

BD CLI

The Brown Dog Command Line Interface (BD-CLI) provides users with an easy to use interface to Brown Dog services. It talks to various components of Brown Dog through its API. It can be used to do operations like file conversions and extractions. Please see the [README](#) for current instructions.

Installation

You can install BD-CLI from the [PyPi](#) repository by following these steps:

1. Create a Python virtual environment in your computer using [virtualenv](#), [virtualenvwrapper](#) or any other tool.
2. Activate the created Python virtual environment
3. Run the following command:
`pip install bdcli`
4. This will install bdcli and all the dependent packages and you should see a new application **bd** from your terminal.

Extractions

[Extraction](#) refers to the process of deriving additional useful information from the contents of one or more files/datasets that helps a user or application in determining what's in the file/dataset or collection of files/datasets. For example, using machine learning to find an object in an image. For example:

```
examples $ bd -b https://bd-api-dev.ncsa.illinois.edu ncsa.png
Brown Dog API URL: https://bd-api-dev.ncsa.illinois.edu
ncsa.json
```

Here we are using the development instance of Brown Dog by passing in the API URL using -b option. This is an optional flag and by default BD-CLI uses the production API instance at <https://bd-api.ncsa.illinois.edu>. The results of the extraction are by default placed in a JSON file, in this case ncsa.json:

ncsa.json

```
examples $ cat ncsa.json | jq .
{
  "metadata.jsonld": [
    {
      "content": {
        "Human Preference Extractor": {
          "Definitions": {
            "Human Preference": "A Computer Vision model that uses the spectral data of an image to get a human preference value ranging from 1 to 5.",
            "Green Index": "The green index is the estimated percentage of green pixels within an image."
          },
          "Data": {
            "Green Index": "2.3"
          }
        }
      },
      "created_at": "Tue Jun 20 10:34:06 CDT 2017",
      "agent": {
        "extractor_id": "http://clowder.ncsa.illinois.edu/extractors/deprecatedapi",
        "@type": "cat:extractor",
        "name": "http://clowder.ncsa.illinois.edu/extractors/deprecatedapi"
      }
    },
    {
      "content": {
        "y1": 288,
        "y0": 88,
        "x0": 920,
        "x1": 1220
      },
      "@context": [
        "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
        {
          "y1": "http://clowder.ncsa.illinois.edu/gi_detector#y1",
          "y0": "http://clowder.ncsa.illinois.edu/gi_detector#y0",
          "x0": "http://clowder.ncsa.illinois.edu/gi_detector#x0",
          "x1": "http://clowder.ncsa.illinois.edu/gi_detector#x1"
        }
      ]
    }
  ],
}
```

```

"created_at": "Tue Jun 20 10:33:54 CDT 2017",
"agent": {
  "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/gi_detector",
  "@type": "cat:extractor",
  "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/gi_detector"
}
},
{
  "content": {
    "ocr_text": "WEB BROWSER MOSAIC THE FIRST POPULAR GRAPHICAL BROWSER FOR THE WORLD WIDE WEB WAS CREATED
BY MARC ANDREESSEN AND ERIC BINA AT THE NATIONAL CENTER FOR COMPUTING APPLICATIONS NCSA UPON ITS 1993 RELEASE
TO THE PUBLIC MOSAIC GAVE INTERNET USERS EASY ACCESS TO MULTIMEDIA SOURCES OF INFORMATION WEB BROWSERS HAVE
TRANSFORMED THE EXCHANGE OP INFORMATION UNIVERSITY OF ILLINOIS"
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "ocr_text": "http://clowder.ncsa.illinois.edu/ncsa.image.ocr#ocr_text"
    }
  ],
  "created_at": "Tue Jun 20 10:33:50 CDT 2017",
  "agent": {
    "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.image.ocr",
    "@type": "cat:extractor",
    "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.image.ocr"
  }
},
{
  "content": {
    "basic_caltech101_score": "-0.696487",
    "basic_caltech101_category": "bonsai"
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "basic_caltech101_score": "http://clowder.ncsa.illinois.edu/metadata/ncsa.cv.
caltech101#basic_caltech101_score",
      "basic_caltech101_category": "http://clowder.ncsa.illinois.edu/metadata/ncsa.cv.
caltech101#basic_caltech101_category"
    }
  ],
  "created_at": "Tue Jun 20 10:33:50 CDT 2017",
  "agent": {
    "extractor_id": "http://141.142.211.76:9000/clowder-dev/extractors/ncsa.cv.caltech101/1.0",
    "@type": "cat:extractor",
    "name": "http://141.142.211.76:9000/clowder-dev/extractors/ncsa.cv.caltech101/1.0"
  }
},
{
  "content": {
    "versus_descriptors": [
      {
        "descriptor_id": "class edu.illinois.ncsa.versus.descriptor.impl.RGBHistogramDescriptor",
        "bands": 3,
        "extractor_id": "edu.illinois.ncsa.versus.extract.impl.RGBHistogramExtractor",
        "bins": 8,
        "descriptor": [
          [
            0.5913427300480177,
            0.10906269800126721,
            0.29938380696545547,
            0.00021076498525954203,
            0,
            0,
            0,
            0
          ],
          [
            0.6151575370082368,
            0.18266582360672562,
            0.2015070350995701,

