From: Ethan Vishniac <apjetv@mcmaster.ca>
Subject: **Re: Astronomical software articles in ApJ**
Date: 2010 October 25 00:45:58 GMT+01:00
To: Norman Gray <norman@astro.gla.ac.uk>
Reply-To: apjetv@mcmaster.ca
Keywords: p-astroinformatics, m-2010-11-adass
1 Attachment, 0.1 KB

Dear Dr. Gray,

I read your note with interest, since the question of where to put papers concerned with software and numerical methods has been a matter of continuing editorial debate. The general rule is that we consider such papers when they are part of an ongoing series that includes science results, or when they are part of a special issue devoted to the results of a particular project. We regard our scope as including primary science results, and our enthusiasm for techniques papers tend to fall off as they become less concerned with direct results and more divorced from ongoing science projects. Novel instrumentation is an appropriate topic even in the absence of observational results. The criteria for such papers includes the judgment that the paper will be interesting even if the particular instrument never actually gets built.

Applying these criteria to software projects can be difficult. Perhaps it would be best for me to simply give my reaction to each of the abstracts below?

> ----
> Article 1 -- software implementation of scientific algorithms
>
> Mixing Bayesian Techniques for Effective Real-time Classification of Astronomical Transients
>
> With the recent advent of time domain astronomy through various surveys several approaches at classification of transients are being tried. Choosing relatively interesting and rarer transients for follow-up is important since following all transients being detected per night is not possible given the limited resources available. In addition, the classification needs to be carried out using minimal number of observations available in order to catch some of the more interesting objects. We present details on two such classification methods: (1) using Bayesian networks with colors and contextual information, and (2) using Gaussian Process Regression and lightcurves. Both can be carried out in real-time and from a very small number of epochs. In order to improve classification i.e. narrow down number of competing classes, it is important to combine as many different classifiers as possible. We show how this can be incorporated in a higher order fusion network and tied with optimal follow-up.
>
> ----

We would consider this for the Supplements.

> Article 2 -- application progress report
>
> WorldWide Telescope: A system of components enabling institutions to create rich web based data access and visualization tools.
>
> WorldWide Telescope has grown from a standalone visualization platform to a rich set of components that can utilized by portals, data providers or research projects to allow rich data access to both catalog and image data. The WWT Client also provides SAMP enabled interoperability allow a suite of data services across client, web and server.

I'm not sure about this one. To be honest, I think we'd probably consider a paper like this if we were publishing a special Supplements issue devoted to WWT papers, so that it was an integral part of the issue and important for understanding science results. We would probably not publish it as a stand-alone paper.

> ----
> Article 3 -- pipeline features and recent developments
>
> SIMPLE Imaging and Mosaicking PipeLinE
>
> The SIMPLE Imaging and Mosaicking PipeLinE (SIMPLE) is an IDL based data reduction environment designed for processing optical and near-IR data

> obtained from wide-field mosaic cameras. It has standard functions for flat fielding, sky subtraction, distortion correction, and photometric and astrometric calibrations. One of the key features of SIMPLE is the ability to correct for image distortion from a set of dithered exposures, without relying on any external information (e.g., distortion function of the optics, or an external astrometric catalog). This is achieved by deriving the first-order derivatives of the distortion function directly out of the dithered images. This greatly help to produce high accuracy on astrometry as well as preserve image sharpness in the mosaicked/stacked image. Despite being designed toward a general reduction environment, the current distribution of SIMPLE has two highly optimized packages, one for the Wide-field InfraRed Camera on the Canada-France-Hawaii Telescope and the other for the Multi-Object InfraRed Camera and Spectrograph on the Subaru Telescope. SIMPLE has produced excellent (photometrically and astrometrically) wide-field images from both cameras. Users and the author of SIMPLE are also developing optimized SIMPLE pipelines for other mosaic cameras such as the Subaru Prime Focus Camera.

Potentially a Supplements paper.

> ----
> Article 4 -- application of general computing technologies to astronomy
>
> Java and High performance computing in Gaia processing.
>
> In recent years Java has matured to a stable easy-to-use language with the flexibility of an interpreter (for reflection etc.) but the performance and type checking of a compiled language. When we started using Java for astronomical applications around 1999 they were the first of their kind in Astronomy. Now a great deal of Astronomy software is written in Java as are many Business applications. We discuss the current environment and trends concerning the language and present an actual example of scientific use of Java for high-performance computing: ESA's mission Gaia. The Gaia scanning satellite will perform a galactic census of about 1000 million objects in our galaxy. The Gaia community has chosen to write its processing software in Java. We explore the manifold reasons for choosing Java for this large science collaboration including recent sucess using the Amazon Cloud for AGIS.

I'm dubious about this one.

> ----
> Article 5 -- development and use of astronomy-specific 'infrastructure'
>
> Another way to explore the sky: HEALPix usage in Aladin full sky mode
>
> The last few years have seen the emergence of a new feature in several astronomical visualization tools : the interactive sky browser supporting immediate panning and zooming. World Wind, Google Sky, World Wide Telescope, Wikisky, Virgo and now Aladin, all these tools have in common a view of the sky based on a hierarchical multi-resolution sky tessellation. The aim is to load and draw the good "pieces" of the sky at the good resolution as fast as possible, according to the current user sky view. The goal is the same but sky indexing solutions differ significantly and do not offer the same capabilities in term of performances, underlying data base complexity, available projections, projection distortion, pixel value access, graphical overlays, etc. Actually, most of the tools offer false-colour skies with a unique simple projection. But this new feature can be used not only for providing a sky background, but also for accessing and analyzing pixel data in the same way that astronomers commonly use FITS images for doing science. In this talk, we will present how Aladin is using an HEALPix sky tessellation for building a powerful sky data base. We will present the arguments in favor of HEALPix, notably: - The intrinsic qualities of HEALPix for implementing fast pixel algorithms such as convolutions, Fourier analysis, wavelet decomposition, nearest neighbor searches, topological analyses... - The hierarchical structure of the sky directly mapped in a simple directory tree, allowing immediate usage for local data; - The projection methods for reducing as much as possible the distortions notably at poles and at the "sky borders"; - The available libraries, and especially the Java package supporting deep sky resolution; - Last but not least, the direct usage for current mission data such as Planck; - etc. We will also discuss about the compatibility/interoperability between all these tools and

> how we could avoid to duplicate these data bases and implement efficient
> collaboration. This might open the door to a future VO standard describing
> this new way to explore the sky.

This could have enough novel features to justify publication in the Supplements.

We will be discussing this at editorial meetings for years to come. I'd welcome your thoughts.

Ethan Vishniac

apjetv.vcf (0.1 KB)