google Maps". Google. September 23, 2020. Archived from the original on December 3, 2020. Retrieved September 23, 2020.
52. ^ Valinsky, Jordan (January 25, 2021). "Google Maps will soon display Covid-19 vaccination sites". CNN. Archived from the original on January 25, 2021. Retrieved January 25, 2021.
53. ^ Bogdan, Popa (January 28, 2021). "Google Releases Big Google Maps Update for a Next-Generation Driving Experience". autoevolution. Archived from the original on January 28, 2021. Retrieved January 28, 2021.
54. ^ "How to use Google Maps to see air quality?". MARCA. June 13, 2022. Archived from the original on June 16, 2022. Retrieved June 16, 2022.
55. ^ Schoon, Ben (October 26, 2022). "Google Maps has removed its COVID-19 layer". 9to5Google. Archived from the original on April 10, 2023. Retrieved April 10, 2023.
56. ^ Luckerson, Victor (February 9, 2015). "10 Google Maps Tricks You Need to Know". Time. Archived from the original on February 9, 2015. Retrieved December 7, 2017.
57. ^ "Get directions and show routes". Google Maps Help. Google Inc. Archived from the original on July 2, 2016. Retrieved December 7, 2017.
58. ^ Brown, Jessica (September 26, 2017). "Google Maps must improve if it wants cyclists to use it". The Guardian. Archived from the original on December 21, 2020. Retrieved July 12, 2018.
59. ^ "The Case for Unshackling Transit Data". CityLab. Archived from the original on January 20, 2021. Retrieved July 12, 2018.
60. ^ "Google Maps may soon get a dark mode and ability to star transit lines". xda-developers. October 10, 2019. Archived from the original on October 20, 2020. Retrieved October 11, 2019.
61. ^ "Google Maps rolls out end-to-end directions for bikeshare users". TechCrunch. July 20, 2020. Archived from the original on January 26, 2021. Retrieved July 24, 2020.
62. ^ Li, Abner (February 27, 2024). "Google Maps adds 'Glanceable directions while navigating' setting". 9to5Google. Archived from the original on March 3, 2024. Retrieved May 2, 2024.
63. ^ Weatherbed, Jess (February 28, 2024). "Google Maps is finally rolling out glanceable directions". The Verge. Archived from the original on May 2, 2024. Retrieved May 2, 2024.
64. ^ Wang, David (February 28, 2007). "Stuck in traffic?". Archived from the original on February 12, 2017. Retrieved February 13, 2014.
65. ^ "Real time traffic information with Google Maps". CrackBerry. March 22, 2007. Archived from the original on July 5, 2014. Retrieved June 23, 2014.
66. ^ Matthews, Susan E. (July 3, 2013). "How Google Tracks Traffic". The Connectivist. Archived from the original on February 22, 2014.
67. ^ Barth, Dave (August 25, 2009). "The Bright Side of Sitting in Traffic: Crowdsourcing Road Congestion Data". Official Google Blog. Archived from the original on February 4, 2018. Retrieved April 3, 2019.
68. ^ Matthews, Susan E. (July 3, 2013). "How Google Tracks Traffic". The Connectivist. Archived from the original on February 22, 2014. Retrieved February 13, 2014.

69. ^ "Help Google Maps find my location". Google Inc. Archived from the original on October 24, 2020. Retrieved December 8, 2016.
70. ^ "The Google 'ick' factor". July 15, 2007. Archived from the original on August 17, 2009. Retrieved July 9, 2009.
71. ^ Poulsen, Kevin (July 15, 2007). "Want Off Street View?". Wired. Archived from the original on June 18, 2007.
72. ^ Petronzio i, Matt (August 22, 2012). "11 Fascinating Facts About Google Maps". Mashable. Archived from the original on April 10, 2015. Retrieved April 3, 2015. "Google employs automatic face and license plate blurring technology to protect people's privacy in Street View, and users can even request additional blurring. Aerial imagery provides much less detail and resolution."
73. ^ "Google begins blurring faces in Street View". May 13, 2008. Archived from the original on June 26, 2011. Retrieved June 11, 2020.
74. ^ "How Google Street View Became An Art Form". Fast Company. May 25, 2017. Archived from the original on November 25, 2020. Retrieved July 12, 2018.
75. ^ "Google Launches Underwater Street View". November 16, 2014. Archived from the original on November 29, 2014.
76. ^ "Explore the world with tour guide and 3D imagery in Google Earth 7". Google LatLong Blog. Archived from the original on January 28, 2016. Retrieved July 24, 2016.
77. ^ "Google Earth adds new 3D imagery in 21 cities to its 11,000 guided tours of our planet". November 2012. Archived from the original on February 21, 2019. Retrieved July 24, 2016.
78. ^ "Immersive view coming soon to Maps — plus more updates". May 11, 2022. Archived from the original on May 13, 2022. Retrieved May 13, 2022.
79. ^ "4 new updates that make Maps look and feel more like the real world". Google. September 28, 2022. Archived from the original on December 27, 2023. Retrieved December 27, 2023.
80. ^ "New ways Maps is getting more immersive and sustainable". Google. February 8, 2023. Archived from the original on December 27, 2023. Retrieved December 27, 2023.
81. ^ "New ways AI is making Maps more immersive". Google. May 10, 2023. Archived from the original on December 27, 2023. Retrieved December 27, 2023.
82. ^ "New Maps updates: Immersive View for routes and other AI features". Google. October 26, 2023. Archived from the original on December 18, 2023. Retrieved December 27, 2023.
83. ^ "Google Maps Adds Apple-Style Landmark Icons".[permanent dead link]
84. ^ Wilson, Randy (December 8, 2009). "Google LatLong: Changing your perspective". Google-latlong.blogspot.com. Archived from the original on October 17, 2010. Retrieved September 18, 2010.
85. ^ Schroeder, Stan (February 12, 2010). "Google Maps Get Labs With 9 Cool New Features". Mashable. Archived from the original on February 16, 2017. Retrieved April 3, 2019.
86. ^ Axon, Samuel (July 11, 2010). "Google Maps Adds 45° Aerial Imagery For All Users". Mashable. Archived from the original on December 17, 2017. Retrieved April 3, 2019.
87. ^ "How to check weather & air quality details on Google Maps". The Indian Express. February 7, 2024. Archived from the original on February 8, 2024. Retrieved February 9, 2024.
88. ^ Li, Abner (November 17, 2022). "Google Maps getting Live View AR search in these cities as Lens adds 'near me' food lookup". 9to5Google. Archived from the original on March 30, 2023. Retrieved January 14, 2024.

