

COGNITIVE FUNCTION EVALUATION DEVICE, COGNITIVE FUNCTION EVALUATION SYSTEM, COGNITIVE FUNCTION EVALUATION METHOD, AND PROGRAM

TECHNICAL FIELD

[0001]

The present invention relates to a cognitive function evaluation device, a cognitive function evaluation system, a cognitive function evaluation method, and a program which are capable of evaluating a cognitive function of a person to be evaluated.

BACKGROUND ART

[0002]

An increase in the number of patients with dementia has become a social problem. Patients showing some signs of dementia notice no symptoms. Accordingly, it is important for their families or a third party to notice the signs of dementia of the patients. As a technique for detecting any change in the life of a resident due to dementia or the like, PTL 1 discloses a life change detection method for detecting a behavior different from the normal behavior of a resident.

Citation List

Patent Literature

[0003]

PTL 1: Japanese Unexamined Patent Application Publication No. 2006-72443

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0004]

Heretofore, as techniques for evaluating a cognitive function, MMSE (Mini Mental State Examination) and HDS-R (Hasegawa Dementia

Scale-Revised) have been known. However, it may be difficult to give a patient (a person to be evaluated) with an unseen health problem the MMSE or HDS-R.

[0005]

Further, in general, the MMSE or HDS-R is not continuously given to the person to be evaluated, because it places a burden on the person to be evaluated. Accordingly, in the MMSE or HDS-R, it is difficult to continuously monitor a change in the cognitive function and thus it is difficult to detect deterioration in the cognitive function at an early stage.

[0006]

Embodiments of the present invention provide a cognitive function evaluation device, a cognitive function evaluation system, a cognitive function evaluation method, and a program which are capable of easily evaluating a cognitive function.

SOLUTION TO PROBLEM

[0007]

A cognitive function evaluation device according to an aspect of the present invention includes an acquisition unit configured to acquire body motion data representing a body motion of a person to be evaluated during walking; a calculation unit configured to calculate a displacement of a body of the person to be evaluated during walking based on the body motion data acquired; an evaluation unit configured to evaluate a cognitive function of the person to be evaluated based on a frequency peak representing a cycle of walking of the person to be evaluated, and to output an evaluation result, the cycle being obtained by performing a frequency analysis on the displacement calculated; and a storage unit configured to store reference data representing a relationship between the cognitive function of the person and information about the frequency peak representing the cycle of walking of the person, wherein the evaluation unit is configured to evaluate the cognitive function of the person to be evaluated by

comparing the frequency peak representing the cycle of walking of the person to be evaluated with the reference data stored in the storage unit.

[0008]

A cognitive function evaluation system according to another aspect of the present invention includes the above cognitive function evaluation device, and a body motion data generation device configured to generate the body motion data.

[0009]

A cognitive function evaluation method according to another aspect of the present invention includes: acquiring body motion data representing a body motion of a person to be evaluated during walking; calculating a displacement of a body of the person to be evaluated during walking based on the body motion data acquired; evaluating a cognitive function of the person to be evaluated based on a frequency peak representing a cycle of walking of the person to be evaluated, and outputting an evaluation result, the cycle being obtained by performing a frequency analysis on the displacement calculated; and storing reference data representing a relationship between the cognitive function of the person and information about the frequency peak representing the cycle of walking of the person, wherein the step of evaluating the cognitive function of the person comprises comparing the frequency peak representing the cycle of walking of the person to be evaluated with the reference data stored in the storage unit.

[0010]

According to another aspect of the present invention, there is provided a program for causing a computer to execute the above cognitive function evaluation method.

ADVANTAGEOUS EFFECT OF INVENTION

[0011]

According to embodiments of the present invention, it is possible to easily evaluate a cognitive function.

CLAIMS

1. A cognitive function evaluation device, comprising:
 - an acquisition unit configured to acquire body motion data representing
 - 5 a body motion of a person to be evaluated during walking;
 - a calculation unit configured to calculate a displacement of a body of the person to be evaluated during walking based on the body motion data acquired;
 - an evaluation unit configured to evaluate a cognitive function of the person to be evaluated based on a frequency peak representing a cycle of
 - 10 walking of the person to be evaluated, and to output an evaluation result, the cycle being obtained by performing a frequency analysis on the displacement calculated; and
 - a storage unit configured to store reference data representing a relationship between the cognitive function of the person and information
 - 15 about the frequency peak representing the cycle of walking of the person,
 - wherein the evaluation unit is configured to evaluate the cognitive function of the person to be evaluated by comparing the frequency peak representing the cycle of walking of the person to be evaluated with the reference data stored in the storage unit.
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2. The cognitive function evaluation device according to claim 1, wherein
 - the evaluation unit is configured to evaluate the cognitive function of the person to be evaluated at three or more levels, by comparing the frequency peak representing the cycle of walking of the person to be evaluated with the
 - 25 reference data stored in the storage unit.