```

```

        0.000669604285467427,
        0,
        0,
        0,
        0
    ],
    [
        0.5999196213037582,
        0.1472782516717198,
        0.2524234700556629,
        0.0003786569688591462,
        0,
        0,
        0,
        0
    ]
]
}
]
},
"@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
        "descriptor_id": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#descriptor_id",
        "versus_descriptors": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#versus_descriptors",
        "bands": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#bands",
        "descriptor": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#descriptor",
        "extractor_id": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#extractor_id",
        "bins": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#bins"
    }
],
"created_at": "Tue Jun 20 10:33:49 CDT 2017",
"agent": {
    "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.versus.image",
    "@type": "cat:extractor",
    "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.versus.image"
}
},
{
    "content": {
        "Border color": "srgb(223,223,223)",
        "Compression": "Zip",
        "Elapsed time": "0:01.219",
        "Artifacts": {
            "verbose": true,
            "filename": "/tmp/tmpzdHVT2.png"
        },
        "height": 1929,
        "Interlace": "None",
        "Compose": "Over",
        "Tainted": false,
        "Filesize": "3.797MB",
        "Pixels per second": "13.89MB",
        "Units": "PixelsPerCentimeter",
        "Chromaticity": {
            "red primary": "(0.64,0.33)",
            "green primary": "(0.3,0.6)",
            "blue primary": "(0.15,0.06)",
            "white point": "(0.3127,0.329)"
        },
        "Type": "TrueColor",
        "Rendering intent": "Perceptual",
        "Print size": "22.3539x27.2227",
        "Channel depth": {
            "blue": "8-bit",
            "green": "8-bit",
            "red": "8-bit"
        },
        "Background color": "white",
        "Transparent color": "black",
        "Format": "PNG (Portable Network Graphics)",

```

```
"Image statistics": {
  "Overall": {
    "skewness": 0.67031,
    "min": "0 (0)",
    "max": "255 (1)",
    "standard deviation": "73.7679 (0.289286)",
    "kurtosis": -1.19763,
    "mean": "91.9025 (0.360402)"
  }
},
"Number pixels": "3.056M",
"width": 1584,
"Channel statistics": {
  "Blue": {
    "skewness": 0.771814,
    "min": "0 (0)",
    "max": "255 (1)",
    "standard deviation": "70.8725 (0.277931)",
    "kurtosis": -0.940633,
    "mean": "87.3909 (0.342709)"
  },
  "Green": {
    "skewness": 0.627148,
    "min": "0 (0)",
    "max": "255 (1)",
    "standard deviation": "73.9244 (0.2899)",
    "kurtosis": -1.27569,
    "mean": "90.7096 (0.355724)"
  },
  "Red": {
    "skewness": 0.59793,
    "min": "0 (0)",
    "max": "255 (1)",
    "standard deviation": "76.4027 (0.299618)",
    "kurtosis": -1.38753,
    "mean": "97.607 (0.382772)"
  }
},
"Class": "DirectClass",
"Mime type": "image/png",
"Page geometry": "1584x1929+0+0",
"Geometry": "1584x1929+0+0",
"Colorspace": "sRGB",
"Depth": "8-bit",
"User time": "0.130u",
"Matte color": "grey74",
"Resolution": "70.86x70.86",
"Gamma": 0.45455,
"Image": "/tmp/tmpzdhVT2.png",
"Properties": {
  "photoshop": {
    "DateCreated": "2014-01-13T09:13:13"
  }
},
"exif": {
  "LightSource": 0,
  "FlashPixVersion": "48, 49, 48, 48",
  "ExposureMode": 0,
  "Flash": 16,
  "SceneCaptureType": 0,
  "DateTime": "2014:01:13 09:13:13",
  "MeteringMode": 5,
  "ExifVersion": "48, 50, 51, 48",
  "ExposureBiasValue": "0/1",
  "Saturation": 0,
  "ExposureProgram": 2,
  "FocalLengthIn35mmFilm": 33,
  "ColorSpace": 1,
  "ExifImageWidth": 1584,
  "Contrast": 0,
  "DateTimeOriginal": "2014:01:13 09:13:13",
```

```

    "WhiteBalance": 0,
    "CompressedBitsPerPixel": "4/1",
    "DateTimeDigitized": "2014:01:13 09:13:13",
    "SensingMethod": 2,
    "FNumber": "7/2",
    "CustomRendered": 0,
    "FocalLength": "28/5",
    "ComponentsConfiguration": "1, 2, 3, 0",
    "ExifOffset": 188,
    "ISOSpeedRatings": 100,
    "Model": "DMC-FZ200",
    "Software": "Ver.1.0",
    "ExposureTime": "1/125",
    "FileSource": 3,
    "MaxApertureValue": "95/32",
    "Make": "Panasonic",
    "Sharpness": 0,
    "GainControl": 0,
    "DigitalZoomRatio": "0/1",
    "ExifImageLength": 1929
  },
  "icc": {
    "model": "IEC 61966-2.1 Default RGB colour space - sRGB",
    "description": "sRGB IEC61966-2.1",
    "copyright": "Copyright (c) 1998 Hewlett-Packard Company",
    "manufacturer": "IEC http://www.iec.ch"
  },
  "signature": "2decf705da4c929f51db201f646f51f5dcd9dcfd42aac6997cf825e37593ca8d",
  "date": {
    "create": "2017-06-20T15:33:48+00:00",
    "modify": "2017-06-20T15:33:48+00:00"
  },
  "aux": {
    "SerialNumber": "0071309260157"
  },
  "xmp": {
    "CreateDate": "2014-01-13T09:13:13",
    "ModifyDate": "2014-01-13T09:13:13",
    "CreatorTool": "Ver.1.0"
  },
  "png": {
    "bKGD": "chunk was found (see Background color, above)",
    "IHDR": {
      "color-type-orig": 2,
      "color_type": "2 (Truecolor)",
      "bit_depth": 8,
      "width,height": "1584, 1929",
      "bit-depth-orig": 8,
      "interlace_method": "0 (Not interlaced)"
    },
    "pHYs": "x_res=7086, y_res=7086, units=1",
    "text": "47 tEXt/zTXt/iTXt chunks were found",
    "sRGB": "intent=0 (Perceptual Intent)",
    "gAMA": "gamma=0.45455 (See Gamma, above)",
    "tIME": "2017-05-08T17:53:53Z",
    "cHRM": "chunk was found (see Chromaticity, above)"
  }
},
"Version": "ImageMagick 6.8.9-9 Q16 x86_64 2017-05-26 http://www.imagemagick.org",
"Iterations": 0
},
"@context": {
  "@vocab": "http://www.w3.org/2003/12/exif/ns"
},
"created_at": "Tue Jun 20 10:33:48 CDT 2017",
"agent": {
  "extractor_id": "http://141.142.211.76:9000/clowder-dev/api/extractors/ncsa.image.metadata",
  "@type": "cat:extractor",
  "name": "http://141.142.211.76:9000/clowder-dev/api/extractors/ncsa.image.metadata"
}
},
},

