Photometric redshifts and K-corrections for SDSS-DR7

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1 Abstract

We present a catalogue of galaxy photometric redshifts and k-corrections for the Sloan Digital Sky Survey Seven Data Release (SDSS-DR7). The photometric redshifts were estimated with an artificial neural network using five *ugriz* bands, concentration indices and Petrosian radii in the g and r bands. We have explored our redshift estimates with different training set concluding that the best choice to improve redshift accuracy comprises the Main Galaxies Sample (MGS), the Luminous Red Galaxies, and galaxies of active galactic nuclei covering the redshift range $0 < z \leq 0.3$. For the MGS, the photometric redshift estimates agree with the spectroscopic values within $rms = 0.0227$. The derived distribution of photometric redshifts in the range $0 < z_{phot} \leq 0.6$ agrees well with the model predictions.
k-corrections were derived by calibration of the `k-correct_v4.2` code results for the MGS with the reference frame ($z = 0.1$) $(g - r)$ colours. We adopt a linear dependence of k corrections on redshift and $(g - r)$ colours that provide suitable distributions of luminosity and colours for galaxies up to redshift $z_{phot} = 0.6$ comparable to the results in the literature. Thus, our k-correction estimate procedure is a powerful, low computational time algorithm capable of reproducing suitable results that can be used for testing

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galaxy properties at intermediate redshifts using the large SDSS database.

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2 Description:

The catalogue comprises 403 files, each one has aproximately 450000 objects. Tags names are:
run: run number
objID: unique SDSS identifier
ra: $\alpha(J2000)$
dec: $\delta(J2000)$
$\mathbf{z_{phot}}$: photometric redshift
$\mathbf{kcor_u}$: k-correction in the u band
$\mathbf{kcor_g}$: k-correction in the g band
$\mathbf{kcor_r}$: k-correction in the r band
$\mathbf{kcor_i}$: k-correction in the i band
$\mathbf{kcor_z}$: k-correction in the z band
$\mathbf{k_{flag}}$: k-correction flags

There is a small percentage (less than 0.4%) of galaxies for which our algorithm does not converge. Since the main sources for this lack of convergence are large magnitude uncertainties and unreliable observed colours, we have tagged galaxies according with the following flags:
$\mathbf{k_{flag}} = \mathbf{0}$ the algorithm does not converge because observed colour $(g-r) > 3$
$\mathbf{k_{flag}} = \mathbf{1}$ the algorithm converge
$\mathbf{k_{flag}} = \mathbf{3}$ the algorithm does not converge because $magerr_r > 5$
$\mathbf{k_{flag}} = \mathbf{4}$ the algorithm does not converge becaus $magerr_g > 5$
$\mathbf{k_{flag}} = \mathbf{5}$ the algorithm does not converge because $magerr_r$ and $magerr_g > 5$
$\mathbf{k_{flag}} = \mathbf{7}$ the algorithm converge but $magerr_r > 5$
$\mathbf{k_{flag}} = \mathbf{8}$ the algoritm converge but $magerr_g > 5$

We recomend to use $k_{flag} = 1$, $k_{flag} = 7$ or $k_{flag} = 8$