CLAIMS:

What is claimed is:

1. A computer implemented method comprising:

receiving, by a processor set, a dataset comprises data associated with reflectance spectra for a number of components in an image;

mapping, by the processor set, the dataset into a lower-dimensional space using a machine learning model, wherein the lower-dimensional space comprises gridded simplex with a number of nodes and a number of vertices, and wherein each vertex in the number of vertices corresponds to a component from the number of components;

optimizing, by the processor set, parameters for the machine learning model using an expectation-maximization algorithm, wherein the parameters for the machine learning model comprise a mixing coefficient for modeling nonuniform mixing distributions for the number of components; and

identifying, by the processor set, the number of components in the image and abundance for each component in the number of components using the machine learning model.

2. The computer implemented method of claim 1, wherein the image is a hyperspectral image.

3. The computer implemented method of claim 1, wherein the number of nodes represent abundance for the number of components in the image.

4. The computer implemented method of claim 1, further comprises:

mapping, by the processor set using the machine learning model, the number of nodes into data space for the dataset using a number of radially symmetric basis functions; and

estimating, by the processor set using the machine learning model, spectral variabilities for each component in the number of components based on the mapped nodes and a prevision parameter for the machine learning model.

5. A computer implemented method comprising:

receiving, by a processor set, a dataset comprises data associated with reflectance spectra for a number of components in an image;

mapping, by the processor set, the dataset into a lower-dimensional space using a machine learning model, wherein the lower-dimensional space comprises gridded simplex with a number of nodes and a number of vertices, and wherein each vertex in the number of vertices corresponds to a component from the number of components; and

optimizing, by the processor set, parameters for the machine learning model using an expectation-maximization algorithm, wherein the parameters for the machine learning model comprise a mixing coefficient for modeling nonuniform mixing distributions for the number of components.

6. The computer implemented method of claim 5, wherein the image is a hyperspectral image.

7. The computer implemented method of claim 5, wherein the number of nodes represent abundance for the number of components in the image.

8. The computer implemented method of claim 5, further comprises:

mapping, by the processor set using the machine learning model, the number of nodes into data space for the dataset using a number of radially symmetric basis functions;

estimating, by the processor set using the machine learning model, spectral variabilities for each component in the number of components based on the mapped nodes and a precision parameter for the machine learning model; and

identifying, by the processor set, the number of components in the image and abundance for each component in the number of components based on the estimated spectral variabilities for each component in the number of components.

9. A computer implemented method comprising:

receiving, by a processor set, a dataset comprises data associated with reflectance spectra for a number of components in an image;

mapping, by the processor set, the dataset into a lower-dimensional space using a machine learning model, wherein the lower-dimensional space comprises gridded simplex with a number of nodes and a number of vertices, and wherein each vertex in the number of vertices corresponds to a component from the number of components;

initializing, by the processor set, parameters for the machine learning model, wherein the parameters for the machine learning model comprise a mixing coefficient for modeling nonuniform mixing distributions for the number of components;

optimizing, by the processor set, the parameters for the machine learning model by using an expectation-maximization algorithm to determine an expectation of penalized complete-data log likelihood, wherein the parameters are optimized when the expectation of penalized complete-data log likelihood meets a predefined threshold; and

identifying, by the processor set, the number of components in the image and abundance for each component in the number of components using the machine learning model.

10. The computer implemented method of claim 9, wherein the image is a hyperspectral image.

11. The computer implemented method of claim 9, wherein the number of nodes represent abundance for the number of components in the image.

12. The computer implemented method of claim 9, further comprises:

mapping, by the processor set using the machine learning model, the number of nodes into data space for the dataset using a number of radially symmetric basis functions; and

estimating, by the processor set using the machine learning model, spectral variabilities for each component in the number of components based on the mapped nodes and a precision parameter for the machine learning model.