

Position Paper: Accessible Image File Formats - The Need and the Way

Sandeep R Patil

IBM Software Labs

IBM India Private Ltd,

Ozone 2, SP Infocity, (Software Park)

Saswad Road, Hadapsar, Pune. City: Pune

State: Maharashtra, Country: India.

Phone: 91-9890523477 Fax: 91-20-26982425

Email: rsandeep@in.ibm.com

ABSTRACT

Accessibility is one of the key checkpoints in all software's products, applications & websites. Accessibility with digital images has always been a major challenge for the industry. Images form an integral part of certain type of documents & most of the Web 2.0 compliant websites. Audience challenged with blindness and many dyslexics only makes use of screen readers/ text readers/narrator software programs to access the computer and computer displayed information. Such audience cannot view digital images/pictures. Hence drafting accessible documents or designing accessibility enhanced websites containing digital images representing figures, diagrams, map, snaps etc is a challenge. There are various published best practices for accessibility of documents or website containing images so that they can be better understood by the visually impaired users. But these are truly not enough to cover all kind of practical scenarios and this paper positions a need for a more innovative solutions. The paper also proposes accessibility enhanced image formation technique with relevant modification required in screen readers/ narrator software programs and positions its edge over the existing methods.

Categories and Subject Descriptors

D.1.7 [Visual Programming]: Image file formats, metadata.

General Terms

Algorithms, Management, Design, Human Factors, Standardization, Theory.

Keywords

Accessibility, Images, Pictures, Graphics, Flow Charts, Design, Innovative Technique, Visually Impaired, Blind, Dyslexia.

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1. INTRODUCTION

Information accessibility is one of the vital aspects associated with information technology industry. Accessibility is not only a key checkpoint for software products but also for websites and internet based applications. On the other hand digital images play a vital role in this digital world. Images in the form of pictures, maps, figures, scenery, flow-chart etc are important for effective communication of information to its audience. This information can vary from being a simple design document for a small software program where images represent flow charts of the design -to- a website hosting minute details on aeronautical engineering where images represent different figures and pictures on the related subject. In order to have this information accessible it's also important to have all the associated images accessible, especially for visually impaired audience who only rely on screen readers to access the information. There are accessibility guidelines published to address the stated problem. But they seem not to be enough.

This paper discusses on the accessibility challenges associated with information containing images followed by the existing guidelines and their limitation. Finally the paper calls for the need of innovation solutions and proposes a methodology of having accessible image file formats that should help address the stated problem.

2. Images: A Challenge for Accessibility

Addressing accessibility for documents and websites is very important. In today's world, creating documents and websites without the use of images or pictures is practically not possible. Use of images in documents or websites brings to the reader a lot of clarity and increased understanding of the subject being addressed. In many cases the use of images is also intended to enrich the end users experience. Many websites who claim to use Web 2.0 architecture to deliver enriched user experiences make extensive use of images. There are lot such advantages of usage of images and hence should be encouraged. But these advantages come with a word of caution. Within the world audience there exists a section of end users who are challenged with visual impairments. Most of these visually impaired users depend only on the screen reader technology to render the text information on the page. As defined in the Web Content Accessibility Guideline 1.0, "Screen reader is a software program that reads the contents of the screen aloud to a user. Screen readers are used primarily by individuals who are blind. Screen readers can usually only

read text that is printed, not painted, to the screen.” It’s the responsibility of the document or website owners that they should have their content accessible to even the visually impaired audience.

Making image enriched documents and websites accessible is a real challenge, but is the need of the hour. There are number of well documented guidelines published which address the stated issue. Few of these guidelines are discussed in the next section. Despite of these guidelines the visual impaired audiences face a lot of problems when accessing pure image files or image enriched documents and websites. There is a need to enhance the existing graphical image technology to address the stated problem more elegantly.

3. Existing Guidelines and Their Limitation

World Wide Web Consortium (W3C) has published a set of web content accessibility guidelines which the developers should follow for making their content accessible. Tough the guidelines are targeted for web content creation most of them are applicable for other type of documents, like documents in .rtf, .doc, .lwp, .ppt, etc formats. Following mentioned are few of many important guidelines published by W3C that address the challenges faced by the visual impaired users when accessing image enriched web content.

Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content). This includes: images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video.