```

```

{
  "content": {
    "conformsTo": [
      {
        "sf:mime": "image/png",
        "sf:version": "1.1",
        "@id": "info:pronom/fmt/12",
        "sf:name": "Portable Network Graphics",
        "sf:basis": "extension match png; byte match at [[[0 16]] [[37 4]] [[3796773 12]]] (signature 3/3)"
      }
    ],
    "extent": 3796785
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "conformsTo": "http://purl.org/dc/terms/conformsTo",
      "extent": "http://purl.org/dc/terms/extent"
    }
  ],
  "created_at": "Tue Jun 20 10:33:48 CDT 2017",
  "agent": {
    "extractor_id": "http://141.142.211.76:9000/clowder-dev/extractors/siegfried/2.0",
    "@type": "cat:extractor",
    "name": "http://141.142.211.76:9000/clowder-dev/extractors/siegfried/2.0"
  }
},
{
  "content": {
    "mean grayscale value": 92.37236772860801
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "mean grayscale value": "http://clowder.ncsa.illinois.edu/ncsa.cv.meangrey#mean_grayscale_value"
    }
  ],
  "created_at": "Tue Jun 20 10:33:48 CDT 2017",
  "agent": {
    "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.cv.meangrey",
    "@type": "cat:extractor",
    "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.cv.meangrey"
  }
},
{
  "content": {
    "sha1": "cd89ff5f85078b3a98f4f92dc25894a69bd89181",
    "sha224": "9b9f30bede741663dcb7c3d1f1d9427a3b059d490831c3a6cd6b62ca",
    "sha384":
"5ec428a0f040935aca0ff21fa72478864626ecd8ce326db12a7ede223464126a1a91ff5712192af8df9051ea7ab3ee4c",
    "sha256": "12adc20571b87d90350238f16a5fcaaaa9d5ea56cd3a4e57616d84b8d2799a32",
    "sha512":
"c7dd3508b864904de193b105d4d2347ec591fa31d0b6ab54bcd3fa2c2ecef9967bb14a452d434d21fb5cfacc849d74c9e098648671e1ec1776599ebb0931b28e",
    "md5": "2a2d9dc555876abfd4641c4529eb7960"
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "sha1": "http://www.w3.org/2001/04/xmldsig-more#sha1",
      "sha224": "http://www.w3.org/2001/04/xmldsig-more#sha224",
      "sha384": "http://www.w3.org/2001/04/xmldsig-more#sha384",
      "sha256": "http://www.w3.org/2001/04/xmldsig-more#sha256",
      "sha512": "http://www.w3.org/2001/04/xmldsig-more#sha512",
      "md5": "http://www.w3.org/2001/04/xmldsig-more#md5"
    }
  ],
  "created_at": "Tue Jun 20 10:33:48 CDT 2017",
  "agent": {
    "extractor_id": "http://141.142.211.76:9000/clowder-dev//api/extractors/ncsa.file.digest",
    "@type": "cat:extractor",

```

```

    "name": "http://141.142.211.76:9000/clouder-dev//api/extractors/ncsa.file.digest"
  }
}
],
"versusmetadata": [
  {
    "descriptor_id": "class edu.illinois.ncsa.versus.descriptor.impl.RGBHistogramDescriptor",
    "bands": 3,
    "extractor_id": "edu.illinois.ncsa.versus.extract.impl.RGBHistogramExtractor",
    "bins": 8,
    "descriptor": [
      [
        0.5913427300480177,
        0.10906269800126721,
        0.29938380696545547,
        0.00021076498525954203,
        0,
        0,
        0,
        0
      ],
      [
        0.6151575370082368,
        0.18266582360672562,
        0.2015070350995701,
        0.000669604285467427,
        0,
        0,
        0,
        0
      ],
      [
        0.5999196213037582,
        0.1472782516717198,
        0.2524234700556629,
        0.0003786569688591462,
        0,
        0,
        0,
        0
      ]
    ]
  }
],
"tags": [],
"filename": "ncsa.png",
"technicalmetadata": [
  {
    "Human Preference Extractor": {
      "Definitions": {
        "Human Preference": "A Computer Vision model that uses the spectral data of an image to get a human preference value ranging from 1 to 5.",
        "Green Index": "The green index is the estimated percentage of green pixels within an image."
      },
      "Data": {
        "Green Index": "2.3"
      }
    }
  }
],
"id": "5949405b4f0c4db82da2da84"
}

