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Anachronism in Fonts and Relative Dating of Computer Printed Documents: A Case Report



الخطأ في تاريخ الخطوط (المفارقات التاريخية) والتأريخ النسبي للمستندات المطبوعة بالكمبيوتر: تقرير حالة

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Abstract

In the field of forensic document examination, identification of fonts and their dates of release may provide a lead as to the relative age of computer printouts. Hence, fonts in a printout can be used as a means of evaluation of an anachronism or chronological inconsistency. Therefore, an anachronism betrays the fabricated nature of the questioned documents.

In the present case study, the traditional methodology of typescript matching coupled with an off-line digital tool were used in identifying pre-dated documents and disproving the genuineness of the documents in question.

The procedure adopted for differentiation, identification and confirmation of font(s) and years of release of fonts for commercial use is discussed.

Hence, in this case report it was safely concluded that the disputed agreement for sale could have been prepared on a later date than the purported date of execution i.e.1993 for the reason that the use of the "Comic Sans MS" font is an anachronism.

المستخلص

في مجال فحص المستندات الجنائي قد يوفر تحديد الخطوط وتواريخ إصدارها أو طباعتها دليلاً على العمر النسبي لمطبوعات الكمبيوتر. وعليه يمكن استخدام الخطوط في المطبوعات كوسيلة لتقييم الخطأ في تحديد التاريخ أو التناقضات الزمنية. لذلك، فإن المفارقة التاريخية تخون الطبيعة الملققة للوثائق المشكوك فيها.

وفي دراسة الحالة الحالية، تم استخدام المنهجية التقليدية لمطابقة الحروف المطبوعة مقترنة بأداة رقمية بدون اتصال في تحديد المستندات القديمة ودحض صحة المستندات المعنية.

وتمت مناقشة الإجراءات المعتمد للتمييز والتعرف والتأكيد على الخط (الخطوط) وسنوات إصدارها للاستخدام التجاري.

ومن ثم، في تقرير الحالة هذا، تم الاستنتاج وبموثوقية أن الاتفاقية المتنازع عليها للبيع من الممكن أنه تم إعدادها في تاريخ لاحق من تاريخ التنفيذ المزعوم، أي 1993 لسبب أن استخدام خط "Comic Sans MS" يعد مفارقة تاريخية.

Keywords: Forensic Science, Forensic Documents, Computer Printout, Fonts, Anachronism.

الكلمات المفتاحية: علوم الأدلة الجنائية، الوثائق الجنائية، مطبوعات الكمبيوتر، الخطوط، المفارقة التاريخية.



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1. Introduction

Forensic Document Examiners (FDE) undertake the task of date estimation of typewritten documents. The progressive changes, which have been made in typewriters from the time they were first put on the market, are in the design, size, and proportions of the typefaces. It is a matter of common knowledge that typewriters of the various kinds were not manufactured before certain dates. Changes and improvements are constantly being made in various kinds of machines in use that may conclusively show that a document must have been written after a certain definite date [1]. Therefore, it follows that the anatomy of each character will lead to the identification of the typefaces in a typewriter and its introduction into commercial use. Once this process of identification is understood and appreciated, progress may be made in identifying matters, not within one's normal purview. Typewriters may be identified by persons never employed in a typewriter factory. Printing methods may be differentiated by persons never engaged as printers. Counterfeit currency can be identified reliably by document examiners who never made a dollar [2]. Therefore, the methodology of the identification of typefaces in typescripts can be extended suitably to the identification of fonts in a computer printout. Because modern computer-generated documents almost exclusively uses typographic fonts, it is certainly the time for FDE to adopt the accepted typographic terminology [3].

In the present digital age, a myriad of fonts is continuously being developed by various developers and released for the benefit of the end-users to be used in Web-pages and word processors. Identification of fonts and their dates of release may provide a lead as to the relative age of the printouts in the field of forensic document examination. Hence, fonts in a printout can be used as a means of evaluation of an anachronism. Anachronism or chronological inconsistency, therefore, betrays the fabricated nature of the questioned document. It helps in identifying pre-dated documents and negates the genuineness of the document in question. One such document was examined for the identification of font and year of release for age estimation.

1.1 Typeface and Fonts

Word processors use different fonts. The term "Typeface" refers to overall design and shape of characters. Further, it is available in many styles of size (points 10, 12, 14 and so on) and line weight (bold, light, medium). These different styles in a typeface are referred to as fonts. In other words, fonts are sub-set of a typeface.