*Equivalent information may be provided in a number of ways, including through attributes (e.g., a text value for the "alt" attribute in HTML and SMIL), as part of element content (e.g., the OBJECT in HTML), as part of the document's prose, or via a linked document (e.g., designated by the "longdesc" attribute in HTML or a **description link**).*

For example, in HTML:

- Use "alt" for the IMG, INPUT, and APPLET elements, or provide a text equivalent in the content of the OBJECT and APPLET elements.

- For complex content (e.g., a chart) where the "alt" text does not provide a complete text equivalent, provide an additional description using, for example, "longdesc" with IMG or FRAME, a link inside an OBJECT element, or a description link.

- For image maps, either use the "alt" attribute with AREA, or use the MAP element with A elements (and other text) as content.

The above stated guidelines are indeed very effective but only when it’s actually practiced. Guidelines are after all guidelines and cannot be enforced upon. Hence, despite of these guidelines even today one will come across many image enriched websites and web contents which are not accessible. The same theory applies with regular content documents containing images like flowcharts, diagrams, figures, maps etc. Most of the above guidelines can also be applied to these image enriched documents, but in actual practice is not being stringently followed.

Let’s also consider scenarios where the document or content to be viewed consists of only images. Searching only images using internet based search engines is one such manifestation. Most of the search engines provide users with the facility to search only images and its search output contains only images. Such a facility cannot be effectively exercised by visually impaired users. There are many such similar manifestations where the above mentioned guidelines cannot be directly applied.

This leads us to believe that there is a strong need to enhance the existing technology to address the accessibility problems encountered by visually impaired users when accessing image enriched documents. There can be various innovative techniques to address the stated problem and one such is the need for having accessibility enhanced image file formats.

4. Proposed Technique for Accessibility Enhanced Image Formation

Metadata is commonly defined as data about data or information about data. Having metadata associated with multi media based file formats is a common practice. Many digital image file formats have their own specific metadata generally embedded in the file header. The proposed technique is to enhance the existing well know image file formats or define a new image file format with the extension to their existing metadata with the new metadata format (described below) which will contain the correct sequential tagging describing the content of the image in sequence. The author or creator of the image will need to fill in the metadata by tagging different sections of the image with relevant description in words. Either a new image editing software application can be developed or existing ones can be modified to recognize the new file format. These image editing programs will need to give the user the basic facility to tag the image. That is, provide the users with the facility to,

- Select a section of the image. On selection the editing software should automatically create a metadata entry for the selected section in the format mentioned below.

- Allow user to enter the text equivalent of the selected image and save the entered text into the metadata entry created for that particular section.

This will finally result into an image containing metadata which describes the text equivalent of different sections of the image in sequence, as entered by the image author or creator.

To make these images accessible the proposed technique will also require enhancing the screen reader software programs to recognize the new image file formats. On encountering the image with the proposed image file format the enhanced screen reader will need to parse the metadata of these images and read aloud the tagging information (stored in text) in sequence which will greatly help the visually impaired audience to imagine the image/picture and then help understand it.

Following is the metadata format that can be clubbed with the image file’s existing metadata which is generally present in the header section of the image file formats.

Proposed Metadata format:

Sequence	Position (optional)	User Entered Text
1

.
N

where,

Sequence - represents the order in which the user enters the tagging information for the image.

Position – represents the relative position of the tag with respect to the entire image. Can have one of the following values “Upper, Upper Left, Upper Right, Center, Center Left, Center Right, Lower, Lower Left, Lower Right”. This can be optional.

User Entered Text – represents the user entered text for the selected section of the image.

For better appreciation of the concept let's consider sample images shown in Figure 1 and Figure 2. Figure 1 containing *Image_1.jpg* is representing a simple flow chart. When this image is read by the screen reader it will only be able to identify that it's an image and will not be able to explain about the image unless the document writer has followed the accessibility guidelines.