89. ^ "New Maps updates: Lens in Maps and other AI features". Google. October 26, 2023. Archived from the original on January 14, 2024. Retrieved January 14, 2024.
90. ^ "Use Live View on Google Maps - Android - Google Maps Help". support.google.com. Archived from the original on January 14, 2024. Retrieved January 14, 2024.
91. ^ "The Google Local map results have "merged" our listing with another in the same building – Maps Help". April 22, 2009. Archived from the original on January 2, 2021. Retrieved January 13, 2010.
92. ^ "Google Maps Merging Mania Due to Algo-Change". April 29, 2009. Archived from the original on May 3, 2009.
93. ^ Madrigal, Matt (November 4, 2021). "Connect with local holiday shoppers". Google Ads & Commerce Blog. Google. Archived from the original on January 3, 2018. Retrieved November 4, 2021.
94. ^ "How to Put Your Business on Google Maps". Spark SEO. June 8, 2020. Archived from the original on October 22, 2020. Retrieved June 23, 2020.
95. ^ Steele, Adam (April 12, 2020). "How To Contact Google My Business Support Online & By Phone". Loganix. Archived from the original on October 20, 2020. Retrieved June 23, 2020.
96. ^ Helft, Miguel (November 17, 2009). "Online Maps: Everyman Offers New Directions". New York Times. Archived from the original on March 12, 2017. Retrieved April 27, 2017.
97. ^ "Changes to Google Business Profile chat - Google Business Profile Help". support.google.com. Archived from the original on May 29, 2024. Retrieved May 29, 2024.
98. ^ Revell, Timothy (April 7, 2017). "Thousands of fake companies added to Google Maps every month". New Scientist. Archived from the original on April 16, 2017. Retrieved April 15, 2017.
99. ^ Widewail. "Improve Local SEO With Google Reviews | Widewail". www.widewail.com. Archived from the original on October 30, 2023. Retrieved October 24, 2023.
100. ^ "Inside Google's Fascinating Stash of 10,000 Indoor Maps". WIRED. Archived from the original on November 12, 2020. Retrieved July 12, 2018.
101. ^ Marshall, Matt (April 5, 2007). "Google releases My Maps". VentureBeat. Archived from the original on April 4, 2019. Retrieved April 4, 2019.
102. ^ Lardinois, Frederic (March 27, 2013). "Google Launches Maps Engine Lite, Makes It Easy To Create Advanced Custom Maps". TechCrunch. Archived from the original on April 4, 2019 . Retrieved April 4, 2019.
103. ^ Pratap, Ketan (September 17, 2014). "Google Rebrands Maps Engine to 'My Maps', Adds Improved Search and More". NDTV Gadgets 360. Archived from the original on April 4, 2019. Retrieved April 4, 2019.
104. ^ "Deprecation of My Maps for Android - My Maps Help". support.google.com. Archived from the original on August 3, 2022. Retrieved August 3, 2022.
105. ^ "Local Guides". Google. Archived from the original on April 8, 2023. Retrieved August 3, 2023.
106. ^ "Google Map Maker has closed". Google Map Maker help. Archived from the original on June 19, 2016. Retrieved August 3, 2018.
107. ^ "Google Testing Video Reviews in Maps". NDTV Gadgets360.com. Archived from the original on October 24, 2020. Retrieved June 20, 2018.
108. ^ "Google calls on Local Guides to add wheelchair info to Maps". SlashGear. September 7, 2017. Archived from the original on October 26, 2020. Retrieved July 12, 2018.

109. ^ Southern, Matt G. (May 13, 2022). "Google Local Guides Program: How To Earn Points & Badges". Search Engine Journal. Archived from the original on January 21, 2023. Retrieved January 21, 2023.
110. ^ "Local Guides". maps.google.com. Archived from the original on February 7, 2019. Retrieved January 21, 2023.
111. ^ **a b** "Points, levels, and badging - Local Guides Help". support.google.com. Archived from the original on January 21, 2023. Retrieved January 21, 2023.
112. ^ "Google Earth's new time travel feature is a gigantic bummer". Trusted Reviews. April 15, 2021. Archived from the original on April 16, 2021. Retrieved April 16, 2021.
113. ^ Antonelli, William (November 26, 2021). "How to check your Google Maps timeline and see every place you've traveled". Business Insider. Archived from the original on July 3, 2023. Retrieved June 20, 2024.
114. ^ "Update Google Maps to use Timeline on your device - Computer - Google Maps Help". support.google.com. Archived from the original on June 15, 2024. Retrieved June 15, 2024.
115. ^ "Google Maps gets rid of another feature on Web". Yahoo Tech. June 5, 2024. Archived from the original on June 15, 2024. Retrieved June 15, 2024.
116. ^ Gautham, A. S. "Google Revises Their Map, Adds Offline Version and 3D Imaging". TechGau.org. Archived from the original on June 13, 2012. Retrieved June 9, 2012.
117. ^ Arthur, Charles (March 20, 2009). "Where the streets all have Google's name". The Guardian. Archived from the original on March 5, 2017. Retrieved April 27, 2017.
118. ^ McClendon, Brian (October 13, 2011). "Step inside the map with Google MapsGL". Official Google Blog. Archived from the original on April 10, 2012. Retrieved April 25, 2012.
119. ^ "Use indoor maps to view floor plans – Computer". Google Maps Help. Archived from the original on February 27, 2017.
120. ^ "Google Maps/Google Earth Additional Terms of Service". Google Maps. Archived from the original on February 8, 2010. Retrieved January 13, 2010.
121. ^ "Google Terms of Service". Google. Archived from the original on January 25, 2012. Retrieved January 13, 2010.
122. ^ "Legal Notices for Google Maps/Google Earth and Google Maps/Google Earth APIs". Google. Archived from the original on January 19, 2021. Retrieved October 3, 2019.
123. ^ **a b** Lee, Mark (July 5, 2012). "Apple Shares Google China Map Partner in Win for Autonavi". Bloomberg News. Archived from the original on October 18, 2014.
124. ^ "Improve information in Google Maps for the world to see". Google Maps. Archived from the original on December 12, 2007.
125. ^ Balakrishnan, Ramesh (March 18, 2008). "Google LatLong: It's your world. Map it". Google-latlong.blogspot.com. Archived from the original on December 30, 2009. Retrieved January 13, 2010.
126. ^ Johnson, Jenna (July 22, 2007). "Google's View of D.C. Melds New and Sharp, Old and Fuzzy". The Washington Post. Archived from the original on February 13, 2011. Retrieved May 3, 2010.
127. ^ "Google Maps Platform Documentation". Google for Developers. Archived from the original on January 28, 2021. Retrieved June 23, 2020.
128. ^ Taylor, Bret (June 29, 2005). "The world is your JavaScript-enabled oyster". Official Google Blog. Archived from the original on September 30, 2009.

