J/A+A/568/A126 SDSS-DR9 photometric redshifts (Brescia+, 2014)

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A catalogue of photometric redshifts for the SDSS-DR9 galaxies.
Brescia M., Cavuoti S., Longo G., De Stefano V.
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ADC_Keywords: Galaxy catalogs ; Galaxies, photometry ; Photometry, SDSS ;
Redshifts
Keywords: techniques: photometric - galaxies: distances and redshifts -
galaxies: photometry - methods: data analysis - catalogs

Abstract:
Accurate photometric redshifts for large samples of galaxies are among
the main products of modern multiband digital surveys. Over the last
decade, the Sloan Digital Sky Survey (SDSS) has become a sort of
benchmark against which to test the various methods. We present an
application of a new method to the estimation of photometric redshifts
for the galaxies in the SDSS Data Release 9 (SDSS-DR9). Photometric
redshifts for more than 143 million galaxies were produced. The MLPQNA
(Multi Layer Perceptron with Quasi Newton Algorithm) model provided
within the framework of the DAMEWARE (DAta Mining and Exploration Web
Application REsource) is an interpolative method derived from machine
learning models. The obtained redshifts have an overall uncertainty of
sigma=0.023 with a very small average bias of about 3x10^-5, and a
fraction of catastrophic outliers of about 5%. This result is slightly

better than what was already available in the literature, particularly
in terms of the smaller fraction of catastrophic outliers.

Description:
We present an application of a machine learning method to the
estimation of photometric redshifts for the galaxies in the SDSS Data
Release 9 (SDSS-DR9). Photometric redshifts for more than 143 million
galaxies were produced. The MLPQNA (Multi Layer Perceptron with Quasi
Newton Algorithm) model provided within the framework of the DAMEWARE
(DAta Mining and Exploration Web Application REsource) is an
interpolative method derived from machine learning models. The
obtained redshifts have an overall uncertainty of $\sigma=0.023$ with a
very small average bias of about $3x10^{-5}$ and a fraction of
catastrophic outliers of about 5%. After removal of the catastrophic
outliers, the uncertainty is about $\sigma=0.017$. The catalogue files
report in their name the range of DEC degrees related to the included
objects.

File Summary:

| FileName | Lrecl | Records | Explanations |
|---|---|---|---|
| ReadMe | 80 | . | This file |
| r00_01.dat | 186 | 3174048 | Photo-z for objects with DEC in [+00, +01[ deg |
| r01_02.dat | 186 | 2622557 | Photo-z for objects with DEC in [+01, +02[ deg |
| r02_03.dat | 186 | 2425949 | Photo-z for objects with DEC in [+02, +03[ deg |

r03_04.dat  186  2452418  Photo-z for objects with DEC in [+03, +04[ deg
r04_05.dat  186  2581739  Photo-z for objects with DEC in [+04, +05[ deg
r05_06.dat  186  2584264  Photo-z for objects with DEC in [+05, +06[ deg
r06_07.dat  186  2573026  Photo-z for objects with DEC in [+06, +07[ deg
r07_08.dat  186  2527441  Photo-z for objects with DEC in [+07, +08[ deg
r08_09.dat  186  2477638  Photo-z for objects with DEC in [+08, +09[ deg
r09_10.dat  186  2446000  Photo-z for objects with DEC in [+09, +10[ deg
r10_11.dat  186  2421873  Photo-z for objects with DEC in [+10, +11[ deg
r11_12.dat  186  2345616  Photo-z for objects with DEC in [+11, +12[ deg
r12_13.dat  186  2368326  Photo-z for objects with DEC in [+12, +13[ deg
r13_14.dat  186  2399749  Photo-z for objects with DEC in [+13, +14[ deg
r14_15.dat  186  2481196  Photo-z for objects with DEC in [+14, +15[ deg
r15_16.dat  186  2453102  Photo-z for objects with DEC in [+15, +16[ deg
r16_17.dat  186  2424682  Photo-z for objects with DEC in [+16, +17[ deg
r17_18.dat  186  2443693  Photo-z for objects with DEC in [+17, +18[ deg
r18_19.dat  186  2393301  Photo-z for objects with DEC in [+18, +19[ deg
r19_20.dat  186  2344795  Photo-z for objects with DEC in [+19, +20[ deg
r20_21.dat  186  2302416  Photo-z for objects with DEC in [+20, +21[ deg
r21_22.dat  186  2306628  Photo-z for objects with DEC in [+21, +22[ deg
r22_23.dat  186  2324688  Photo-z for objects with DEC in [+22, +23[ deg
r23_24.dat  186  2316396  Photo-z for objects with DEC in [+23, +24[ deg
r24_25.dat  186  2346731  Photo-z for objects with DEC in [+24, +25[ deg

