Documentation of `redmonster` Output File

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1 Introduction

This document describes the format of the *redmonster* file, which contains the spectroscopic redshifts and classifications from the `redmonster` software.

2 File Format

2.1 File naming convention

Files from `redmonster` will generally follow the naming scheme

redmonster-pppp-mmmmm.fits

where *pppp* is the 4-digit SDSS plate number, and *mmmmm* is the 5-digit MJD. These correspond with the *spPlate* input file and and cannot be changed by the user.

In the case where a file with the above naming convention exists in the given path, the default behavior of the software is to overwrite it. However, the user may elect to leave the older file intact, in which case the new file will be written as

redmonster-pppp-mmmmm-YYYY-nn-dd_HH:MM:SS.fits

where *YYYY*, *nn*, *dd*, *HH*, *MM*, and *SS* are the year, month, day, hour, minute, and second, respectively, of the time at which the file was written.

2.2 File type

All `redmonster` outputs are uncompressed FITS files with all relevant information in the primary HDU header and the first and second BIN tables. The file size is approximately 20 Mb.

2.3 File contents

The general structure of the file is as follows:

HDU0	NULL	Empty
HDU1	Binary FITS Table	Object redshifts and classifications
HDU2	`nfibers` × `npix` float image	Best-fit template model for each object

2.4 Header structure

The primary HDU header is identical to that of the *spPlate* files. The header keywords are as follows:

SIMPLE	FITS STANDARD
BITPIX	PIXEL
NAXIS	NUMBER OF AXES
EXTEND	
TAI	1st row - Number of seconds since 17 Nov 1858
RA	1st row - Right ascension of telescope boresight
DEC	1st row - Declination of telescope boresight
EQUINOX	
RADECSYS	
AZ	1st row - Azimuth of telescope

2.5 Binary tables

The first binary FITS table contains all redshift and classification information. The data included is as follows, as specified by the binary table's header:

Z1	Best redshift (least χ^2_r)
Z2	Second best redshift
Z_ERR1	1-σ error associated with Z1
Z_ERR2	1-σ error associated with Z2
CLASS	Object type classification
SUBCLASS	Best-fit template parameters
FIBERED	*spPlate* fiber numbers used (0-based)
MINVECTOR	Coordinates of best-fit template in *ndArch* file
ZWARNING	Warning flags (documented elsewhere)
DOF	Degrees of freedom used in calculating χ^2_r
NPOLY	Number of additive polynomials used
FNAME	Full name of *ndArch* file of best-fit template

In some cases (failure of fit, small $\Delta\chi^2$, etc.), redshift values have been set to -1. In these cases, the associated errors have also been set to -1.

The second binary FITS table contains an `nfibers` $\times$ `npix` float image comprised of the best-fit models (template plus polynomials at global minimum of χ^2 surface) for each fiber.

Details for this part still need to be filled in once `io.py` is edited to write the models as well.