CLAIMS

1. An age estimation method comprising:

estimating an age of a subject from facial image data of the subject based on a correlation between ages and intensities of spatial frequencies obtained from facial image data~~.~~, wherein the spatial frequencies belong to a plurality of different spatial frequency bands.

2. The age estimation method according to claim 1, wherein the correlation are expressed by an equation or the model, and the method comprising:

obtaining an estimated age of the subject by applying the intensities of the spatial frequencies from the facial image data of the subject to the equation or a model.

3. An age estimation method comprising:

acquiring facial image data of a subject;

calculating intensities of spatial frequencies from the acquired facial image data; and

calculating an estimated age of the subject by applying the calculated intensities of the spatial frequencies to an equation or model that is obtained in advance and expresses a correlation between ages and spatial frequencies obtained from facial image data~~.~~, wherein the spatial frequencies belong to a plurality of different spatial frequency bands.

4. The age estimation method according to claim 2 or 3,

wherein the equation is a multiple regression equation obtained from multiple regression analysis or a prediction equation obtained from PLS.

5. The age estimation method according to any one of claims 1 to 4,

wherein the facial image data is image data of a portion of a face or an entire face.

6. The age estimation method according to any one of claims 1 to 5,

wherein the age is an actual age or an impression age by appearance.

7. The age estimation method according to any one of claims 1 to 6,

wherein the facial image data is color image data, and the intensities of the spatial frequencies include combinations of the intensities of the spatial frequencies calculated from a plurality of color channels.

~~8. The age estimation method according to any one of claims 1 to 7,~~

~~wherein the spatial frequencies belong to a plurality~~

~~of different spatial frequency bands.~~

~~9~~8. The age estimation method according to any one of claims 1 to 7~~–8~~,

wherein the spatial frequency bands are low frequency band of 50 cycles/image-width or less and high frequency band of larger than 50 cycles/image-width.

~~10~~9. The age estimation method according to any one of claims 1 to 8~~ or 9~~,

wherein the spatial frequencies that belong to the spatial frequency bands preferably have a difference of 10 cycles/image-width or more.

~~11~~10. The age estimation method according to claims ~~8~~1 to ~~10~~9,

wherein the subject is a female,

the correlation is a correlation between ages and intensities of spatial frequencies obtained from facial image data of entire faces of females, and

the spatial frequencies include at least four spatial frequencies that belong to respective spatial frequency bands as follows:

0 to 50 cycles/image-width;

50 to 100 cycles/image-width;

100 to 200 cycles/image-width; and

200 cycles/image-width or more.

~~1211~~. The age estimation method according to claims ~~81~~ to ~~109~~,

wherein the subject is a male,

the correlation is a correlation between ages and intensities of spatial frequencies obtained from facial image data of entire faces of males, and

the spatial frequencies include at least four spatial frequencies that belong to respective spatial frequency bands as follows:

0 to 50 cycles/image-width;

50 to 100 cycles/image-width;

100 to 150 cycles/image-width; and

150 cycles/image-width or more.

~~1312~~. The age estimation method according to any one of claims ~~81~~ to ~~109~~,

wherein the correlation is a correlation between ages and intensities of spatial frequencies obtained from image data of lips,

the spatial frequencies include at least three spatial frequencies that belong to respective spatial frequency bands as follows:

0 to 40 cycles/image-width;

40 to 100 cycles/image-width; and

100 cycles/image-width or more.

~~14~~13. An age estimation apparatus comprising:

an intensity calculating unit that calculates intensities of spatial frequencies from facial image data of a subject;

a storage unit that stores age correlation data expressing a correlation between ages and intensities of spatial frequencies obtained from facial image data; and

an age calculating unit that calculates an estimated age of the subject by matching the intensities of the spatial frequencies calculated by the intensity calculating unit with the age correlation data stored in the storage unit~~.~~,

wherein the spatial frequencies belong to a plurality of different spatial frequency bands.

~~15~~14. An age estimation program causing a computer to function as:

an intensity calculating unit that calculates intensities of spatial frequencies from facial image data of a subject;

a storage unit that stores age correlation data that expresses a correlation between ages and intensities of spatial frequencies obtained from the facial image data; and

an age calculating unit that calculates an estimated age of the subject by matching the intensities of the spatial frequencies calculated by the intensity calculating

unit with the age correlation data stored in the storage unit~~.~~, wherein the spatial frequencies belong to a plurality of different spatial frequency bands.

~~16. A sex determination method comprising:~~

~~determining a sex of a subject from facial image data of the subject based on a correlation between sexes and intensities of spatial frequencies obtained from facial image data.~~

~~17. The sex determination method according to claim 16 comprising~~

~~determining the sex of the subject by applying the intensities of the spatial frequencies from the facial image data of the subject to an equation or model,~~

~~wherein the correlation is expressed by the equation or the model.~~

~~18. The sex determination method according to claim 17,~~

~~wherein the equation is a discriminant function obtained by discriminant analysis.~~

~~19. The sex determination method according to any one of claims 16 to 18,~~

~~wherein the spatial frequencies belong to bands of 100 to 250 cycles/image width.~~

~~20. A sex determination method comprising:~~

~~acquiring facial image data;~~

~~calculating intensities of spatial frequencies from the acquired facial image data;~~

~~acquiring a sex grouping variable by applying the calculated intensities of the spatial frequencies to a discriminant function that is prepared in advance and expresses a correlation between sex grouping variables and the intensities of the spatial frequencies obtained from facial image data; and~~

~~determining a sex based on the obtained grouping variables.~~

~~21. A sex determination apparatus comprising:~~

~~an intensity calculating unit that calculates intensities of spatial frequencies from facial image data of a subject;~~

~~a storage unit that stores sex correlation data that expresses a correlation between sexes and intensities of spatial frequencies obtained from facial image data; and~~

~~a sex determining unit that determines a sex of the subject by matching the intensities of the spatial frequencies calculated by the intensity calculating unit with the sex correlation data stored in the storage unit~~

~~22. A sex determination program causing a computer to function as:~~

~~an intensity calculating unit that calculates intensities of spatial frequencies from facial image data of a subject;~~

~~a storage unit that stores sex correlation data indicating a correlation between sexes and intensities of spatial frequencies obtained from facial image data; and~~

~~a sex determining unit that determines a sex of the subject by matching the intensities of the spatial frequencies calculated by the intensity calculating unit with the sex correlation data stored in the storage unit.~~

~~23~~15. An age estimation apparatus according to claim 13 further comprising:

~~an intensity calculating unit that calculates intensities of spatial frequencies from facial image data of a subject;~~

a storage unit that stores sex correlation data indicating a correlation between sexes and intensities of spatial frequencies obtained from facial image data, and male age correlation data and female age correlation data indicating correlations between ages and intensities of spatial frequencies obtained from facial image data by sex;

a sex determining unit that determines a sex of the

subject by matching the intensities of the spatial frequencies calculated by the intensity calculating unit with the sex correlation data stored in the storage unit;

an age correlation data selecting unit that selects the male age correlation data or the female age correlation data based on the sex determined by the sex determining unit; and

an age calculating unit that calculates an estimated age of the subject by matching the intensities of the spatial frequencies calculated by the intensity calculating unit with the correlation data selected by the correlation data selecting unit.