Mathematical Model:

Let S be the system which mines images relevant to the query image from the database

S= {I, O, S, Fun, F, E}

Where

I: input set

O: output set

S: success conditions

F: failure conditions

E: Exceptions

I= {I1, I2, I3}

I1: input query image

I2: input dataset

I3: calculated image descriptors

O= {O1, O2, O3, O4}

O1: normalized image

O2: query image descriptors

O3: descriptors of each image of dataset

O4: mined images similar to the query image from the dataset

Fun= {Fun1, Fun2, Fun3, Fun4, Fun5}

Fun1 (I1): preprocessing on the image -> O1

Fun2 (O1): calculate query image descriptors ->O2

Fun3 (I2): process each image and calculate descriptors ->O3

Fun4 (O2, O3): match the input O2 to each image of O3 and find similar images ->O4

Fun5: calculate retrieval time

F= {F1, F2, F3}

F1: irrelevant images displayed

F2: hardware (GPU) failure

F3: non universality of the machine learning algorithm used