New font offerings: Cochineal, Nimbus15, LibertinusT1Math

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Abstract

This document is an expansion of my talk at TUG 2016, detailing the major projects I have worked on during roughly the previous year. Cochineal is a fork of Crimson, an excellent text font family reminiscent of Minion. Nimbus15 is a reworking of the newest versions (2015) of the Nimbus fonts from URW++, which now have added Greek and Cyrillic alphabets. LibertinusT1Math attempts the conversion of Khaled Hosny's LibertinusMath from `otf` to `pfb` with LaTeX support files.

1 Cochineal

Cochineal is an oldstyle text font family containing Roman, Greek and Cyrillic alphabets, derived from Sebastian Kosch's Crimson (2014) font family. Crimson, originally named Crimson Text, has regular, semibold and bold weights, with semibold the least developed. Because of the time and effort it would have taken to bring semibold up to parity with the other weights, Cochineal is made available only in regular and bold weights, and regular and bold italic, in both `otf` and `pfb` formats.

The Crimson fonts in these weights contained about 4500 glyphs, close to 1500 of which were in the regular Roman font. To make glyph coverage uniform across the four styles required making around 1500 new glyphs — a substantial FontForge job of several months duration. The likelihood of bugs, especially in spacing and kerning, in a project of this scale is quite high, as the name might suggest.

(This paragraph is rendered in Cochineal.) The Cochineal package provides fonts in regular, *italic*, **bold**, and ***bold italic***, with a full array of features, including both lining (1234567890) and old-style (1234567890) figures, both in tabular and proportional spacing, superiors ^{Abc123}, inferior figures $_{456}$, Small Caps (and **Small Caps**, *Small Caps*, ***Small Caps***), and a swash Q that can be specified globally with the package option `swashQ` or individually with the macro `\Qswash`: Q. In Latin scripts, Cochineal is somewhat reminiscent of Minion Pro, though its italic glyphs tend to be narrower. The Greek (ελληνικά) coverage permits polytonic Greek as well as some ancient forms, and the Cyrillic (кириллица) includes essentially complete T2A coverage.

LaTeX support for Cochineal is provided in encodings OT1, T1, TS1, LY1, LGR, T2A and OT2. While LGR and OT2 are little-used by authors of `tex` documents in which Greek or Cyrillic is predominant, they seem to be important to Western scholars who need to be able to generate short segments of polytonic and ancient Greek or Cyrillic using a Western keyboard. As `otf` versions of the fonts are provided, they may be used directly in Unicode TeXs by means of the `fontspec` package. Because the `cochineal` package contains a `cochineal.fontspec` file specifying the `otf` file names, just include in your preamble:

```
\usepackage{fontspec}
\setmainfont[Mapping=tex-text]{cochineal}
```

Usage under LaTeX has many options that are spelled out in detail in the package documentation.

For mathematical typesetting with Cochineal, one may use `newtxmath` with option `cochineal`:

```
\usepackage{cochineal}
\usepackage[cochineal,vvarbb]{newtxmath}
\usepackage[cal=boondoxo,frak=boondox]{mathalfa}
```

produces output like:

A Simple *Central Limit Theorem*
Let X_1, X_2, $\cdots$ be a sequence of i.i.d. *random variables with mean* 0 *and variance* 1 *on a probability space* $(\Omega, \mathscr{F}, \Pr)$. *Let*

$$\mathfrak{N}(y) := \int_{-\infty}^{y} \frac{\mathrm{e}^{-t^2/2}}{\sqrt{2\pi}} \, \mathrm{d}t,$$

$$S_n := \sum_{1}^{n} X_k.$$

Then

$$\Pr\left(\frac{S_n}{\sqrt{n}} \le y\right) \xrightarrow[n\to\infty]{} \mathfrak{N}(y)$$

or, equivalently, for $f \in \mathscr{C}_{\mathrm{b}}(\mathbb{R})$,

$$\mathbb{E}f\left(S_n/\sqrt{n}\right) \xrightarrow[n\to\infty]{} \int_{-\infty}^{\infty} f(t) \frac{\mathrm{e}^{-t^2/2}}{\sqrt{2\pi}} \, \mathrm{d}t.$$

The Cochineal package includes a "theorem" font style, a version of italic with upright punctuation and lining figures, which I think is more suitable than ordinary italic for theorem statements and such. I have abused NFSS by setting `\textsl` to point to the theorem font.

