CLAIMS

[Claim 1] An equipment control device comprising:

a result acquisition unit to obtain, for each candidate setting, a simulation result on a basis of the candidate setting data, the candidate settings being a plurality of candidates for setting data to control one or more units of equipment installed in a building; each unit of equipment is one of: air conditioning equipment, illumination equipment, ventilation equipment, hot water supply equipment; the simulation result corresponding to a result of an operation of the building of a case where the candidate setting is applied to the one or more units of equipment;

a satisfaction level calculation unit to calculate, for each candidate setting, a satisfaction level of a stakeholder of the building from the simulation result of said candidate setting, the satisfaction level being a value expressing a degree of satisfaction of a stakeholder regarding one of a plurality of building environment satisfaction indices, based on the result of the simulation; each satisfaction index being one of: an index concerning a thermal environment, an index concerning a light environment, an index concerning an air quality environment, an index concerning a sound environment, an index concerning energy consumption, an index concerning peak power, an index concerning a CO_2 emission amount;

a constraint level calculation unit to calculate, for each candidate setting, a constraint level from the simulation result of said candidate setting, the constraint level expressing a degree of how much an operation constraint of the building is satisfied or expressing how much the operation constraint of the building is deviated from; the operation constraint being a constraint requested of the operation of the building;

a candidate optimization unit to rank the superiority/inferiority of the plurality of candidate settings on a basis of the satisfaction level of each candidate setting and the constraint level of each candidate setting, and to optimize the plurality of candidate settings on a basis of said ranking, thereby generating a plurality of new candidate settings;

a selection unit to display the plurality of new candidate settings and, in response to user input, to select a candidate setting to be applied to the one or more units of equipment as an applicable setting from among the plurality of new candidate settings; and

a control unit to apply the applicable setting to the one or more units of equipment.

[Claim 2] The equipment control device according to claim 1, comprising

an integration unit,

wherein the satisfaction level calculation unit calculates, for each candidate setting, a plurality of satisfaction levels about a plurality of indices, as the satisfaction level of the stakeholder, and

wherein the integration unit integrates, for each candidate setting, two or more satisfaction levels about two or more particular indices out of the plurality of satisfaction levels included in the satisfaction level of the stakeholder, into one satisfaction level.

[Claim 3] The equipment control device according to claim 1 or 2, wherein the result acquisition unit

simulates the operation of the building on a basis of each of a plurality of virtual settings for the one or more units of equipment, thereby obtaining a simulation result for each virtual setting,

learns, for each virtual setting, a set of the virtual setting and the simulation result, thereby generating a learned model, and obtains, for each candidate setting, the simulation result of the candidate setting with using the learned model.

[Claim 4] The equipment control device according to any one of claims 1 to 3, comprising

a correction unit to acquire a past setting applied to the one or more units of equipment, and an operation result of the building obtained when the past setting is applied, to compare a simulation result under the past setting with the operation result, and to correct a simulation parameter on a basis of a comparison result.

[Claim 5] The equipment control device according to any one of claims 1 to 4, comprising

a setting acquisition unit to acquire a preset setting being applied to the one or more units of equipment,

wherein the selection unit selects the applicable setting on a basis of the present setting.

[Claim 6] The equipment control device according to any one of claims 1 to 5, wherein the candidate optimization unit optimizes the plurality of candidate settings with using each of a plurality of optimization algorithms, thereby generating a plurality of candidate setting groups each formed of a plurality of new candidate settings, and

wherein the selection unit selects one out of the plurality of candidate setting groups, and selects the applicable setting from among the plurality of new candidate settings that constitute a plurality of selected candidate setting groups.

[Claim 7] An equipment control method comprising:

obtaining, for each candidate setting, a simulation result on a basis of a the candidate setting data, the candidate settings being a plurality of candidates for setting data to control one or more units of equipment installed in a building; each unit of equipment is one of: air conditioning equipment, illumination equipment, ventilation equipment, hot water supply equipment; the simulation result corresponding to a result of an operation of the building of a case where the candidate setting is applied to the one or more units of equipment;

calculating, for each candidate setting, a satisfaction level of a stakeholder of the building from the simulation result of said candidate setting, the satisfaction level being a

value expressing a degree of satisfaction of a stakeholder regarding one of a plurality of building environment satisfaction indices, based on the result of the simulation; each satisfaction index being one of: an index concerning a thermal environment, an index concerning a light environment, an index concerning an air quality environment, an index concerning a sound environment, an index concerning energy consumption, an index concerning peak power, an index concerning a CO_2 emission amount;

calculating, for each candidate setting, a constraint level from the simulation result of said candidate setting, the constraint level expressing a degree of how much an operation constraint of the building is satisfied or expressing how much the operation constraint of the building is deviated from; the operation constraint being a constraint requested of the operation of the building;

ranking the superiority/inferiority of the plurality of candidate settings on a basis of the satisfaction level of each candidate setting and the constraint level of each candidate setting, and optimizing the plurality of candidate settings on a basis of said ranking, thereby generating a plurality of new candidate settings;

displaying the plurality of new candidate settings and, in response to a user input, selecting a candidate setting to be applied to the one or more units of equipment as an applicable setting from among the plurality of new candidate settings; and applying the applicable setting to the one or more units of equipment.

[Claim 8] An equipment control program which causes a computer to execute:

a result acquisition process of obtaining, for each candidate setting, a simulation result on a basis of the candidate setting data, the candidate settings being a plurality of candidates for setting data to control one or more units of equipment installed in a building; each unit of equipment is one of: air conditioning equipment, illumination equipment, ventilation equipment, hot water supply equipment; the simulation result corresponding to a result of an operation of the building of a case where the candidate setting is applied to the one or more units of equipment;

a satisfaction level calculation process of calculating, for each candidate setting, a satisfaction level of a stakeholder of the building from of the simulation result of said candidate setting, the satisfaction level being a value expressing a degree of satisfaction of a stakeholder regarding one of a plurality of building environment satisfaction indices, based on the result of the simulation; each satisfaction index being one of: an index concerning a thermal environment, an index concerning a light environment, an index concerning an air quality environment, an index concerning a sound environment, an index concerning energy consumption, an index concerning peak power, an index concerning a CO_2 emission amount;

a constraint level calculation process of calculating, for each candidate setting, a constraint level from the simulation result of said candidate setting, the constraint level expressing a degree of how much an operation constraint of the building is satisfied or expressing how much the operation constraint of the building is deviated from; the operation constraint being a constraint requested of the operation of the building;

a candidate optimization process of ranking the superiority/inferiority of the plurality of candidate settings on a basis of the satisfaction level of each candidate setting and the constraint level of each candidate setting, and optimizing the plurality of candidate settings on a basis of said ranking, thereby generating a plurality of new candidate settings;

a selection process of displaying the plurality of new candidate settings and, in response to a user input, selecting a candidate setting to be applied to the one or more units of equipment as an applicable setting from among the plurality of new candidate settings; and

a control process of applying the applicable setting to the one or more units of equipment.