CLAIMS

1. A method comprising the following steps:

obtaining from a database a set of boring parameters characterizing formation of a bore by at least one given tunnel boring machine over at least one boring site, the set of boring parameters including at least one of a torque of a cutting wheel of the at least one given tunnel boring machine, a speed of rotation of the cutting wheel of the at least one given tunnel boring machine, a speed of advance of the at least one given tunnel boring machine, a contact force of the at least one given tunnel boring machine, a surface area of the cutting wheel of the at least one given tunnel boring machine, a radius of the cutting wheel of the at least one given tunnel boring machine, and a confinement pressure at an axis of the at least one given tunnel boring machine,

identifying a set of energy formulas depending on at least one of the boring parameters,

determining a set of variables based on the energy formulas thus identified, the set of variables including at least one of an average, maximum, and standard deviation of the energy formulas,

applying a non-supervised classification algorithm to the variables so as to obtain groups of individuals identified according to a predefined criterion of the non-supervised classification algorithm,

applying a supervised classification algorithm to the variables and to the groups of individuals thus determined so as to obtain a ground/machine interaction model connecting the variables to the groups of individuals,

measuring, while boring a ground with a tunnel boring machine, at least one boring parameter, the at least one boring parameter comprising a torque of a cutting wheel of the tunnel boring machine, a speed of rotation of a cutting wheel of the tunnel boring machine, a speed of advance of the tunnel boring machine, and a contact force of the tunnel boring machine,

determining the group of individuals corresponding to the measured at least one boring parameter using the ground/machine interaction model, and

modifying at least one of the boring parameters of the tunnel boring machine as a function of the group of individuals thus determined.

2. The method according to claim 1, wherein the non-supervised classification comprises a clustering algorithm.

3. The method according to claim 2, wherein the non-supervised classification comprises a K-MEANS algorithm.

4. The method according to claim 1, wherein the supervised classification comprises a random forest algorithm.

5. The method according to claim 1, wherein applying a non-supervised classification algorithm to the variables comprises determining between 8 and 10 different groups of individuals.

6. The method according to claim 1, wherein each variable describes a ground segment, and wherein the groups of individuals determined correspond to groups of ground segments.

7. The method according to claim 6, wherein the ground segment is a given ring deposited by at least one given tunnel boring machine, on at least one boring site, and wherein the groups of individuals determined correspond to groups of rings deposited by at least one given tunnel boring machine on at least one boring site.

8. The method according to claim 1, further comprising, prior to determining the group of individuals corresponding to the measured at least one boring parameter, calculating at least one of the set of variables based on the measured at least one boring parameter, and wherein, while determining the group of individuals corresponding to the measured at least one boring parameter, determining the group of individuals by applying the ground/machine interaction model and to the variables thus determined.

9. The method according to claim 1, wherein, during boring, the tunnel boring machine successively deposits a plurality of rings, and further comprising for each ring of the plurality:

measuring at least one boring parameter, the at least one boring parameter comprising a torque of a cutting wheel of the tunnel boring machine, a speed of rotation of a cutting wheel of the tunnel boring machine, a speed of advance of the tunnel boring machine, and a contact force of the tunnel boring machine,

determining the group of individuals corresponding to the measured at least one boring parameter using the ground/machine interaction model, and

modifying at least one of the boring parameters of the tunnel boring machine as a function of the group of individuals thus determined.

10. The method according to claim 1, wherein the energy formulas comprise a rotation energy, a translation energy index, and a friction coefficient.

11. A system comprising:

a database storing a set of boring parameters characterizing formation of a bore by at least one given tunnel boring machine over at least one boring site and storing a ground/machine interaction model determined by:

identifying a set of energy formulas depending on at least one of the set of boring parameters, the at least one boring parameter including a torque of a cutting wheel of the at least one given tunnel boring machine, a speed of rotation of the cutting wheel of the at least one given tunnel boring machine, a speed of advance of the at least one given tunnel boring machine, a contact force of the at least one given tunnel boring machine, a surface area of the cutting wheel of the at least one given tunnel boring machine, a radius of the cutting wheel of the at least one given tunnel boring machine, and a confinement pressure at an axis of the at least one given tunnel boring machine,

determining a set of variables based on the energy formulas thus identified, the set of variables including an average, maximum, and/or standard deviation of the energy formulas,

applying a non-supervised classification algorithm to the variables so as to obtain groups of individuals identified according to a predefined criterion of the non-supervised classification algorithm, and

applying a supervised classification algorithm to the variables and to the groups of individuals thus determined so as to obtain a ground/machine interaction model connecting the variables to the groups of individuals; and

a processor configured to:

measure, while boring a ground with a tunnel boring machine, at least one boring parameter, the at least one boring parameter comprising a torque of a cutting wheel of the tunnel boring machine, a speed of rotation of a cutting wheel of the tunnel boring machine, a speed of advance of the tunnel boring machine, and a contact force of the tunnel boring machine,

determine the group of individuals corresponding to the measured at least one boring parameter using the ground/machine interaction model, and

modify at least one of the boring parameters of the tunnel boring machine as a function of the group of individuals thus determined.