```

Optionally you can use the `-v` flag to get a more verbose output, including the content of the output file `ncsa.json`. You can also get a list of available extractors that will process a given input file:

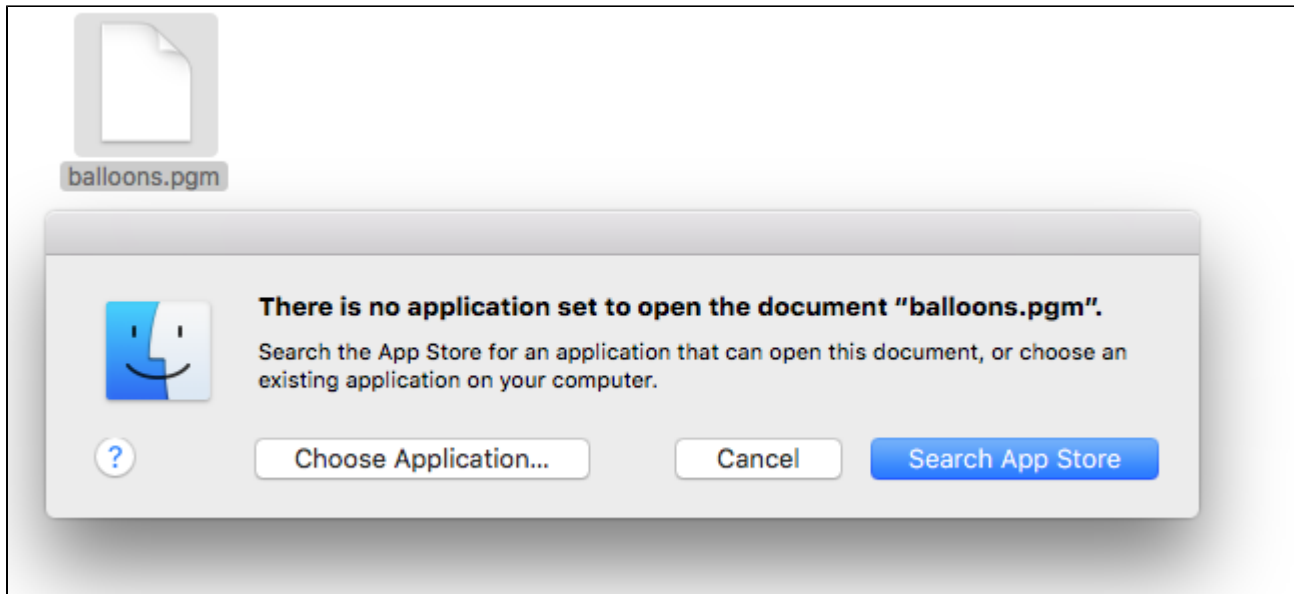
```

examples $ bd --extractors -b https://bd-api-dev.ncsa.illinois.edu ncsa.png
Brown Dog API URL: https://bd-api-dev.ncsa.illinois.edu
siegfried, ncsa.video.preview, ncsa.video.person_tracking, ncsa.video.person_detector, ncsa.versus.image, ncsa.text.greenindexroute, ncsa.pdf.preview, ncsa.office.preview, ncsa.nlp.simplesummary, ncsa.nlp.simplelanguage, ncsa.image.preview, ncsa.image.ocr, ncsa.image.metadata, ncsa.image.humanpref, ncsa.image.geotiff, ncsa.geo.tiff, ncsa.geo.shp, ncsa.file.digest, ncsa.dbpedia, ncsa.cv.river, ncsa.cv.profiles, ncsa.cv.meangrey, ncsa.cv.faces, ncsa.cv.eyes, ncsa.cv.closeups, ncsa.cv.caltech101, ncsa.chi_analysis, ncsa.audio.preview, ncsa.arcgis.treedelin, ncsa.arcgis.landsat7mosaic, ncsa.arcgis.floodplain, gi_detector