Adobe® Systems [4] uses the terms font, typeface and font family for classification and grouping of scalable fonts used in word processors and web pages

1.2 Identification of Fonts and Dates of Release

Many online tools are available to identify the fonts from web pages or files of word processing applications. These online tools compare the shapes of the letters from the digital library and return the list of probable fonts. However, it is relatively difficult to identify the fonts from an image or a printout by the online tools. Therefore, off-line identification tools were preferred for identification of fonts from an image. The tool named "Find my Font v3.3.15" [5] identifies similar fonts and lists them according to the matching percentage. Since the list generated by the software is too long, one has to manually sift through the list of probable fonts. Therefore, alternate methods are tried by the author. A particular font in a printout can be more readily identified by studying the anatomy of the font (shapes of different parts of a letter or numeral). Subsequently, the version and dates of release of different fonts can be accessed at URL <http://bowfinprintworks.com/SansGuide/SansAlphaList.txt>[6]. Microsoft® also provides its font library at URL <https://docs.microsoft.com/en-us/typography/font-list/?FID=3>[7], which includes versions and dates of release of a font. These catalogues are very similar to the Haas Typewriter Atlas & Catalogue for typefaces distributed by ASQDE and of immense help in the chronological study of fonts used in word processors and web pages

2. Case Study

A Sale Agreement purported to be executed on 12/02/1993 was submitted for ascertaining the date of its execution. This disputed agreement was a computer printout on seven pages with 27 paragraphs and one schedule. Figure-1 depicts one of the regions of study of said agreement. Similar characters are marked with blue arrows in Figure-1. On a visual examination under magnification, it was observed that all essential parts of the deed are of one font whereas the description of the property at different places on various pages are of another font, as indicated by the design of the letters and numerals commonly occurring among both the fonts. The differentiating features between the two set of fonts, observed by visual examination are tabulated in Table-1.

As next step, the disputed document was scanned and the scanned image was analysed using the software named "Find my Font v3.3.15", free edition for listing the probable fonts. The letters and numerals (totalling 10 characters as the software allows a maximum of ten



characters only) such as ‘G’, ‘a’, ‘t’, ‘e’, ‘S’, ‘y’, ‘C’, ‘1’, ‘4’, ‘6’ were selected from the image and submitted for identification of one set of suspected font. It has returned a list of 43 matching fonts with Arial having a score of 91.58 at sixth place as shown in Figure-2A. On a reference to Microsoft Font Library [7], it was observed that the top five fonts are Thai script and Devanagari script. Similarly, the matching process of the next set of suspected fonts has returned a list of 17 matching fonts with Comic Sans MS at First place having a score of 89.04 as shown in Figure -3. These matching scores are used only for screening purpose and further analysis is required to reach at a conclusion.

Once, the screening of the fonts is over, the final step of confirmation of font and point size has to be ascertained by the conventional superimposition method. Therefore, sample paragraphs with the content as occurring in the disputed documents were prepared with font

size 9, 10, 11 and 12 for both Arial and Comic Sans MS fonts. Transparencies of those print-outs were prepared and then superimposed over the contents of the original disputed documents for further confirmation of the identity of the fonts and font size. The fonts viz., Comic Sans MS with point size 10 and Arial with point size 12 were used to print the disputed agreement.

After the identity of the font is confirmed, the next process of pinpointing the year of release of the font for commercial use is taken up. As per Wikipedia, the “Arial” font was released in the year 1982 [8] and the “Comic sans MS” was released in the year 1994 [9].

The procedure adopted for differentiation, identification and confirmation of font(s) and years of release is summarized in the flow chart shown in Figure-4.

3. Results and Discussion

Any computer-printed document having two different

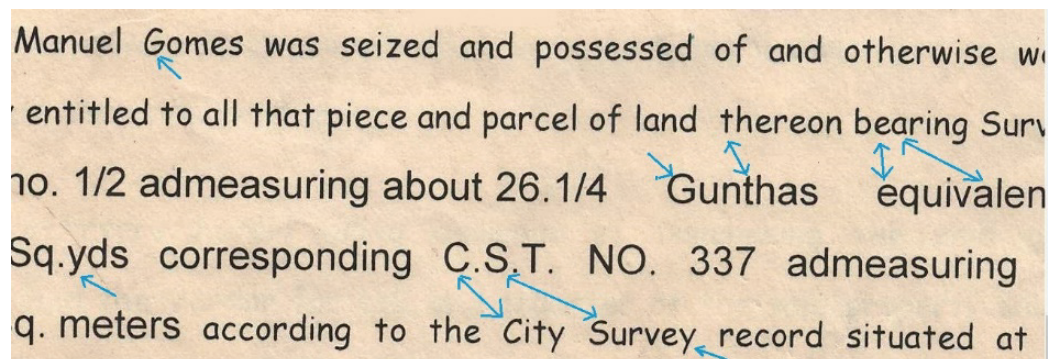


Figure 1- The region of interest on the disputed printout..

