Consideration for Developing Environments of Web-based Interactive Statistical Graphics

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1. Web-based interactive statistical graphics

Statistic information on the Web has become familiar and important. Technologies to realize visualizing statistical information, using Java and Flash [1], become more useful. Thus we can represent interactive statistical graphics on the Web. Moreover, XML-based graphical representation environments SVG (Scalable Vector Graphics) [2] and X3D (Extensible 3D) [3] appear as alternative to realize interactive statistical graphics. In this paper we compare characteristics of Flash, SVG and X3D about Web-based interactive statistical graphics features.

2. Characteristics of statistical graphics using Java, Flash SVG and X3D

Web-based Interactive Statistical Graphics has been usually created by Java. Java-based statistical graphics are suited for Server-side technique, JSP or Servlet. There are lots of authoring tools to create Java application and free class libraries. But if you would like to make interactive statistical graphics, you should be required high level programming skill.

Recent Web technologies flash, SVG and X3D make vector image, so graphics images are small file size and keep high quality due to zoom-in/out operation. It is easy to create Web-based statistical graphics to use these environments and to implement interactive facilities by script language. The characteristics of Web-based graphics environments are listed Figure 1.

Flash is rich contents rich internet application to combine animation, voice and programs. The Flash contents are easy made by Macromedia Flash. It is a great advantage that Flash plug-in for several platforms (OS) are released and widely spread. Flash contents are needed to compile similar to Java application.

SVG is a two-dimensional XML-based vector graphics format standardized by W3C. Since SVG has two parts, an XML-based file format, and a programming interface for graphical applications, it can hold not only graphical data, but also its related information.

X3D is a virtual reality modeling language and an open standard for 3D on the web. X3D Encoding has both an XML encoding and a classic VRML encoding. Shared virtual worlds written in X3D format is achieved by the X3D plug-in or the X3D browser.

Table 1. Characteristics of graphics by Java, Flash, SVG and X3D

	Plot	Plug-in	Graphics Format	Animation	interactivity	Authoring Tool
Java	2D, 3D		raster	possible	program	many
Flash	2D	popular	vector	easy	ActionScript	Flash
SVG	2D	necessary	vector	possible	DOM and JavaScript	some
X3D	3D	necessary	vector	possible	JavaScript, Java	a few

3. Advantage to use Flash, SVG and X3D, and examples of these graphics

Because there is a good authoring tool for flash, so it is easy to implement interactive facilities to Flash-based statistical graphics. Thus it is the most suitable to create Flash-based graph application for the statistical education. Figure 1 shows interactive teach-ware for introductory statistics course. Moreover, Flash is suitable to create rich GUI for CGI application.

SVG and X3D files are written in plain text, they can be handled easily (scriptable): SVG files can be provided in XML format as open and standard specifications, they can be generated by any programming language without the need for any software and libraries, and also other XML data files can be straightforwardly converted and loaded to them by XSLT and Document Object Model (DOM).

Another advantage to use XML-based format, it is easy to combine the other XML formats. So it is easy to use server-side application to describe statistical information include documents and graphics. The documents are described as XHTML format and the graphics are described SVG format. Figure 2 shows a Web application using SVG graphics.

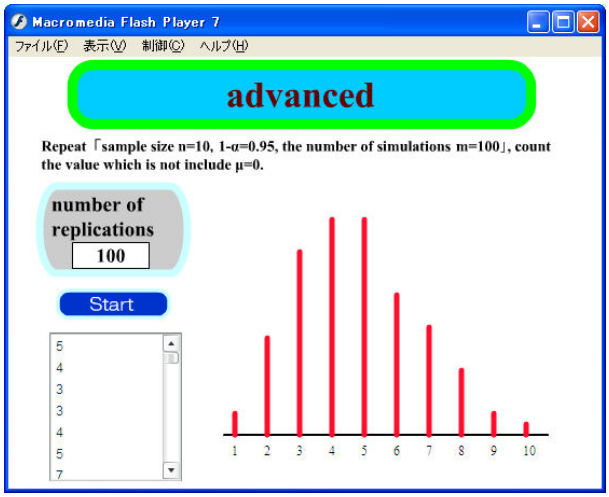

Figure 1. Flash contents as teach-ware.

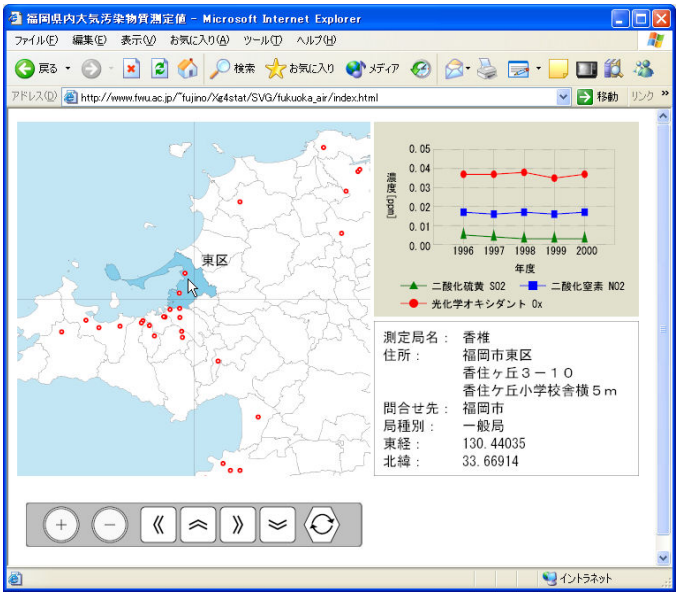

Figure 2. SVG Web application

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[1] Flash http://www.macromedia.com/software/flash/
[2] SVG http://www.adobe.com/svg/
[3] X3D http://www.web3d.org/

RÉSUMÉ

En cet article nous comparons des environnements pour réaliser lesgraphiques statistiques interactifs sur le Web. Nousprésenterons quelques exemples créés par Flash et SVG.