129. ^ "User Guide | Google Maps Platform". Google Cloud. Archived from the original on November 12, 2020. Retrieved July 10, 2018.
130. ^ "Google Maps API – Terms of use". Google. Archived from the original on December 24, 2013.
131. ^ Rose, Ian (February 12, 2014). "PHP and MySQL: Working with Google Maps". Syntaxxx. Archived from the original on October 18, 2014. Retrieved October 13, 2014.
132. ^ Hoetmer, Ken (May 15, 2013). "A fresh new look for the Maps API, for all one million sites". Google Maps Platform. Archived from the original on November 28, 2013.
133. ^ "APIs Dashboard". ProgrammableWeb. Archived from the original on April 30, 2016. Retrieved May 4, 2016.
134. ^ Eustace, Alan (September 2, 2011). "A fall spring-clean". Official Google Blog. Archived from the original on September 7, 2011. Retrieved September 2, 2011.
135. ^ "Google Maps API FAQ". Google for Developers. Archived from the original on January 16, 2014.
136. ^ "Google Maps API FAQ Usage Limits". Google for Developers. Archived from the original on January 16, 2014.
137. ^ "Google Maps for Business". Google. Archived from the original on December 24, 2013.
138. ^ "Introducing Google Maps Platform". Google. May 2, 2018. Archived from the original on September 14, 2022. Retrieved September 14, 2022.
139. ^ Monument to the People's Heroes. "Google China street map uses GCJ-02 coordinates". Archived from the original on May 25, 2017. Retrieved April 8, 2015.
140. ^ Monument to the People's Heroes. "Google China satellite imagery uses GCJ-02 coordinates". Archived from the original on May 25, 2017. Retrieved April 8, 2015.
141. ^ Monument to the People's Heroes. "Google.com satellite imagery uses WGS-84 coordinates". Archived from the original on November 18, 2015. Retrieved April 8, 2015.
142. ^ "Where We've Been & Where We're Headed Next". Archived from the original on September 28, 2017. Retrieved January 2, 2018.
143. ^ **a b** Martin, Brittany (September 12, 2018). "Why Is Google Maps Using a 19th Century Name for an L.A. Neighborhood?". Los Angeles. Archived from the original on January 26, 2023. Retrieved January 26, 2023.
144. ^ "Google Maps' Phantom Neighborhoods Are Confusing Southern Californians. Help Us Keep Track Of Them". September 12, 2018. Archived from the original on January 26, 2023. Retrieved January 26, 2023.
145. ^ **a b c d** Nicas, Jack (August 2, 2018). "As Google Maps Renames Neighborhoods, Residents Fume". The New York Times. Archived from the original on January 31, 2023. Retrieved January 24, 2023.
146. ^ "Blurred Out: 51 Things You Aren't Allowed to See on Google Maps". Archived from the original on July 21, 2009.
147. ^ "Google Maps: The White House — Elliott C. Back". Elliottback.com. Archived from the original on December 1, 2008. Retrieved August 27, 2010.
148. ^ Barlow, Karen (August 8, 2005). "Google Earth prompts security fears". ABC News Online. Archived from the original on June 16, 2009. Retrieved November 4, 2013.
149. ^ Sutter, John D. (November 5, 2010). "Google Maps border becomes part of international dispute". CNN. Archived from the original on May 8, 2012. Retrieved April 25, 2012.

150. ^ Ball, James (January 28, 2014). "Angry Birds and 'leaky' phone apps targeted by NSA and GCHQ for user data". The Guardian. Archived from the original on March 2, 2014. Retrieved March 3, 2014.
151. ^ Gibbs, Samuel. Google says sorry over racist Google Maps White House search results Archived April 14, 2022, at the Wayback Machine. The Guardian. Retrieved on 15 April 2022
152. ^ Fung, Brian (December 6, 2021). "If you search Google Maps for the N-word, it gives you the White House". Washington Post. ISSN 0190-8286. Archived from the original on April 23, 2022. Retrieved September 22, 2023.
153. ^ "ÃƒÂ£Ã¢â‚¬Å¡Ã‚Â°ÃƒÂ£Ã†â€™Ã‚Â¼ÃƒÂ£Ã¢â‚¬Å¡Ã‚Â°ÃƒÂ£Ã†â€™Ã‚Â«ÃƒÂ£Ã†â€™Ã…Â¾ÃƒÂ£
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. Asahi Shimbun. March 2, 2024. Archived from the original on December 1, 2015. Retrieved March 2, 2024.
154. ^ "ÃƒÂ£Ã¢â‚¬Å¡Ã‚Â°ÃƒÂ£Ã†â€™Ã‚Â¼ÃƒÂ£Ã¢â‚¬Å¡Ã‚Â°ÃƒÂ£Ã†â€™Ã‚Â«ÃƒÂ£Ã†â€™Ã…Â¾ÃƒÂ£
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. FNN Prime Online. December 1, 2015. Archived from the original on December 4, 2015. Retrieved March 2, 2024.
155. ^ "Google Maps Hacks". Simon Weckert. Archived from the original on August 6, 2024. Retrieved July 31, 2024.
156. ^ "An Artist Used 99 Phones to Fake a Google Maps Traffic Jam". Wired. ISSN 1059-1028. Archived from the original on January 17, 2021. Retrieved February 4, 2020.
157. ^ Liu, Oscar (September 19, 2024). "Hong Kong officials concerned over pranksters renaming schools on Google Maps". South China Morning Post. Archived from the original on November 22, 2024. Retrieved November 18, 2024.
158. ^ Thomson, Jono (September 23, 2024). "Google says spoofed Taiwan school names being fixed". Taiwan News. Archived from the original on November 29, 2024. Retrieved November 18, 2024.
159. ^ ÃƒÂ¨Ã‚Â•Ã‚Â¯ÃƒÂ¥Ã‚Â•Ã‹â€ ÃƒÂ¦Ã¢â‚¬â€œÃ‚Â°ÃƒÂ¨Ã‚Â•Ã…Â¾ÃƒÂ§Ã‚Â¶Ã‚Â². "GoogleÃƒÂ¥Ã…â€œÃ‚Â°ÃƒÂ¥Ã…â€œÃ¢â‚¬â€œÃƒÂ¦Ã¢â‚¬Â•Ã‚Â¹ÃƒÂ¦Ã‚Â Ã‚Â¡ÃƒÂ¥Ã‚Â•Ã‚Â•ÃƒÂ
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Ã‚Â¸ÃƒÂ§Ã¢â‚¬Â•Ã…Â¸ÃƒÂ¦Ã†â€™Ã‚Â¡ÃƒÂ¦Ã‚Â•Ã…Â¾ÃƒÂ¥Ã‚ÂÃ‚Â¸ÃƒÂ¦Ã‚Â Ã‚Â¡".
ÃƒÂ¨Ã‚Â•Ã‚Â¯ÃƒÂ¥Ã‚Â•Ã‹â€ ÃƒÂ¦Ã¢â‚¬â€œÃ‚Â°ÃƒÂ¨Ã‚Â•Ã…Â¾ÃƒÂ§Ã‚Â¶Ã‚Â² (in Chinese). Archived from the original on December 31, 2024. Retrieved November 18, 2024.
160. ^ **a** **b** Allison, Charmayne; Robinson, Lee; Goetze, Eliza (August 15, 2023). "A student nurse was left stranded in the desert with just an esky of beers after Google Maps led her astray". ABC News Australia. Archived from the original on September 22, 2023. Retrieved September 22, 2023.
161. ^ **a** **b** **c** "Google sued after man drove off collapsed bridge following map directions". Al Jazeera. September 21, 2023. Archived from the original on January 25, 2024. Retrieved September 22, 2023.