3. The cognitive function evaluation device according to claim 1, wherein the reference data represents a correlation between a cognitive function scale and the frequency peak representing the cycle of walking of the person to be evaluated.

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4. The cognitive function evaluation device according to claim 1, wherein the evaluation unit is configured to evaluate the cognitive function of the person to be evaluated based on a peak level of the frequency peak, and evaluate that the cognitive function of the person to be evaluated deteriorates as the peak level decreases.

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5. The cognitive function evaluation device according to claim 1, wherein the evaluation unit is configured to evaluate the cognitive function of the person to be evaluated based on a half width of the frequency peak, and evaluate that the cognitive function of the person to be evaluated deteriorates as the half width increases.

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6. The cognitive function evaluation device according to any one of claims 1 to 5, wherein the calculation unit is configured to calculate a displacement in an up-down direction of the body of the person to be evaluated during walking based on the body motion data acquired, and

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the evaluation unit is configured to evaluate the cognitive function of the person to be evaluated based on the frequency peak obtained by performing the frequency analysis on the displacement in the up-down direction calculated.

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7. The cognitive function evaluation device according to any one of claims 1 to 6, further comprising:

a storage unit configured to store reference data representing a relationship between the cognitive function of the person and information about the frequency peak representing the cycle of walking of the person,

wherein the evaluation unit is configured to evaluate the cognitive
5 function of the person to be evaluated by comparing the frequency peak representing the cycle of walking of the person to be evaluated with the reference data stored in the storage unit.

8. The cognitive function evaluation device according to any one of claims
10 1 to 7, wherein

the acquisition unit is configured to acquire, as the body motion data, video data of the person to be evaluated during walking, the video data being captured by a camera, and

the calculation unit is configured to calculate the displacement of the
15 body of the person to be evaluated during walking by performing image processing on the video data.

9. The cognitive function evaluation device according to claim 8, wherein
the acquisition unit is configured to acquire the video data captured by
20 the camera during walking of the person to be evaluated in a space in which two markers representing a start point and an end point of a predetermined interval are arranged, and

in the image processing, the calculation unit is configured to specify a period in which the person to be evaluated walks on the predetermined interval
25 in the video data, and calculate the displacement of the body of the person to be evaluated during walking in the period.

10. The cognitive function evaluation device according to claim 9, further comprising:

a height information storage unit configured to store height information about the person to be evaluated,

5 wherein the calculation unit is configured to correct a position of the person to be evaluated in the video data by using the height information stored in the height information storage unit, and specify the period in which the person to be evaluated walks on the predetermined interval in the video data based on the corrected position of the person to be evaluated.

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11. The cognitive function evaluation device according to any one of claims 1 to 7, wherein

the acquisition unit is configured to acquire, as the body motion data, data representing an acceleration of the body motion measured by an
15 acceleration sensor worn by the person to be evaluated, and

the calculation unit is configured to calculate the displacement of the body of the person to be evaluated during walking by integrating the acceleration.

20 12. A cognitive function evaluation system, comprising:

the cognitive function evaluation device according to any one of claims 1 to 11, and

a body motion data generation device configured to generate the body motion data.

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13. A cognitive function evaluation method, comprising:

acquiring body motion data representing a body motion of a person to

be evaluated during walking;

calculating a displacement of a body of the person to be evaluated during walking based on the body motion data acquired;

5 evaluating a cognitive function of the person to be evaluated based on a frequency peak representing a cycle of walking of the person to be evaluated, and outputting an evaluation result, the cycle being obtained by performing a frequency analysis on the displacement calculated; and

10 storing reference data representing a relationship between the cognitive function of the person and information about the frequency peak representing the cycle of walking of the person,

wherein the step of evaluating the cognitive function of the person comprises comparing the frequency peak representing the cycle of walking of the person to be evaluated with the reference data stored in the storage unit.

15 14. A program for causing a computer to execute the cognitive function evaluation method according to claim 13.