r25_26.dat  186  2345722  Photo-z for objects with DEC in [+25, +26[ deg
r26_27.dat  186  2309884  Photo-z for objects with DEC in [+26, +27[ deg
r27_28.dat  186  2278879  Photo-z for objects with DEC in [+27, +28[ deg
r28_29.dat  186  2234187  Photo-z for objects with DEC in [+28, +29[ deg
r29_30.dat  186  2219295  Photo-z for objects with DEC in [+29, +30[ deg
r30_31.dat  186  2162802  Photo-z for objects with DEC in [+30, +31[ deg
r31_32.dat  186  2080848  Photo-z for objects with DEC in [+31, +32[ deg
r32_33.dat  186  1982223  Photo-z for objects with DEC in [+32, +33[ deg
r33_34.dat  186  1936611  Photo-z for objects with DEC in [+33, +34[ deg
r34_35.dat  186  1870717  Photo-z for objects with DEC in [+34, +35[ deg
r35_36.dat  186  1780638  Photo-z for objects with DEC in [+35, +36[ deg
r36_38.dat  186  3372102  Photo-z for objects with DEC in [+36, +38[ deg
r38_40.dat  186  3406218  Photo-z for objects with DEC in [+38, +40[ deg
r40_42.dat  186  3259750  Photo-z for objects with DEC in [+40, +42[ deg
r42_44.dat  186  3185334  Photo-z for objects with DEC in [+42, +44[ deg
r44_46.dat  186  2965157  Photo-z for objects with DEC in [+44, +46[ deg
r46_48.dat  186  2589271  Photo-z for objects with DEC in [+46, +48[ deg
r48_50.dat  186  2313002  Photo-z for objects with DEC in [+48, +50[ deg
r50_53.dat  186  3180836  Photo-z for objects with DEC in [+50, +53[ deg
r53_56.dat  186  2957915  Photo-z for objects with DEC in [+53, +56[ deg
r56_60.dat  186  3426159  Photo-z for objects with DEC in [+56, +60[ deg
r60_65.dat  186  3815459  Photo-z for objects with DEC in [+60, +65[ deg

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r65_70.dat    186  1677346   Photo-z for objects with
DEC in [+65, +70[ deg
r70_85.dat    186  1337222   Photo-z for objects with
DEC in [+70, +85[ deg
r-01_00.dat   186  3182508   Photo-z for objects with
DEC in [-01, +00[ deg
r-02_-01.dat  186  2471559   Photo-z for objects with
DEC in [-02, -01[ deg
r-04_-02.dat  186  3808610   Photo-z for objects with
DEC in [-04, -02[ deg
r-06_-04.dat  186  2637920   Photo-z for objects with
DEC in [-06, -04[ deg
r-08_-06.dat  186  2661702   Photo-z for objects with
DEC in [-08, -06[ deg
r-10_-08.dat  186  2006992   Photo-z for objects with
DEC in [-10, -08[ deg
r-15_-10.dat  186  2175039   Photo-z for objects with
DEC in [-15, -10[ deg
r-20_-15.dat  186  1693609   Photo-z for objects with
DEC in [-20, -15[ deg
r-30_-20.dat  186   702996   Photo-z for objects with
DEC in [-30, -20[ deg
rspecial.dat  186    18006  *Photo-z for special SDSS
objects
fits/*          .       59   Tables as fits files
--------------------------------------------------
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Note on rspecial.dat: photo-z for SDSS special objects
with a mismatch between
  photometric and spectroscopic class assignment.
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See also:
    http://www.sdss.org : SDSS Home Page

Byte-by-byte Description of file: r*.dat
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   Bytes Format Units   Label     Explanations
--------------------------------------------------
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   1- 19  I19   ---     objID     Unique SDSS
identifier
```

```
  21- 29  F9.5  deg     RAdeg     Right Ascension
(J2000)
  31- 39  F9.5  deg     DEdeg     Declination (J2000)
  41- 46  F6.3  mag     umag      [0/40] u-band PSF
magnitude
  48- 53  F6.3  mag     gmag      [0/40] g-band PSF
magnitude
  55- 60  F6.3  mag     rmag      [0/40] r-band PSF
magnitude
  62- 67  F6.3  mag     imag      [0/40] i-band PSF
magnitude
  69- 74  F6.3  mag     zmag      [0/40] z-band PSF
magnitude
  76- 81  F6.3  mag   e_umag      ?=99.999 u-band PSF
magnitude error
  83- 88  F6.3  mag   e_gmag      ?=99.999 g-band PSF
magnitude error
  90- 95  F6.3  mag   e_rmag      ?=99.999 r-band PSF
magnitude error
  97-102  F6.3  mag   e_imag      ?=99.999 i-band PSF
magnitude error
 104-109  F6.3  mag   e_zmag      ?=99.999 z-band PSF
magnitude error
 111-116  F6.3  mag     extu      ?=99.999 Extinction
in u-band
 118-123  F6.3  mag     extg      ?=99.999 Extinction
in g-band
 125-130  F6.3  mag     extr      ?=99.999 Extinction
in r-band
 132-137  F6.3  mag     exti      ?=99.999 Extinction
in i-band
 139-144  F6.3  mag     extz      ?=99.999 Extinction
in z-band
 146-152  F7.3  mag     u-g       u-g color index from
PSF SDSS magnitudes
 154-160  F7.3  mag     g-r       g-r color index from
PSF SDSS magnitudes
 162-168  F7.3  mag     r-i       r-i color index from
PSF SDSS magnitudes
 170-176  F7.3  mag     i-z       i-z color index from
PSF SDSS magnitudes
 178-184  F7.5  ---     zphot     Estimated photometric
redshift
     186  I1    ---   q_zphot     [0/3] Quality Flag of
the zphot: 0=none,
```

1=high,
2=medium, 3=low
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Acknowledgements:
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(End) Massimo Brescia [INAF-OACN, Italy], Patricia Vannier [CDS] 15-Jul-2014