162. ^ **a b** Meacham, Savannah (February 21, 2024). "'I wouldn't want to live this again': Tourists lost for a week after Google Maps mishap". The Sydney Morning Herald. Australian Associated Press. Archived from the original on February 27, 2024. Retrieved February 29, 2024.
163. ^ Lagan, Bernard (February 29, 2024). "Google Maps stranded us with crocodiles and snakes in the outback". The Times. ISSN 0140-0460. Archived from the original on February 23, 2024. Retrieved February 29, 2024.
164. ^ **a b** Lou, Michelle (June 26, 2019). "Nearly 100 drivers followed a Google Maps detour – and ended up stuck in an empty field". CNN. Archived from the original on December 13, 2023. Retrieved February 29, 2024.
165. ^ Brodkin, Jon (September 21, 2023). "Google sued over fatal Google Maps error after man drove off broken bridge". Ars Technica. Archived from the original on September 22, 2023. Retrieved September 22, 2023.
166. ^ Lynch, Jamiel (September 21, 2023). "Family sues Google alleging its Maps app led father to drive off collapsed bridge to his death, attorneys say". CNN. Archived from the original on January 25, 2024. Retrieved September 22, 2023.
167. ^ Ritter, Moira (September 20, 2023). "Dad of 2 died after driving off collapsed bridge, family says. Now, Google being sued". The Charlotte Observer. Archived from the original on January 18, 2024. Retrieved January 25, 2024.
168. ^ Matza, Max (September 21, 2023). "Google accused of directing motorist to drive off collapsed bridge". BBC News. Archived from the original on January 20, 2024. Retrieved January 25, 2024.
169. ^ Roy, Adam (November 8, 2023). "A Hiker Is Lucky to Be Alive After Following a Fake Trail on Google Maps". Backpacker. Archived from the original on November 10, 2023. Retrieved November 12, 2023.
170. ^ Holpuch, Amanda (November 12, 2023). "Hikers Rescued After Following Nonexistent Trail on Google Maps". The New York Times. Archived from the original on January 10, 2024. Retrieved February 29, 2024.
171. ^ **a b** Wilson, Madeline (November 29, 2023). "Google Maps Is Sorry for Sending L.A.-Bound Drivers on Nightmare Desert Detour". Los Angeles. Archived from the original on December 15, 2023. Retrieved November 29, 2023.
172. ^ Wu, Daniel (November 28, 2023). "Google apologizes after map led drivers down dirt path into the desert". The Washington Post. Archived from the original on November 29, 2023. Retrieved November 29, 2023.
173. ^ Stewart, Will (December 11, 2020). "Man frozen to death after Google Maps wrong turn". news.com.au. Archived from the original on July 8, 2021. Retrieved March 2, 2024.
174. ^ "Google Maps leads three men to death as car plunges from incomplete bridge into river in Bareilly, UP". The Economic Times. November 25, 2024. ISSN 0013-0389. Archived from the original on November 25, 2024. Retrieved November 25, 2024.
175. ^ "UP News: Google Map Route Leads To Death Of 3, Car Falls Into Ramganga River in Bareilly". English Jagran. November 24, 2024. Archived from the original on November 24, 2024. Retrieved November 25, 2024.
176. ^ Hauari, Gabe (January 31, 2025). "Mexico's president asks Google not to rename Gulf of Mexico". USA TODAY. Retrieved February 13, 2025.

177. ^ McMahon, Liv (February 13, 2025). "Google Maps blocks Gulf of America reviews after rename criticism". BBC News. Archived from the original on February 15, 2025. Retrieved February 21, 2025.
178. ^ Dellinger, A. J. (February 13, 2025). "Google Maps Won't Let You Leave Negative Reviews on the Gulf of America". Gizmodo. Archived from the original on February 15, 2025. Retrieved February 21, 2025.
179. ^ "See where your friends are with Google Latitude". February 4, 2009. Archived from the original on December 30, 2009.
180. ^ "Privacy fears over Google tracker". BBC News. February 5, 2009. Archived from the original on February 17, 2009. Retrieved February 16, 2009.
181. ^ Rodriguez, Salvador (July 11, 2013). "Google Latitude joins long list of products axed by the Web giant". Los Angeles Times. Archived from the original on October 16, 2021. Retrieved March 7, 2024.
182. ^ "Google Maps will let you share your location with friends and family for a specific period of time". techcrunch.com. March 22, 2017. Archived from the original on March 22, 2017. Retrieved March 22, 2017.
183. ^ "Fix an error on Google Maps". Google Inc. Archived from the original on October 22, 2020. Retrieved August 11, 2011.
184. ^ "Tele Atlas Map Insight map feedback". Tele Atlas. Archived from the original on January 12, 2021. Retrieved August 11, 2011.
185. ^ "Google contact request form". Archived from the original on July 4, 2014. Retrieved October 4, 2014.
186. ^ "Google Map Maker graduates to Google Maps". Google Map Maker forum. November 8, 2016. Archived from the original on December 3, 2018. Retrieved April 16, 2017.
187. ^ **a** **b** "Google Maps". Google Play. Retrieved March 10, 2025.
188. ^ "Google Maps 25.10.04.732665141". APKMirror. March 7, 2025. Retrieved March 10, 2025 .
189. ^ "Google Maps (Wear OS) 25.09.00.730474011.W". APKMirror. February 21, 2025. Retrieved March 10, 2025.
190. ^ "Google Maps". App Store. Retrieved March 10, 2025.
191. ^ "Google Maps Go". Google Play. Retrieved March 10, 2025.
192. ^ "Google Maps Go 161.1". APKMirror. October 13, 2023. Retrieved March 10, 2025.
193. ^ "Google Maps 11.143.0303 beta". APKMirror. August 20, 2024. Retrieved August 24, 2024.
194. ^ Team, PhoneArena (November 10, 2005). "Google local for Mobile announced". PhoneArena. Archived from the original on October 5, 2023. Retrieved October 4, 2023.
195. ^ Gohring, Nancy (November 7, 2005). "Google launches downloadable mobile application". Computerworld. Archived from the original on October 5, 2023. Retrieved October 4, 2023.
196. ^ "Google Local for Mobile". All About Symbian. February 16, 2006. Archived from the original on June 19, 2023. Retrieved October 4, 2023.
197. ^ "Google Maps". October 16, 2006. Archived from the original on October 16, 2006. Retrieved October 4, 2023.
198. ^ Welch, Chris (September 29, 2012). "Steve Jobs added Google Maps to the original iPhone just weeks before unveiling". The Verge. Archived from the original on October 30, 2023. Retrieved October 24, 2023.