1.1 Production issues

Producing T2A, LGR and OT2 encoded support files is somewhat complicated because specialized encoding files must be generated to describe all required ligatures. Those for Western European encodings are fairly easy to obtain using `autoinst`, a wrapper for `otftotfm`, but it turns out that the latter does not respect the spacing parameters in the `otf`, and these must be corrected by passing through a `space-factor` setting. (It seems that this is a common issue when using scripts that call `otftotfm`.) I used the following:

```
autoinst --noupdmap --notitling        \
 --inferiors --superiors --fractions   \
 --target=${tmfc}                       \
 --encoding=LY1,OT1,T1                  \
 --extra="--space-factor=1.06635"       \
 --vendor=public --typeface=cochineal \
 *.otf
```

2 Nimbus15

Nimbus15 is derived from the Nimbus fonts issued in 2015 by URW++ by way of Artifex, makers of Ghostscript. They are metric clones of Courier, Helvetica and Times. The 2015 versions appeared in an update to the Ghostscript sources in October 2015. They are included in TeX Live 2016 in PostScript binary format, but lack the associated `.afm` files.

The novelty here is that there are now Greek and Cyrillic glyphs in all the Nimbus fonts. It is indeed regrettable that the license under which the new Nimbus fonts are distributed is incompatible with versions issued prior to 2000, on which the TeX Gyre fonts were based, because these may not now be blended. This limits the utility of Nimbus15 because the TeX Gyre versions are much better except in Greek and Cyrillic. NimbusMono, at least the narrow version described below, may have some reason to exist independently.

Starting from the Artifex distribution, several characters were added throughout: cyrbreve U+F6D4, dotlessj U+0237, and visiblespace U+2423. This was done so the `OT1` and `OT2` encodings would be complete in all cases.

2.1 NimbusSerif ("Times")

`NimbusRomNo9L`, a metric clone of Times, was extended to include Greek (monotonic only) and Cyrillic glyphs. The current distribution from URW++/ Artifex has many errors in spacing and kerning of Greek and Cyrillic glyphs. I expanded the Greek section so that polytonic and some ancient Greek forms are available, added a number of Cyrillic glyphs and tried to correct the spacing and kerning. Since TeX Gyre Termes has much more extensive coverage of Latin glyphs, the only usage for this font that makes sense to me is for standalone Greek and Cyrillic.

2.2 NimbusSans ("Helvetica")

`NimbusSanL`, a metric clone of Helvetica, has been extended to include Greek (monotonic only) and Cyrillic glyphs. I changed the tonos accent from vertical to slanted for consistency with the Courier and Times clones. Analogous to NimbusSerif, given that TeX Gyre Heros has much more extensive coverage

of Latin glyphs, the only usage that makes sense to me is for standalone Greek and Cyrillic.

2.3 NimbusMono ("Courier")

In short:
```
NimbusMono-Regular      -> zco-Light
NimbusMono-Bold         -> zco-Bold
NimbusMono-Oblique      -> zco-LightOblique
NimbusMono-BoldOblique -> zco-BoldOblique
```

In addition, a new weight, intermediate between Light and **Bold**, was created, given the names `zco-Regular` and `zco-Oblique`.

The low asterisk U+204E glyph was added to all the `zco` fonts so that `*` would render correctly.

The glyphs in Light, Regular and **Bold** have stem widths 41, 64 and 100 units respectively. (The stem width of `cmtt10` in this scale is 69, slightly more than zco-Regular, while its advance width is 525, less than zco-Regular at 600.) A few glyphs required modification prior to and following the thickening process.

The Greek glyphs support only monotonic Greek typesetting. Several Greek glyphs were modified from the originals, most importantly alpha (less fish-like), nu (curved, not v-shaped) and Phi (less tall). Thanks are due to Dimitrios Filippou for his important feedback on Greek typographic issues.

Additionally, `zco-Regular` was further modified to a narrow version, `zcoN-Regular`, starting with the FontForge Style/Change Glyph transformations and finishing with manual adjustments to shorten serifs where necessary and make circular outlines narrower. This narrow version, though available only in upright and oblique shapes, seems to me more useful than the overly wide normal Courier. For an example, see the list underneath the section heading above.

3 LibertinusT1Math

The last job mentioned was the conversion of Khaled Hosny's LibertinusMath `otf` to a traditional LaTeX setup with `pfb` fonts and accompanying LaTeX support files. This was a somewhat complex process, and will require a separate article at a later time.

4 Availability

Packages are available from CTAN and in TeX Live, MiKTeX and other distributions. A list of all my packages on CTAN, including these, is at the url below.

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  http://ctan.org/author/id/sharpe