```

Conversions

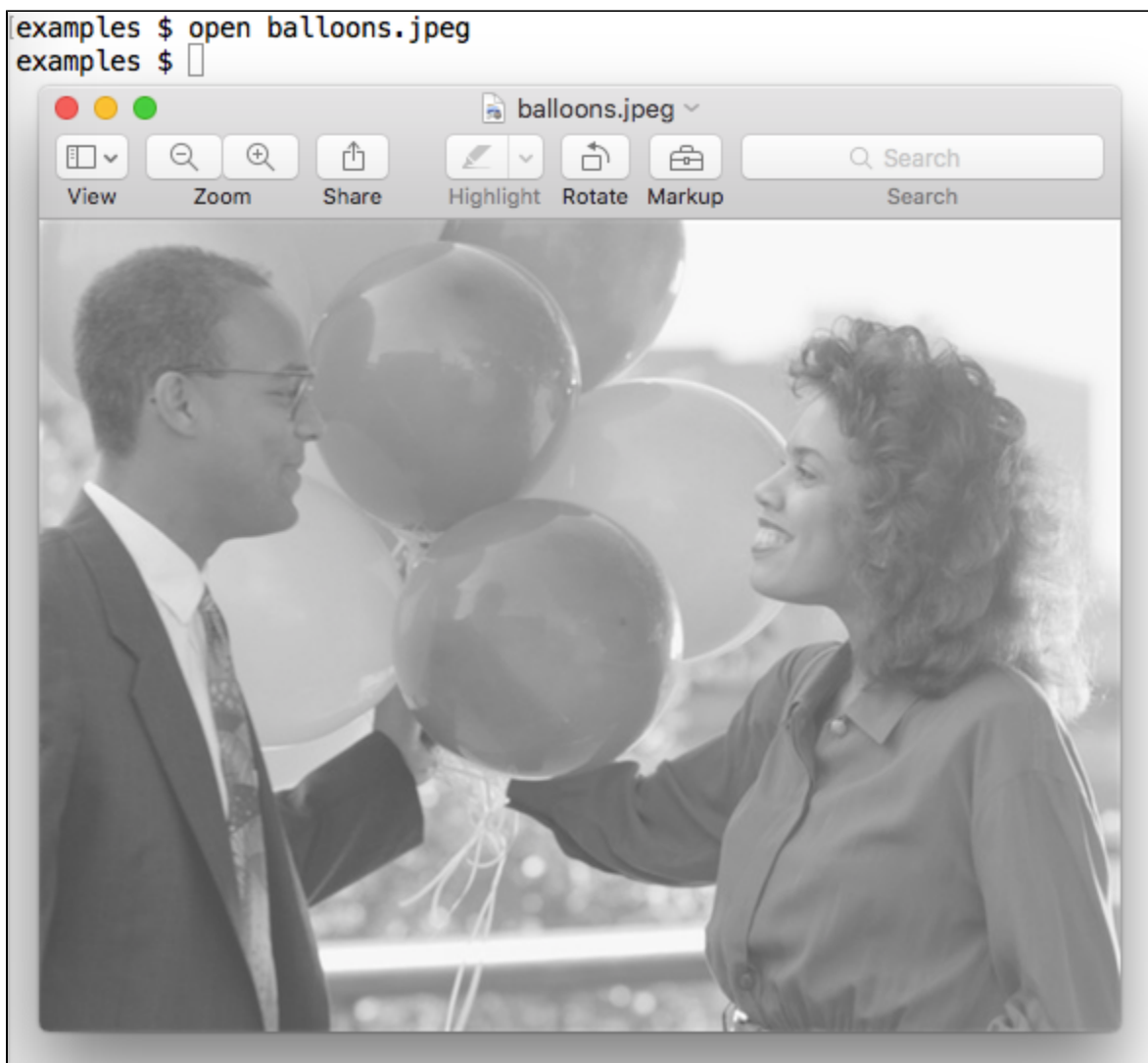
[Conversions](#) refer to the process of transforming files/datasets from one format to another. This is especially useful when you do not have a specific software required to open your input file. For example, the screenshot below shows a situation when software needed to open a PGM image file is not available:



To get around this the file can be converted to another format for which required software is available (say JPEG). With the Brown Dog DTS you can do this via a remote service without having to worry about have such utilities locally installed. For example, using the conversion command below:

```
examples $ bd -b https://bd-api-dev.ncsa.illinois.edu -o jpeg balloons.pgm
Brown Dog API URL: https://bd-api-dev.ncsa.illinois.edu
balloons.jpeg
```

Now, you can open the file to view the converted file:



Similar to extraction, you can get a list of output formats to which a given input file can be converted:

```
examples $ bd -b https://bd-api-dev.ncsa.illinois.edu --outputs balloons.pgm
Brown Dog API URL: https://bd-api-dev.ncsa.illinois.edu
ascii, azw3, bil.zip, bmp, clim, csv, dalec, dib, doc, docx, ed.zip, eps, epsi, epub, fb2, flt.zip, gif, html, htmlz, jpeg, jpg, json, linkages, lit, lrf, met, met.biocro, met.clm45, met.dalec, met.ed2, met.fates, met.gday, met.jul
es, met.linkages, met.ljguess, met.maas, met.maespa, met.preles, met.sigmet, mobi, odp, ods, odt, pcd, pdb, pdf, pdf12, pdf13, pdf14, pdfwr, pecan.nc, pecan.zip, pict, pmlz, png, pnm, ppm, ppt, ps, ps2, rb, rgb, rgba, rtf, sgi, sn
b, sun, svg, xw, tcr, tga, tif, tiff, ttf, txt, txtz, x, xbm, xls, xlsx, xml, xpm, xwd, yuv, zip
```

This list will grow over time as new conversion capabilities get added to the DTS.

Pipelining Transformations

Using this feature you can combine two or more transformations in a single command. For example, converting a PGM file to PNG and then doing an extraction:

```
examples $ bd -b https://bd-api-dev.ncsa.illinois.edu -o png balloons.pgm | bd -b https://bd-api-dev.ncsa.illinois.edu
bdcli: Brown Dog API URL: https://bd-api-dev.ncsa.illinois.edu
balloons.json
```

which generates:

balloons.json

```
examples $ cat balloons.json | jq .
{
  "metadata.jsonld": [
    {
      "content": {
```

```

    "Human Preference Extractor": {
      "Definitions": {
        "Human Preference": "A Computer Vision model that uses the spectral data of an image to get a human preference value ranging from 1 to 5.",
        "Green Index": "The green index is the estimated percentage of green pixels within an image."
      },
      "Data": {
        "Green Index": "0.0"
      }
    },
    "created_at": "Fri Jun 23 11:34:45 CDT 2017",
    "agent": {
      "extractor_id": "http://clowder.ncsa.illinois.edu/extractors/deprecatedapi",
      "@type": "cat:extractor",
      "name": "http://clowder.ncsa.illinois.edu/extractors/deprecatedapi"
    }
  },
  {
    "content": {
      "basic_caltech101_score": "-0.723433",
      "basic_caltech101_category": "Faces"
    },
    "@context": [
      "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
      {
        "basic_caltech101_score": "http://clowder.ncsa.illinois.edu/metadata/ncsa.cv.caltech101#basic_caltech101_score",
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"(128,128,128) #808080 gray(128)": 2230,
"(155,155,155) #9B9B9B gray(155)": 2624,
"(221,221,221) #DDDDDD gray(221)": 454,
"(184,184,184) #B8B8B8 gray(184)": 1762,
"(101,101,101) #656565 gray(101)": 1564,
"(225,225,225) #E1E1E1 gray(225)": 673,
"(112,112,112) #707070 gray(112)": 1868,
"(189,189,189) #BDBDBD gray(189)": 1473,
"(82, 82, 82) #525252 gray(82)": 238,
"(235,235,235) #EBEBEB gray(235)": 347,
"(86, 86, 86) #565656 gray(86)": 773,
"(85, 85, 85) #555555 gray(85)": 665,
"(200,200,200) #C8C8C8 gray(200)": 1576,
"(215,215,215) #D7D7D7 gray(215)": 1115,
"(229,229,229) #E5E5E5 gray(229)": 480,
"(103,103,103) #676767 gray(103)": 1828,
"(96, 96, 96) #606060 gray(96)": 1666,
"(219,219,219) #DBDBDB gray(219)": 554,
"(146,146,146) #929292 gray(146)": 4005,
"(193,193,193) #C1C1C1 gray(193)": 1968,
"(205,205,205) #CDCDCD gray(205)": 1221,
"(245,245,245) #F5F5F5 gray(245)": 432,
"(137,137,137) #898989 gray(137)": 3027,
"(248,248,248) #F8F8F8 gray(248)": 17452,
"(182,182,182) #B6B6B6 gray(182)": 1696,
"(234,234,234) #EAEAEA gray(234)": 346,
"(132,132,132) #848484 gray(132)": 2408,
"(197,197,197) #C5C5C5 gray(197)": 4133,
"(87, 87, 87) #575757 gray(87)": 722,
"(161,161,161) #A1A1A1 gray(161)": 1817,
"(140,140,140) #8C8C8C gray(140)": 3712,
"(240,240,240) #F0F0F0 gray(240)": 377,
"(222,222,222) #DEDEDE gray(222)": 861,
"(106,106,106) #6A6A6A gray(106)": 1935,
"(218,218,218) #DADADA gray(218)": 592,
"(107,107,107) #6B6B6B gray(107)": 1817,
"(144,144,144) #909090 gray(144)": 3991,
"(165,165,165) #A5A5A5 gray(165)": 1911,
"(239,239,239) #EFEFEF gray(239)": 221,
"(90, 90, 90) #5A5A5A gray(90)": 932,
"(113,113,113) #717171 gray(113)": 2024,
"(118,118,118) #767676 gray(118)": 1974,
"(217,217,217) #D9D9D9 gray(217)": 562,
"(211,211,211) #D3D3D3 gray(211)": 1011,
"(174,174,174) #AEAEAE gray(174)": 1524,
"(164,164,164) #A4A4A4 gray(164)": 1877,
"(99, 99, 99) #636363 gray(99)": 1594,
"(201,201,201) #C9C9C9 gray(201)": 1524,
"(133,133,133) #858585 gray(133)": 2674,
"(233,233,233) #E9E9E9 gray(233)": 156,
"(119,119,119) #777777 gray(119)": 1956,
"(97, 97, 97) #616161 gray(97)": 1551,
"(102,102,102) #666666 gray(102)": 1504,
"(185,185,185) #B9B9B9 gray(185)": 1750,
"(203,203,203) #CBCBCB gray(203)": 1234,
"(116,116,116) #747474 gray(116)": 1938,
"(136,136,136) #888888 gray(136)": 2959,
"(175,175,175) #AFAFAF gray(175)": 1520,
"(127,127,127) #7F7F7F gray(127)": 2034,
"(220,220,220) #DCDCDC gray(220)": 1128,
"(145,145,145) #919191 gray(145)": 3854,
"(150,150,150) #969696 gray(150)": 4101,
"(246,246,246) #F6F6F6 gray(246)": 784,
"(121,121,121) #797979 gray(121)": 2239,
"(237,237,237) #EDEDDE gray(237)": 258,
"(160,160,160) #A0A0A0 gray(160)": 1881,
"(95, 95, 95) #5F5F5F gray(95)": 1923,
"(228,228,228) #E4E4E4 gray(228)": 242,