199. ^ "Google Maps for now available on Windows Mobile devices". Engadget. July 19, 2019. Archived from the original on October 30, 2023. Retrieved October 24, 2023.
200. ^ "New native S60 Google Maps for Mobile with GPS support". All About Symbian. October 12, 2007. Archived from the original on October 30, 2023. Retrieved October 24, 2023.
201. ^ "Google Announces Launch of Google Maps for Mobile With "My Location" Technology". News from Google. November 28, 2007. Archived from the original on April 26, 2017. Retrieved April 25, 2017.
202. ^ Marshall, Matt (November 28, 2007). "Google releases useful "my location" feature for cellphones". VentureBeat. Archived from the original on April 25, 2017. Retrieved April 25, 2017.
203. ^ Schonfeld, Erick (November 28, 2007). "Google Mobile Maps PinPoints Your Location Without GPS". TechCrunch. AOL. Archived from the original on April 26, 2017. Retrieved April 25, 2017.
204. ^ Vanlerberghe, Mac (September 23, 2008). "Google on Android". Google Mobile Blog. Archived from the original on December 7, 2017. Retrieved April 30, 2017.
205. ^ Tseng, Erick (September 23, 2008). "The first Android-powered phone". Official Google Blog. Archived from the original on December 7, 2017. Retrieved April 30, 2017.
206. ^ Gates, Sara (June 11, 2012). "Apple Maps App Officially Debuts, Google Maps Dropped (PHOTOS)". HuffPost. AOL. Archived from the original on August 7, 2020. Retrieved April 30, 2017.
207. ^ Chen, Brian X.; Wingfield, Nick (September 19, 2012). "Apple's iPhone Update Leaves Out Google's Maps". The New York Times. Archived from the original on December 11, 2020. Retrieved April 30, 2017.
208. ^ "New Apple maps app under fire from users". BBC. September 20, 2012. Archived from the original on December 4, 2016. Retrieved April 30, 2017.
209. ^ Patel, Nilay (September 20, 2012). "Wrong turn: Apple's buggy iOS 6 maps lead to widespread complaints". The Verge. Vox Media. Archived from the original on December 10, 2016. Retrieved April 30, 2017.
210. ^ Arthur, Charles (September 20, 2012). "Apple's self-inflicted maps issue is a headache – but don't expect an apology". The Guardian. Archived from the original on November 11, 2020. Retrieved April 30, 2017.
211. ^ Olanoff, Drew (December 12, 2012). "Google Launches Native Maps For iOS, And Here's The Deep Dive On Navigation, Info Sheets And More". TechCrunch. AOL. Archived from the original on November 12, 2020. Retrieved April 30, 2017.
212. ^ Bohn, Dieter (December 12, 2012). "Google Maps for iPhone is here: how data and design beat Apple". The Verge. Vox Media. Archived from the original on November 11, 2020. Retrieved April 30, 2017.
213. ^ Keizer, Gregg (December 18, 2012). "Google Maps snares 10M downloads on iOS App Store". Computerworld. International Data Group. Archived from the original on October 22, 2020. Retrieved April 30, 2017.
214. ^ Musil, Steven (December 12, 2012). "Google Maps returns to iOS as an app after Apple's removal". CNET. CBS Interactive. Archived from the original on November 12, 2020. Retrieved April 30, 2017.
215. ^ **a** **b** Rodriguez, Salvador (December 13, 2012). "Google Maps returns to iPhone; iPad app coming soon". Los Angeles Times. Archived from the original on June 29, 2017. Retrieved

April 30, 2017.
216. ^ Arrington, Michael (October 28, 2009). "Google Redefines GPS Navigation Landscape: Google Maps Navigation For Android 2.0". TechCrunch. AOL. Archived from the original on October 22, 2020. Retrieved April 30, 2017.
217. ^ Schroeder, Stan (October 28, 2009). "Google Maps Navigation Becomes Reality on Android". Mashable. Archived from the original on November 9, 2020. Retrieved April 30, 2017.
218. ^ Fingas, Jon (July 16, 2013). "Google Maps 2.0 for iOS starts rolling out with iPad support, indoor maps (update: offline maps too)". Engadget. AOL. Archived from the original on October 23, 2020. Retrieved April 30, 2017.
219. ^ Ingraham, Nathan (June 27, 2012). "Google Maps for Android now supports saving maps for offline use". The Verge. Vox Media. Archived from the original on November 11, 2020. Retrieved April 30, 2017.
220. ^ Lawler, Richard (June 27, 2012). "Google Maps offline for Android is available today in version 6.9, also Compass Mode for Street View". Engadget. AOL. Archived from the original on November 12, 2020. Retrieved April 30, 2017.
221. ^ Kastrenakes, Jacob (May 6, 2014). "Google Maps for iOS and Android add offline support, lane guidance, and Uber integration". The Verge. Vox Media. Archived from the original on November 11, 2020. Retrieved April 30, 2017.
222. ^ Siegal, Jacob (May 6, 2014). "Google Maps just got a huge update – here are the 5 best new features". BGR. Penske Media Corporation. Archived from the original on November 8, 2020. Retrieved April 30, 2017.
223. ^ Pierson, David (November 11, 2015). "Google Maps Now Available Offline". Government Technology. Los Angeles Times. Archived from the original on October 30, 2020. Retrieved November 19, 2016.
224. ^ "Download areas and navigate offline – iPhone & iPad". Google Maps Help. Archived from the original on December 19, 2020. Retrieved November 19, 2016.
225. ^ Bolton, Doug (January 25, 2016). "How to use Google Maps on your smartphone when you don't have a connection". The Independent. Archived from the original on October 22, 2020. Retrieved June 29, 2018.
226. ^ McCourt, David (May 30, 2019). "How to use Google Maps offline". AndroidPIT. Archived from the original on October 23, 2020. Retrieved November 19, 2016.
227. ^ Welch, Chris (January 26, 2017). "Google Maps now tells you how hard it is to park in some cities". The Verge. Vox Media. Archived from the original on November 12, 2020. Retrieved December 7, 2017.
228. ^ Haselton, Todd (April 26, 2017). "How to use a new Google Maps feature to help you find your parked car". CNBC. NBCUniversal News Group. Archived from the original on November 11, 2020. Retrieved December 7, 2017.
229. ^ Sawers, Paul (April 26, 2017). "Google Maps now makes it easier to remember where you parked your car". VentureBeat. Archived from the original on November 11, 2020. Retrieved December 7, 2017.
230. ^ Gartenberg, Chaim (August 29, 2017). "Google Maps will now help you find parking". The Verge. Vox Media. Archived from the original on November 11, 2020. Retrieved December 7, 2017.