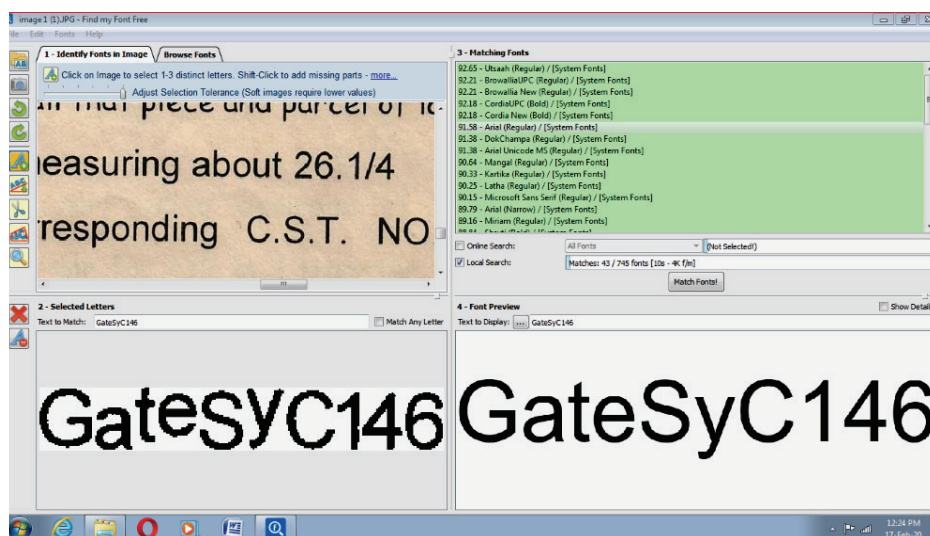


Figure 2- Screen shot for Arial font.

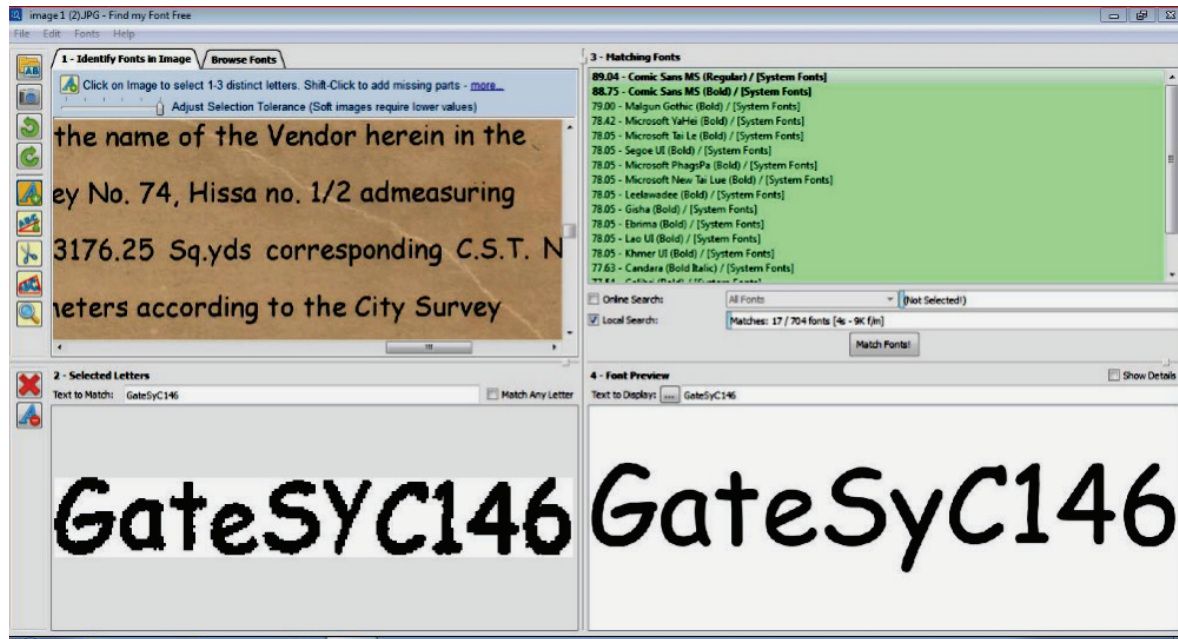


Figure 3- Screen shot for Comic Sans MS font.