```

    "(247,247,247) #F7F7F7 gray(247)": 3008,
    "(171,171,171) #ABABAB gray(171)": 1639,
    "( 83, 83, 83) #535353 gray(83)": 381,
    "(105,105,105) #696969 gray(105)": 2035,
    "(143,143,143) #8F8F8F gray(143)": 4002,
    "(154,154,154) #9A9A9A gray(154)": 2770,
    "(232,232,232) #E8E8E8 gray(232)": 323,
    "(166,166,166) #A6A6A6 gray(166)": 1709,
    "(111,111,111) #6F6F6F gray(111)": 1770,
    "(139,139,139) #8B8B8B gray(139)": 3412,
    "(216,216,216) #D8D8D8 gray(216)": 1381,
    "( 89, 89, 89) #595959 gray(89)": 807,
    "( 84, 84, 84) #545454 gray(84)": 503,
    "(108,108,108) #6C6C6C gray(108)": 1665,
    "(131,131,131) #838383 gray(131)": 2190,
    "( 94, 94, 94) #5E5E5E gray(94)": 1976,
    "(192,192,192) #C0C0C0 gray(192)": 1741
  },
  "width": 640,
  "Channel statistics": {
    "Gray": {
      "skewness": 0.413264,
      "min": "80 (0.313725)",
      "max": "248 (0.972549)",
      "standard deviation": "42.8404 (0.168002)",
      "kurtosis": -0.610308,
      "mean": "159.916 (0.627121)"
    },
    "Pixels": 307200
  },
  "Class": "PseudoClass",
  "Mime type": "image/png",
  "Page geometry": "640x480+0+0",
  "Geometry": "640x480+0+0",
  "Colorspace": "Gray",
  "Colormap entries": 256,
  "Depth": "8-bit",
  "User time": "0.010u",
  "Matte color": "gray(189)",
  "Gamma": 0.45455,
  "Image": "/tmp/tmppZUN2Y.png",
  "Properties": {
    "comment": "created by 'xv balloons_bw.tif'",
    "date": {
      "create": "2017-06-23T16:34:43+00:00",
      "modify": "2017-06-23T16:34:43+00:00"
    },
    "png": {
      "bKGD": "chunk was found (see Background color, above)",
      "IHDR": {
        "color-type-orig": 0,
        "color_type": "0 (Grayscale)",
        "bit_depth": 8,
        "width,height": "640, 480",
        "bit-depth-orig": 8,
        "interlace_method": "0 (Not interlaced)"
      },
      "text": "3 tEXt/zTXt/iTXt chunks were found",
      "gAMA": "gamma=0.45455 (See Gamma, above)",
      "tIME": "2017-06-23T16:34:42Z"
    },
    "signature": "2bd68a4db6eb3a9887414ccdeffb742e315d6a7dd5a5b72eb62d4c9bfef3c98f"
  },
  "Colors": 168,
  "Version": "ImageMagick 6.8.9-9 Q16 x86_64 2017-05-26 http://www.imagemagick.org",
  "Iterations": 0
},
"@context": {
  "@vocab": "http://www.w3.org/2003/12/exif/ns"
},
"created_at": "Fri Jun 23 11:34:44 CDT 2017",

```

```

"agent": {
  "extractor_id": "http://141.142.211.76:9000/clowder-dev/api/extractors/ncsa.image.metadata",
  "@type": "cat:extractor",
  "name": "http://141.142.211.76:9000/clowder-dev/api/extractors/ncsa.image.metadata"
},
{
  "content": {
    "y1": 433,
    "y0": 166,
    "x0": 192,
    "x1": 594
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "y1": "http://clowder.ncsa.illinois.edu/gi_detector#y1",
      "y0": "http://clowder.ncsa.illinois.edu/gi_detector#y0",
      "x0": "http://clowder.ncsa.illinois.edu/gi_detector#x0",
      "x1": "http://clowder.ncsa.illinois.edu/gi_detector#x1"
    }
  ],
  "created_at": "Fri Jun 23 11:34:44 CDT 2017",
  "agent": {
    "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/gi_detector",
    "@type": "cat:extractor",
    "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/gi_detector"
  }
},
{
  "content": {
    "ocr_text": "No text detected"
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "ocr_text": "http://clowder.ncsa.illinois.edu/ncsa.image.ocr#ocr_text"
    }
  ],
  "created_at": "Fri Jun 23 11:34:44 CDT 2017",
  "agent": {
    "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.image.ocr",
    "@type": "cat:extractor",
    "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.image.ocr"
  }
},
{
  "content": {
    "conformsTo": [
      {
        "sf:mime": "image/png",
        "sf:version": "1.0",
        "@id": "info:pronom/fmt/11",
        "sf:name": "Portable Network Graphics",
        "sf:basis": "extension match png; byte match at [[[0 16]] [[169329 12]]]"
      }
    ],
    "extent": 169341
  },
  "@context": [
    "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
    {
      "conformsTo": "http://purl.org/dc/terms/conformsTo",
      "extent": "http://purl.org/dc/terms/extent"
    }
  ],
  "created_at": "Fri Jun 23 11:34:44 CDT 2017",
  "agent": {
    "extractor_id": "http://141.142.211.76:9000/clowder-dev/extractors/siegfried/2.0",
    "@type": "cat:extractor",
    "name": "http://141.142.211.76:9000/clowder-dev/extractors/siegfried/2.0"
  }
}

```