231. ^ Ghoshal, Abhimanyu (December 5, 2017). "Google Maps' new two-wheeler mode shows faster routes for beating traffic on your bike". The Next Web. Archived from the original on December 7, 2020. Retrieved December 7, 2017.
232. ^ Jonnalagadda, Harish (December 5, 2017). "Google Maps gets a dedicated two-wheeler mode in India". Android Central. Mobile Nations. Archived from the original on December 7, 2017. Retrieved December 7, 2017.
233. ^ "Google Maps AR directions released". CNBC. February 21, 2020. Retrieved February 21, 2020.[dead link]
234. ^ Kastrenakes, Jacob (May 20, 2020). "Here are all the winners of the 2020 Webby Awards". The Verge. Archived from the original on May 21, 2020. Retrieved May 22, 2020.
235. ^ "Google Maps update will let you draw in missing roads". Trusted Reviews. March 11, 2021. Archived from the original on March 31, 2021. Retrieved March 30, 2021.
236. ^ Mehta, Ivan (June 14, 2022). "Google Maps will now show you info about toll pricing on your route". TechCrunch. Archived from the original on June 14, 2022. Retrieved June 14, 2022.
237. ^ "Baig: Google Maps app – welcome return of an old friend". USA Today. Gannett Company . December 13, 2012. Archived from the original on November 25, 2020. Retrieved April 30, 2017.
238. ^ Parker, Jason (November 6, 2014). "Google Maps for iOS review". CNET. CBS Interactive. Archived from the original on October 22, 2020. Retrieved April 30, 2017.
239. ^ Fowler, Bree (December 16, 2012). "App review: Google Maps on iOS is back with a bang" . FirstPost. Archived from the original on October 9, 2019. Retrieved April 30, 2017.
240. ^ Diaz, Jesus (December 13, 2012). "Google Maps for iOS Review: Maps Done Right". Gizmodo. Univision Communications. Archived from the original on October 24, 2020. Retrieved April 30, 2017.
241. ^ Pogue, David (December 12, 2012). "Maps App for iPhone Steers Right". The New York Times. Archived from the original on November 12, 2020. Retrieved April 30, 2017.
242. ^ Tweney, Dylan (August 17, 2014). "Yes, Google Maps is tracking you. Here's how to stop it". VentureBeat. Archived from the original on October 2, 2017. Retrieved April 30, 2017.
243. ^ Elliott, Matt (April 20, 2017). "Is Google is tracking you? Find out here". CNET. CBS Interactive. Archived from the original on April 29, 2017. Retrieved April 30, 2017.
244. ^ Kumparak, Greg (December 18, 2013). "Google's Location History Browser Is A Minute-By-Minute Map Of Your Life". TechCrunch. AOL. Archived from the original on May 11, 2017. Retrieved April 30, 2017.
245. ^ Mirani, Leo (April 3, 2014). "Google's sneaky new privacy change affects 85% of iPhone users—but most of them won't have noticed". Quartz. Atlantic Media. Archived from the original on August 10, 2017. Retrieved April 30, 2017.
246. ^ El Khoury, Rita (March 9, 2019). "Google Maps hits 5 billion downloads on the Play Store, does it after YouTube but before the Google app". Android Police. Archived from the original on October 8, 2019. Retrieved October 26, 2019.
247. ^ "Google Maps navigates its way to 10 billion installs". Android Police. November 4, 2021. Archived from the original on January 25, 2022. Retrieved January 25, 2022.
248. ^ El Khoury, Rita (January 17, 2018). "[Update: APK Download] Google Maps Go shows up on the Play Store for Go phones, but you can give it a try anyway". Android Police. Archived from the original on June 3, 2018. Retrieved October 26, 2019.

249. ^ *Hager, Ryne (September 26, 2018). "[Update: Maps Go too] Google Go hits 10 million installs on Play Store - an indicator of Android Go's success?". Android Police. Archived from the original on September 26, 2019. Retrieved October 26, 2019.*
250. ^ *Richterich, Annika (November 2011). "Cartographies of Digital Fiction: Amateurs Mapping a New Literary Realism". The Cartographic Journal. **48** (4): 237–249. Bibcode:2011CartJ..48..237R. doi:10.1179/1743277411Y.0000000021. ISSN 0008-7041. S2CID 131524536. Archived from the original on October 20, 2022. Retrieved October 16, 2022.*
251. ^ *"THE GOOGLE TRILOGY - E M I L I O V A V A R E L L A". April 18, 2013. Archived from the original on October 16, 2022. Retrieved October 16, 2022.*
252. ^ *group_inou (April 14, 2016). "EYE (music video)". YouTube. Archived from the original on October 16, 2022. Retrieved October 16, 2022.*
253. ^ *Arcade Fire; Milk, Chris (2011). "The Wilderness Downtown". The Wilderness Downtown. Archived from the original on October 16, 2022. Retrieved October 16, 2022.*
254. ^ *Arcade Fire (2011). "Video documentation of Wilderness Within video". YouTube. Archived from the original on October 16, 2022. Retrieved October 16, 2022.*

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- Map Maker
- Mapathon

link = Google Maps

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Views and mapping sites

- Earth
- Street View

Street View

Coverage

- Africa
- Antarctica
- Asia
  - Israel
- Europe
- North America
  - Canada
  - United States
- Oceania
- South America
  - Argentina
  - Chile
  - Colombia

- Privacy concerns
- Competing products

Other

- Historypin
- Google Maps pin
- *Google Maps Road Trip*
- Argleton

Links to related articles

- **v**
- **t**
- **e**

Google

a subsidiary of Alphabet

Company

Divisions

- AI
- *Area 120*
- ATAP
- *Brain*
- China
- Cloud Platform
- Energy
- Google.org
  - Crisis Response
- *Health*
- Registry

Subsidiaries

Active

- Security Operations
- DeepMind
- Fitbit
- ITA Software
- Jigsaw
- Looker
- Mandiant
- Owlchemy Labs

Defunct

- Actifio
- Adscape
- Akwan Information Technologies
- Anvato
- Apigee
- BandPage
- Bitium
- BufferBox
- Crashlytics
- Dodgeball
- DoubleClick
- Dropcam
- Endoxon
- Flutter
- Global IP Solutions
- Green Throttle Games
- GreenBorder
- Gridcentric
- ImageAmerica
- Impermium
- Invite Media
- Kaltix
- Marratech

Development

A–C

- Accelerated Linear Algebra
- AMP
- *Actions on Google*
- ALTS
- American Fuzzy Lop
- *Android Cloud to Device Messaging*
- Android Debug Bridge
- Android NDK
- Android Runtime
- Android SDK
- Android Studio
- Angular
- *AngularJS*
- Apache Beam
- APIs
- App Engine
- App Inventor
- *App Maker*
- App Runtime for Chrome
- *AppJet*
- Apps Script
- AppSheet
- ARCore
- *Base*
- Bazel
- BeyondCorp
- Bigtable
- BigQuery
- Bionic
- Blockly
- *Borg*
- *Caja*
- Cameyo
- Chart API
- Charts
- *Chrome Frame*
- Chromium
  - Blink
- Closure Tools
- *Cloud Connect*
- Cloud Dataflow
- Cloud Datastore
- *Cloud Messaging*
- Cloud Shell
- Cloud Storage

Software

A

- *Aardvark*
- Account
  - Dashboard
  - Takeout
- Ad Manager
- AdMob
- Ads
- AdSense
- *Affiliate Network*
- Alerts
- *Allo*
- Analytics
- Android Auto
- *Android Beam*
- *Answers*
- *Apture*
- Arts & Culture
- Assistant
- *Attribution*
- Authenticator

B

- *BebaPay*
- *BeatThatQuote.com*
- *Blog Search*
- Blogger
- *Body*
- *Bookmarks*
- Books
  - Ngram Viewer
- *Browser Sync*
- *Building Maker*
- *Bump*
- *BumpTop*
- *Buzz*

