True Color Method

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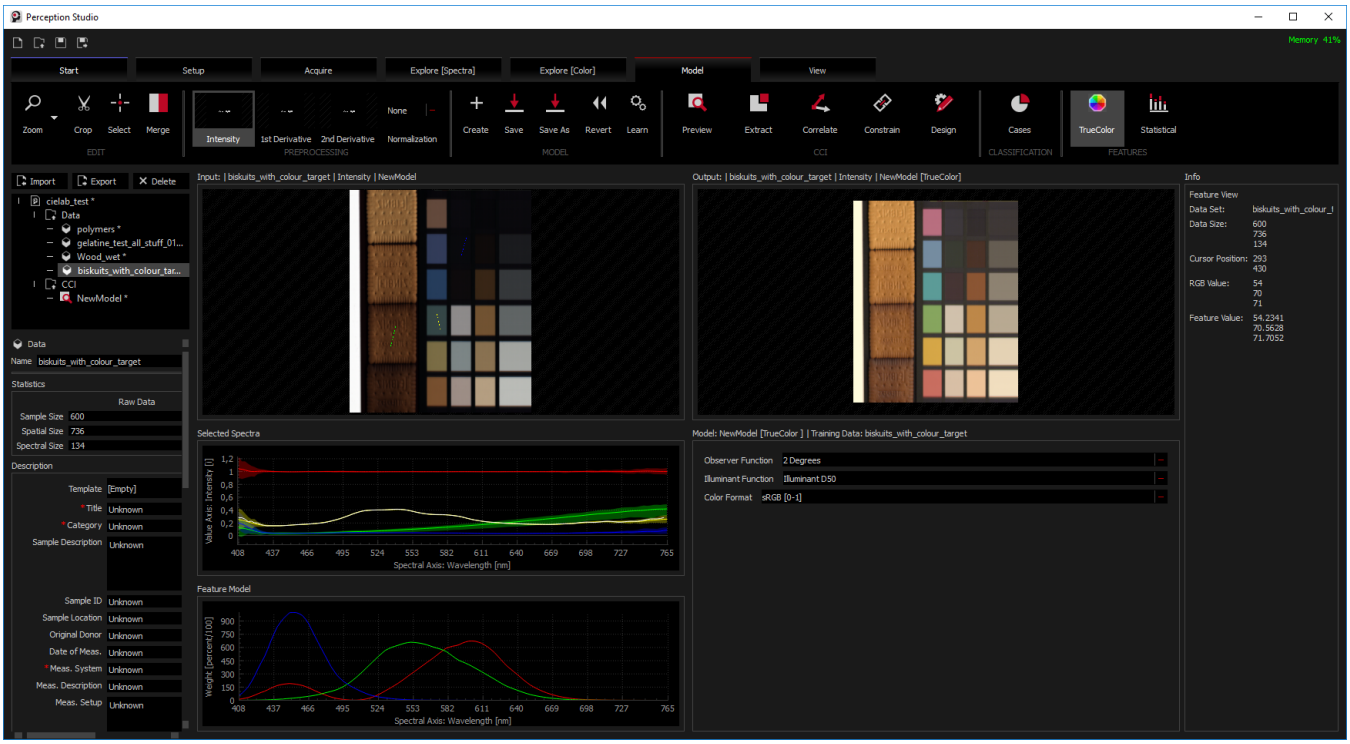
True Color Overview

The *True Color* method calculates color measurements from hyperspectral data and creates a true color image from this information.

This method only works for the visual range, if the data set does not contain information in the visual range, then the output image stays black as no useable information is present.

The user has options to change:

- Observer Function: simulated angle of view
- Illuminant Function: type of simulated lighting conditions
- Color Format: the color format of the output image. Note, that only sRGB will produce visually matching colors.



Observer Function

Cite Wikipedia: https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_standard_observer

Due to the distribution of cones in the eye, the tristimulus values depend on the observer's field of view. To eliminate this variable, the CIE defined a color-mapping function called the standard (colorimetric) observer, to represent an average human's chromatic response within a 2° arc inside the fovea. This angle was chosen owing to the belief that the color-sensitive cones resided within a 2° arc of the fovea. Thus the CIE 1931 Standard Observer function is also known as the CIE 1931 2° Standard Observer. A more modern but less-used alternative is the CIE 1964 10° Standard Observer, which is derived from the work of Stiles and Burch, and Speranskaya.

For the 10° experiments, the observers were instructed to ignore the central 2° spot. The 1964 Supplementary Standard Observer function is recommended when dealing with more than about a 4° field of view. Both standard observer functions are discretized at 5 nm wavelength intervals from 380 nm to 780 nm and distributed by the CIE. All corresponding values have been calculated from experimentally obtained data using interpolation. The standard observer is characterized by three color matching functions.

Illuminant Function

The illuminant defines the standardized light source, which was used when recording the data. This means, the light source has to fit the selected illuminant to produce correct results.

Cite Wikipedia: https://en.wikipedia.org/wiki/Standard_illuminant

> *The International Commission on Illumination (usually abbreviated CIE for its French name) is the body responsible for publishing all of the well-known standard illuminants. Each of these is known by a letter or by a letter-number combination.*
>
> *Illuminants A, B, and C were introduced in 1931, with the intention of respectively representing average incandescent light, direct sunlight, and average daylight. Illuminants D represent phases of daylight, Illuminant E is the equal-energy illuminant, while Illuminants F represent fluorescent lamps of various composition.*
>
> *There are instructions on how to experimentally produce light sources ("standard sources") corresponding to the older illuminants. For the relatively newer ones (such as series D), experimenters are left to measure to profiles of their sources and compare them to the published spectra*

Color Formats & Streams

There are three color formats, which are, sRGB, XYZ and Lab. Each format has its own value range. A True Color model can be applied to a perception core as configuration. In this case, the user can select the bit depth of the stream (either 8bit or 16bit). Depending on the bit depth, the range of the streamed values is scaled to fit the possible range.

A detailed explanation of the stream values can be found here Truecolor Streams