```

    }
  },
  {
    "content": {
      "versus_descriptors": []
    },
    "@context": [
      "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
      {
        "descriptor_id": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#descriptor_id",
        "versus_descriptors": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#versus_descriptors",
        "bands": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#bands",
        "descriptor": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#descriptor",
        "extractor_id": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#extractor_id",
        "bins": "http://clowder.ncsa.illinois.edu/ncsa.versus.image#bins"
      }
    ],
    "created_at": "Fri Jun 23 11:34:44 CDT 2017",
    "agent": {
      "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.versus.image",
      "@type": "cat:extractor",
      "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.versus.image"
    }
  },
  {
    "content": {
      "mean_grayscale_value": 159.91587890625001
    },
    "@context": [
      "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
      {
        "mean_grayscale_value": "http://clowder.ncsa.illinois.edu/ncsa.cv.meangrey#mean_grayscale_value"
      }
    ],
    "created_at": "Fri Jun 23 11:34:44 CDT 2017",
    "agent": {
      "extractor_id": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.cv.meangrey",
      "@type": "cat:extractor",
      "name": "https://clowder.ncsa.illinois.edu/clowder/api/extractors/ncsa.cv.meangrey"
    }
  },
  {
    "content": {
      "sha1": "aa96bac9ad1ae37c6333941de87c25ed855cf6a8",
      "sha224": "886fd6479e48135578cbf309cdf74a22b70ca000cfc402b4c3a8ebeb",
      "sha384":
"0c5b6ad353576d2edd5213b25c3dd1a7f43529caa3e899c9c218f549673c9bce1ac8655b885f090cfe2ebd3921bc0a27",
      "sha256": "9fad76631d78287817489cb501a42385e3cf8012855a11bcfdf0196809ce597a",
      "sha512":
"b46ce394126537ec31c51a617ad879d2dce2ba301bd11ef3dc2ed648c4024674a305a946aad009c408a31861ef5df4828238b61c98b8bd1f70fda1c4483fa2ce",
      "md5": "6ee3820d6cad624123406203303e23e8"
    },
    "@context": [
      "https://clowder.ncsa.illinois.edu/contexts/metadata.jsonld",
      {
        "sha1": "http://www.w3.org/2001/04/xmldsig-more#sha1",
        "sha224": "http://www.w3.org/2001/04/xmldsig-more#sha224",
        "sha384": "http://www.w3.org/2001/04/xmldsig-more#sha384",
        "sha256": "http://www.w3.org/2001/04/xmldsig-more#sha256",
        "sha512": "http://www.w3.org/2001/04/xmldsig-more#sha512",
        "md5": "http://www.w3.org/2001/04/xmldsig-more#md5"
      }
    ],
    "created_at": "Fri Jun 23 11:34:43 CDT 2017",
    "agent": {
      "extractor_id": "http://141.142.211.76:9000/clowder-dev//api/extractors/ncsa.file.digest",
      "@type": "cat:extractor",
      "name": "http://141.142.211.76:9000/clowder-dev//api/extractors/ncsa.file.digest"
    }
  }
}

```

```

],
"versusmetadata": [],
"tags": [
  "Human Profile Automatically Detected"
],
"filename": "balloons.png",
"technicalmetadata": [
  {
    "Human Preference Extractor": {
      "Definitions": {
        "Human Preference": "A Computer Vision model that uses the spectral data of an image to get a human
preference value ranging from 1 to 5.",
        "Green Index": "The green index is the estimated percentage of green pixels within an image."
      },
      "Data": {
        "Green Index": "0.0"
      }
    }
  }
],
"id": "594d43234f0c4db82da515dd"
}

```

Redirection

Like with most command line tools BD-CLI supports input / output redirection. This can be used to integrate BD-CLI with other command-line utilities. An example is shown below. Here we are providing the name of the input file needed by BD-CLI from a text file:

```

examples $ ls
balloons.jpeg  balloons.json  balloons.pgm  balloons.png
examples $
examples $ ls | grep png > in.txt
examples $
examples $ cat in.txt
balloons.png
examples $
examples $ bd -b https://bd-api-dev.ncsa.illinois.edu -o jpeg < in.txt
bdcli: Brown Dog API URL: https://bd-api-dev.ncsa.illinois.edu
balloons.jpeg
examples $
examples $ ls
balloons.jpeg  balloons.json  balloons.pgm  balloons.png  in.txt
examples $ █

```

Help

Below you can see the output of the command (bd -h) which basically describes how to use this client:

BD-CLI Help

Brown Dog Command-Line Interface (BD-CLI)

=====

bd [OPTION] [FILE/DIRECTORY]

Command line interface to Brown Dog services. Use to convert files between formats and extract various derived products from file contents (e.g. tags, metadata, signatures, previews).

-b set the BD URL (e.g. https://bd-api.ncsa.illinois.edu)

-t set the token

-v verbose output

-w set wait time for conversions/extractions

-h display help

-o set output format

--outputs list the available output formats for the given file

--extractors list the available extractors for the given file

--find search current directory for a file similar to the given file

--bigdata use this flag if the file is large enough and it needs to be processed locally rather than using remote
Brown Dog services

****Examples:****

List available output formats for given file:

```
bd --outputs image.pcd
```

Convert the given Kodak Photo CD image to a JPEG image. Produces file image.jpg:

```
bd -o jpg image.pcd
```

Convert a directory of images into the JPEG format:

```
bd -o jpg images/
```

List available extractors for given file:

```
bd --extractors image.jpg
```

Extract data from files contents (e.g. tags, previews, analysis, and other derived products). Produces file image.json:

```
bd image.jpg
```

Chain conversion and extraction. Equivalent to the previous two examples:

```
bd -o jpg image.pcd | bd
```

Index files within a directory:

```
bd images/
```

Search for a similar file within a directory that has already been indexed:

```
bd --find /path/image.jpg
```

Read input filename from a text file. This feature can be used to integrate BD-CLI with other programs by passing filename around. Here input.txt can contain one input filename:

```
bd < input.txt
bd -o jpg < input.txt
```