C

- Calendar
- Cast
- *Catalogs*
- Chat
- *Checkout*
- Chrome
- *Chrome Apps*
- Chrome Experiments
- Chrome Remote Desktop
- Chrome Web Store

	Hardware	
Pixel	**Smartphones**	○ Pixel (2016) ○ Pixel 2 (2017) ○ Pixel 3 (2018) ○ Pixel 3a (2019) ○ Pixel 4 (2019) ○ Pixel 4a (2020) ○ Pixel 5 (2020) ○ Pixel 5a (2021) ○ Pixel 6 (2021) ○ Pixel 6a (2022) ○ Pixel 7 (2022) ○ Pixel 7a (2023) ○ Pixel Fold (2023) ○ Pixel 8 (2023) ○ Pixel 8a (2024) ○ Pixel 9 (2024) ○ Pixel 9 Pro Fold (2024)
	Smartwatches	○ Pixel Watch (2022) ○ Pixel Watch 2 (2023) ○ Pixel Watch 3 (2024)
	Tablets	○ Pixel C (2015) ○ Pixel Slate (2018) ○ Pixel Tablet (2023)
	Laptops	○ Chromebook Pixel (2013–2015) ○ Pixelbook (2017) ○ Pixelbook Go (2019)
	Other	○ Pixel Buds (2017–present)
	Smartphones	○ Nexus One (2010) ○ Nexus S (2010) ○ Galaxy Nexus (2011) ○ Nexus 4 (2012) ○ Nexus 5 (2013) ○ Nexus 6 (2014) ○ Nexus 5X (2015) ○ Nexus 6P (2015)

- **v**
- **t**
- **e**

Litigation

Advertising	○ *Feldman v. Google, Inc.* (2007) ○ *Rescuecom Corp. v. Google Inc.* (2009) ○ *Goddard v. Google, Inc.* (2009) ○ *Rosetta Stone Ltd. v. Google, Inc.* (2012) ○ *Google, Inc. v. American Blind & Wallpaper Factory, Inc.* (2017) ○ Jedi Blue
Antitrust	○ European Union (2010–present) ○ *United States v. Adobe Systems, Inc., Apple Inc., Google Inc., Intel Corporation, Intuit, Inc., and Pixar* (2011) ○ *Umar Javeed, Sukarma Thapar, Aaqib Javeed vs. Google LLC and Ors.* (2019) ○ *United States v. Google LLC* (2020) ○ *United States v. Google LLC* (2023)
Intellectual property	○ *Perfect 10, Inc. v. Amazon.com, Inc.* (2007) ○ *Viacom International Inc. v. YouTube, Inc.* (2010) ○ *Lenz v. Universal Music Corp.*(2015) ○ *Authors Guild, Inc. v. Google, Inc.* (2015) ○ *Field v. Google, Inc.* (2016) ○ *Google LLC v. Oracle America, Inc.* (2021) ○ Smartphone patent wars
Privacy	○ *Rocky Mountain Bank v. Google, Inc.* (2009) ○ *Hibnick v. Google, Inc.* (2010) ○ *United States v. Google Inc.* (2012) ○ Judgement of the German Federal Court of Justice on Google's autocomplete function (2013) ○ *Joffe v. Google, Inc.* (2013) ○ *Mosley v SARL Google* (2013) ○ *Google Spain v AEPD and Mario Costeja González* (2014) ○ *Frank v. Gaos* (2019)
Other	○ *Garcia v. Google, Inc.* (2015) ○ *Google LLC v Defteros* (2020) ○ *Epic Games v. Google* (2021) ○ *Gonzalez v. Google LLC* (2022)

Related

Concepts

- Beauty YouTuber
- BookTube
- BreadTube
- "Don't be evil"
- Gayglers
- *Google* as a verb
- Google bombing
  - 2004 U.S. presidential election
- Google effect
- Googlefight
- Google hacking
- Googleshare
- Google tax
- Googlewhack
- Googlization
- Illegal flower tribute
- Objectives and key results
- Rooting
- Search engine manipulation effect
- Side project time
- Sitelink
- Site reliability engineering
- StudyTube
- VTuber
- YouTube Poop
- YouTuber
  - list

Android

- Booting process
- Custom distributions
- Features
- Recovery mode
- Software development

Street View coverage

- Africa
- Antarctica
- Asia
  - Israel
- Europe
- North America
  - Canada
  - United States
- Oceania
- South America

Italics denote discontinued products.

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- Image not found or type unknown Outline

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Alphabet Inc.

Subsidiaries

Current

- Access
  - Google Fiber
- Calico
- CapitalG
- Google
  - DeepMind
    - AlphaFold
    - AlphaGo
      - vs. Fan Hui
      - vs. Ke Jie
      - vs. Lee Sedol
        - film
      - Future of Go Summit
    - AlphaGo Zero
    - AlphaStar
    - AlphaZero
    - Master
    - MuZero
    - WaveNet
  - DoubleClick
  - Firebase
  - Fitbit
  - Tenor
  - Waze
  - YouTube
- GV
- Isomorphic Labs
- Verily
  - Baseline Study
- X Development
- Waymo
- Wing

Former

- Boston Dynamics
- Chronicle Security
- Jigsaw
- Loon
- Makani
- Meka Robotics
- Nest Labs
- Sidewalk Labs
  - Toronto
- Vicarious

Executives

Current

- Sundar Pichai (CEO)
- Ruth Porat (president and CIO)
- Anat Ashkenazi (CFO)

Former

- Larry Page (CEO)
- Sergey Brin (President)
- David Drummond (CLO)

People

Board of directors

Current

- Frances Arnold
- Sergey Brin
- R. Martin Chavez
- John Doerr
- John L. Hennessy
- Ann Mather
- Larry Page
- Sundar Pichai
- Ram Shriram
- Roger W. Ferguson Jr.

Former

- Diane Greene
- Alan Mulally
- Eric Schmidt

Others

- Andrew Conrad
- Tony Fadell
- Arthur D. Levinson
- David Krane
- Astro Teller

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- Image not found or type unknown Internet portal

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Android

- Android Go
  - Comparison of products

Software development

Development tools

Official

- Android Runtime (ART)
- Software development kit (SDK)
  - Android Debug Bridge (ADB)
  - Fastboot
  - Android App Bundle
  - Android application package (APK)
- Bionic
- Dalvik
- Firebase
  - Google Cloud Messaging (GCM)
  - Firebase Cloud Messaging (FCM)
- Google Mobile Services (GMS)
- Native development kit (NDK)
- Open accessory development kit (OADK)
- RenderScript
- Skia
- AdMob
- Material Design
- Fonts
  - Droid
  - Roboto
  - Noto
- Google Developers

Other

- OpenBinder
- Apache Harmony
- OpenJDK
- Gradle

Integrated development environments (IDE)

- Android Studio
  - IntelliJ IDEA
- Eclipse
  - Android Development Tools (ADT)
- MIT App Inventor