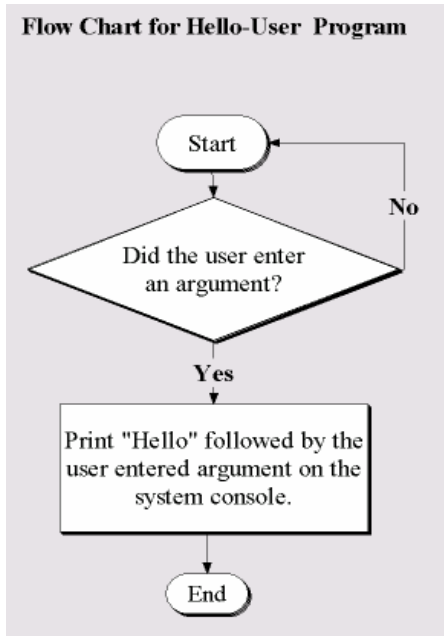


Figure 1: Image_1.jpg

Hence the image will not be accessible to visually impaired audience. The second image called *Image_2.new_format* (shown in Figure 2) represents the same flow chart as *Image_1.jpg* except that *Image_2.new_format* is associated with the proposed tagging metadata embedded into its header. In this case with the help of enhanced screen reader which recognize these new image file format will be able to parse the tagged information and speak out the text equivalent of the image in a sequential manner as shown below.

Typical Screen Reader Output for Image_1.jpg will be: “Identified Image. Image_1.jpg”.

Proposed Screen Reader Output for Image_2.new_format will be: “Identified Image. Image_2.new_format. Rendering image information. Flow chart for hello user program by John Deo. Start flow chart. Condition, Did the user enter an argument? No, go to Start. Yes, go to next process. Process, Print "Hello" followed by the user entered argument on the system console. End of flowchart.”

Some key benefits on using this technique are:

a) Use of this technique will help towards making images accessible, especially for the visually impaired audience. Hence on using the proposed file format, the applications whose end user

output is purely in form of image or images will now automatically be accessible to visually impaired users.

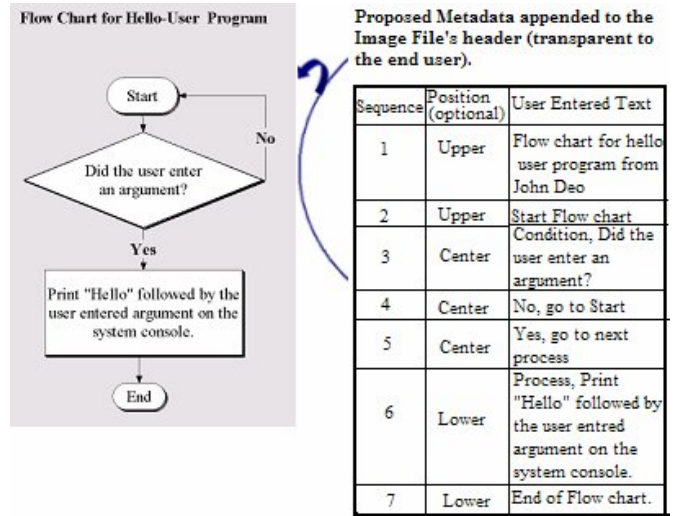


Figure 2: Image_2.new_format

b) In many scenarios, usage of such type of images in content documents or websites will help make the content accessible without the explicit need for incorporating text equivalent techniques for images present in the content.

The major concerns associated with this technique are to make the image creator/author fill in the correct metadata for the image and to have these accessible image files formats globally acceptable. But all in all the proposed technique will surely get in a new innovative angle to think on the solutions for accessibility related problems.

5. Challenges and Limitations

i) With the use of proposed image format one will not require the need to follow the accessibility guidelines for images as they will be built-in. But the challenge here will be in making users use the proposed image file format in their documents or websites. One of the ways to meet this challenge is by certifying Web2.0 compliance only on use of the proposed images.

ii) The facility to assist user with equivalent description for the images and its different section or parts is beyond the scope of this paper and relies on the image creator or editor to do the needful. With the belief that the document owner is the best person to describe the included images and their relevance to the document content, the usage of these images will be more effective if the document owner inputs the visual information into the proposed image files.

iii) The image file format proposed in this paper currently limits its usefulness to pictures with limited or uniformly defined components like a flow chart, a structured process diagram or a specific digital photo describing a particular event like a soccer player hitting a goal. For complex images having large number of intermingled components the proposed technique leaves it to the author of the document or image to do the relevant and required tagging which will best explain the image.

6. Conclusion

The existing set of guidelines seems not to be sufficient to address the accessibility related problem associated with visually impaired audience. There can be more innovative solutions that the industry should come up with. This paper discussed one such approach of having accessible image file formats with enhanced screen readers that can read through these image files. This should greatly assist the visually impaired users when accessing images or image enriched documents.

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