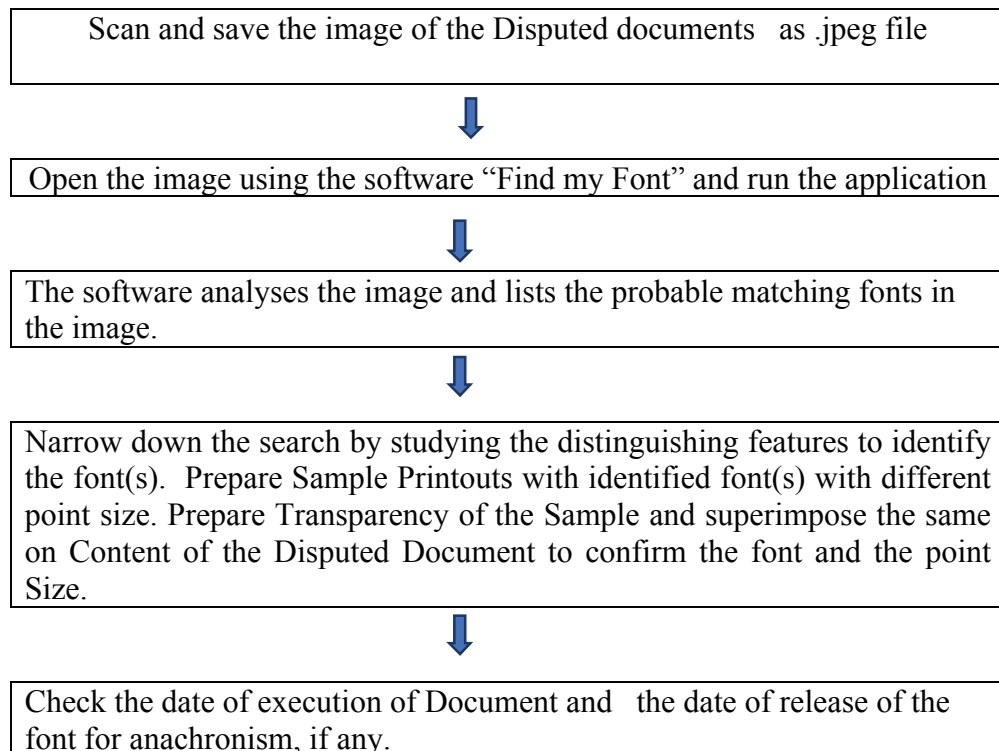


Figure 4- Method adopted for Analysis of Fonts.

Table 1- Differentiating features of letters and numerals.

Sl. No	Differentiating Features	Arial	Comic Sans MS
1	• Counter	C	C
2	• Counter • Beak	G	G
3	• Spine	S	S
4	• Beak or commencement • Finial or ending	a	a
5	• Bowl	d	d
6	• Cross bar	e	e
7	• Ear • Finial	g	g
8	• Finial	y	y
9	• 't-cross' • Stem • Finial	t	t
10	• Serif	1	1
11	• Spine	2	2
12	• Bowl	5	5
13	• Beak	6	6
14	• Finial	9	9

fonts may be viewed with utmost caution. The identification of fonts and any anachronisms, if observed, may confirm the spurious nature of the document. The print-out, examined by the author, was printed with Arial font for the description of the property in four different paragraphs and Comic Sans MS was used for the rest of the contents of the disputed document. The predominant font used in the disputed agreement is Comic Sans MS and the same was released for commercial use in the year 1994. Therefore, the font Comic Sans MS is chronologically inconsistent with the date of execution of the agreement i.e. 12/02/1993. Hence, it was safely concluded that the disputed agreement for sale could have been prepared on a later date than the purported date of execution i.e. 1993 for the reason that the use of the "Comic Sans MS" font is an anachronism.

Use of the tool viz., "Find My Font" provides only probable fonts and the match score depends on the data set (letters or numerals) chosen for identification. Forensic Document Examiners may resort to conventional method of Typescripts comparison and superimposition technique to ascertain the font and its point size in a com-

puter print out.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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