Languages, databases

- Java
- Kotlin
- XML
- C
- C++
- SQLite

Extended

- Android XR
- Cardboard

Releases

- Cupcake (1.5)
- Donut (1.6)
- Eclair (2.0–2.1)
- Froyo (2.2)
- Gingerbread (2.3)
- Honeycomb (3.x)
- Ice Cream Sandwich (4.0)
- Jelly Bean (4.1–4.3)
- KitKat (4.4)
- Lollipop (5.x)
- Marshmallow (6.0)
- Nougat (7.x)
- Oreo (8.x)
- Pie (9)
- 10
- 11
- 12
- 13
- 14
- 15
- 16

Derivatives

- Android Automotive
- Android Things
- TV
  - devices
- Android XR
- Wear OS

- **Devices**
  - **Pixel**
    - C
    - Pixel & Pixel XL
    - 2 & 2 XL
    - 3 & 3 XL
      - 3a & 3a XL
    - 4 & 4 XL
      - 4a & 4a (5G)
    - 5
      - 5a
    - 6 & 6 Pro
      - 6a
    - 7 & 7 Pro
      - 7a
    - Fold
    - Tablet
    - 8 & 8 Pro
      - 8a
    - 9, 9 Pro & 9 Pro XL
      - 9 Pro Fold
  - **Nexus**
    - One
    - S
    - Galaxy Nexus
    - 4
    - 10
    - Q
    - 5
      - 5X
    - 6
      - 6P
    - 7
      - 2012
      - 2013
    - 9
    - Player
  - **Play edition**
    - HTC One (M7)
    - HTC One (M8)
    - LG G Pad 8.3
    - Moto G
    - Samsung Galaxy S4
    - Sony Xperia Z Ultra
  - Android One
  - other smartphones

Custom distributions

- AliOS
- Android-x86
  - Remix OS
- AOKP
- Baidu Yi
- Barnes & Noble Nook
- CalyxOS
- ColorOS
  - realme UI
- CopperheadOS
- EMUI
  - Magic UI
- Fire OS
- Flyme OS
- GrapheneOS
- Xiaomi HyperOS
  - MIUI
  - MIUI for Poco
- LeWa OS
- LineageOS
  - /e/
  - CrDroid
  - CyanogenMod
  - DivestOS
  - iodéOS
  - Kali NetHunter
- LiteOS
- Meta Horizon OS
- MicroG
- Nokia X software platform
- OmniROM
- OPhone
- OxygenOS
- PixelExperience
- Pixel UI
- Replicant
- Resurrection Remix OS
- SlimRoms
- TCL UI
- Ubuntu for Android
- XobotOS
- ZUI

Booting and recovery

- Booting process
- Recovery mode
  - TWRP
  - ClockworkMod
- Fastboot

APIs

- Google Maps
- Google Play Services
  - SafetyNet
- Google Search

Alternative UIs

- Asus ZenFone
- Cherry OS
- ColorOS
- EMUI
- Funtouch OS
- Flyme OS
- HiOS
- Hive UI (XOLO Hive)
- HTC Sense
- LG UX
  - Optimus UI
- Motoblur
- One UI
- Origin OS
  - Experience
  - TouchWiz
- OxygenOS
- Pixel UI
- XOS
- Xperia UI

Rooting

- SuperSU
- Magisk
- Kingo Root

Lists

- Custom distributions
- Features
- Free and open-source applications
- Google apps
- Launchers

Related topics

- Index of articles
- Androidland
- Chromecast
- Google
- Java vs. Android API
- Lawn statues
- BlueStacks
- Legal issues
  - *Google v. Oracle*
  - smartphone patent wars

- Image not found or type unknown Category:Android development
- Image not found or type unknown Category:Mobile telecommunications
- Image not found or type unknown Software portal
- Image not found or type unknown Telecommunication portal

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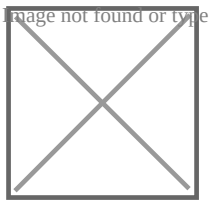
OpenStreetMap

Organisations

- Geochicas?
- Humanitarian OpenStreetMap Team
- Mapbox
- MapTiler
- Mapzen
- Missing Maps
- OpenStreetMap Foundation
- Ramani Huria
- Wikimedia Italia



Software	**Editing**	○ iD ○ JOSM ○ KartaView ○ Mapillary ○ OpenDroneMap ○ Potlatch ○ StreetComplete
	Visualisation	○ Leaflet ○ Mapnik ○ Marble ○ OpenLayers ○ OpenRailwayMap ○ OpenSeaMap
	Navigation	○ GNOME Maps ○ GraphHopper ○ Karta GPS ○ Komoot ○ Locus Map ○ Maps.me ○ Navit ○ Neshan ○ Open Source Routing Machine ○ Organic Maps ○ OsmAnd ○ Wheelmap.org
Derivations		○ FOSM ○ OpenGeofiction ○ OpenHistoricalMap ○ Overture Maps
People		○ Steve Coast ○ Allan Mustard

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International	○ VIAF ○ FAST
National	○ Germany ○ United States ○ France ○ BnF data ○ Israel
Other	○ IdRef

Check our other pages :

- SEO in marketing
- search engine optimisation Sydney
- SEO specialist
- SEO experts
- search engine optimisation strategy

Frequently Asked Questions

What is a content agency in Sydney?

A content agency in Sydney focuses on creating high-quality, SEO-optimized content that resonates with your target audience. Their services typically include blog writing, website copy, video production, and other forms of media designed to attract traffic and improve search rankings.

Why should I consider SEO packages in Australia?

SEO packages in Australia typically bundle essential optimization services such as keyword research, technical audits, content creation, and link building at a set price. They are designed to simplify the process, provide consistent results, and help businesses of all sizes improve their online visibility.

What is involved in SEO consulting?

SEO consulting involves analyzing a website's current performance, identifying areas for improvement, and recommending strategies to boost search rankings. Consultants provide insights on keyword selection, on-page and technical optimization, content development, and link-building tactics.

What are the benefits of working with an SEO consultant in Sydney?

An SEO consultant in Sydney can provide tailored advice and strategies that align with your business's goals and local market conditions. They bring expertise in keyword selection, content optimization, technical SEO, and performance monitoring, helping you achieve better search rankings and more organic traffic.

What role do SEO consultants play in a digital marketing strategy?

SEO consultants are responsible for improving your website's visibility and performance in search engines. By analyzing data, refining keyword strategies, and optimizing site elements, they enhance your overall digital marketing efforts, leading to more traffic, better user engagement, and higher conversions.

What are local SEO services in Sydney?

Local SEO services in Sydney focus on optimizing a business's online presence to attract local customers. This includes claiming local business listings, optimizing Google My Business profiles, using location-specific keywords, and ensuring consistent NAP (Name, Address, Phone) information across the web.

digital agency Sydney

SEO Sydney

Phone : 1300 684 339

City : Sydney

State : NSW

Zip : 2000

Google Business Profile

Google Business Website

Company Website : https://sydney.website/seo-sydney/

USEFUL LINKS

SEO Website

SEO Services Sydney

Local SEO Sydney

SEO Ranking

SEO optimisation

LATEST BLOGPOSTS

SEO community

SEO Buzz

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