CLAIMS

1. A payment method, comprising:

acquiring a frontal face image, and a side face image from at least one side, of a to-be-identified user;

identifying whether the to-be-identified user is an authorized user of a payment electronic account according to the frontal face image and the side face image, wherein the identifying whether the to-be-identified user is an authorized user comprises:

performing a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and

performing a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account, wherein performing a similarity comparison between the side face image and the recorded side face image comprises:

adjusting the side face image to obtain a standard side face image, wherein the standard side face image is of a specific size, and the side face in the standard side face image has a specified posture;

extracting a first side face feature vector of the to-be-identified user according to the standard side face image;

acquiring a second side face feature vector corresponding to the recorded side face image; and

calculating a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector; and

identifying whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity; and

making a deduction operation on the payment electronic account if it is identified that the to-be-identified user is an authorized user of the payment electronic account,

wherein the adjusting the side face image to obtain a standard side face image comprises:

determining positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and

adjusting the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.

~~2. The method according to claim 1, wherein the identifying whether the to-be-identified user is an authorized user of a payment electronic account according to the frontal face image and the side face image comprises:~~

~~performing a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and performing a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account; and~~

~~identifying whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity.~~

~~3. The method according to claim 2, wherein the performing a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account comprises:~~

~~adjusting the side face image to obtain a standard side face image, wherein the standard side face image is of a specified size, and the side face in the standard side face image has a specified posture;~~

~~extracting a first side face feature vector of the to-be-identified user according to the standard side face image;~~

~~acquiring a second side face feature vector corresponding to the recorded side face image;~~

~~and~~

~~calculating a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector.~~

~~4. The method according to claim 3, wherein the adjusting the side face image to obtain a standard side face image comprises:~~

~~determining positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and~~

~~adjusting the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.~~

~~5~~2. The method according to claim ~~3~~1, wherein the calculating a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector comprises:

calculating a Euclidean distance between the first side face feature vector and the second side face feature vector; and

determining the Euclidean distance as the similarity between the side face image and the recorded side face image.

~~6~~3. The method according to any one of claims ~~2~~ 1 to ~~5~~ 2, wherein the identifying whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity comprises:

if the frontal face similarity is greater than a first set threshold and the side face similarity is greater than a second set threshold, determining that the to-be-identified user is an authorized user of the payment electronic account.

~~7~~4. A payment apparatus, comprising:

an acquisition module configured to acquire a frontal face image, and a side face image from at least one side, of a to-be-identified user;

an identification module configured to identify whether the to-be-identified user is an authorized user of a payment electronic account according to the frontal face image and the side face image; and

an execution module configured to make a deduction operation on the payment electronic account if the to-be-identified user is an authorized user of the payment electronic account,

wherein the identification module comprises:

a comparison unit configured to perform a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and perform a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account; and

an identification unit configured to identify whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity,

wherein the comparison unit comprises:

an adjustment subunit configured to adjust the side face image to obtain a standard side face image, wherein the standard side face image is of a specified size, and the side face in the standard side face image has a specified posture;

an extraction subunit configured to extract a first side face feature vector of the to-be-identified user according to the standard side face image;

an acquisition subunit configured to acquire a second side face feature vector corresponding to the recorded side face image; and

a calculation subunit configured to calculate a similarity between the side face image and the

recorded side face image, and

wherein the adjustment subunit is specifically configured to:

determine positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and adjust the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.

~~8. The apparatus according to claim 7, wherein the identification module comprises:~~

~~a comparison unit configured to perform a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and perform a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account; and~~

~~an identification unit configured to identify whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity.~~

~~9. The apparatus according to claim 8, wherein the comparison unit comprises:~~

~~an adjustment subunit configured to adjust the side face image to obtain a standard side face image, wherein the standard side face image is of a specified size, and the side face in the standard side face image has a specified posture;~~

~~an extraction subunit configured to extract a first side face feature vector of the to-be-identified user according to the standard side face image;~~

~~an acquisition subunit configured to acquire a second side face feature vector corresponding to the recorded side face image; and~~

~~a calculation subunit configured to calculate a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature~~

~~vector.~~

~~10. The apparatus according to claim 9, wherein the adjustment subunit is specifically configured to:~~

~~determine positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and adjust the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.~~

~~11~~5. The apparatus according to ~~any one of~~ claim~~s~~ ~~8~~ 4~~to 10~~, wherein the identification unit comprises:

a determination subunit configured to: if the frontal face similarity is greater than a first set threshold and the side face similarity is greater than a second set threshold, determine that the to-be-identified user is an authorized user of the payment electronic account.

~~12~~6. A payment system, comprising a client terminal device and a payment apparatus, wherein the client terminal device is provided with a frontal face image collector, at least one side face image collector, and an image collection controller;

the image collection controller is configured to: when a to-be-identified user performs a payment using a payment electronic account, control the frontal face image collector and the side face image collector to simultaneously collect a frontal face image and a side face image of the to-be-identified user;

the client terminal device is configured to send the frontal face image and the side face image to the payment apparatus; and

the payment apparatus is configured to acquire the frontal face image and the side face image, and identify whether the to-be-identified user is an authorized user of the payment electronic

account according to the frontal face image and the side face image; and make a deduction operation on the payment electronic account if the to-be-identified user is an authorized user of the payment electronic account,

wherein the payment apparatus is specifically configured to:

perform a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and perform a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account; and identify whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity,

wherein the payment apparatus is further specifically configured to:

adjust the side face image to obtain a standard side face image, wherein the standard side face image is of a specified size, and the side face in the standard side face image has a specified posture; extract a first side face feature vector of the to-be-identified user according to the standard side face image; acquire a second side face feature vector corresponding to the recorded side face image; and calculate a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector, and

wherein the payment apparatus is further specifically configured to:

determine positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and adjust the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.

~~13. The system according to claim 12, wherein the payment apparatus is specifically configured to:~~

~~perform a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and perform a similarity comparison~~

~~between the side face image and a recorded side face image corresponding to the payment electronic account; and identify whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity.~~

~~14. The system according to claim 13, wherein the payment apparatus is further specifically configured to:~~

~~adjust the side face image to obtain a standard side face image, wherein the standard side face image is of a specified size, and the side face in the standard side face image has a specified posture; extract a first side face feature vector of the to-be identified user according to the standard side face image; acquire a second side face feature vector corresponding to the recorded side face image; and calculate a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector.~~

~~15. The system according to claim 14, wherein the payment apparatus is further specifically configured to~~

~~determine positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and adjust the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.~~

~~16~~7. The system according to ~~any one of~~ claim~~s 13 and 14~~6, wherein the payment apparatus is further specifically configured to:

if the frontal face similarity is greater than a first set threshold and the side face similarity is greater than a second set threshold, determine that the to-be-identified user is an authorized user of the payment electronic account.

~~17~~8. A payment device, comprising:

a processor; and

a memory configured to store computer-executable instructions, wherein execution of the executable instructions causes the processor to perform the following steps:

acquiring a frontal face image, and a side face image from at least one side, of a to-be-identified user;

identifying whether the to-be-identified user is an authorized user of a payment electronic account according to the frontal face image and the side face image, wherein the identifying whether the to-be-identified user is an authorized user comprises:

performing a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and

performing a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account, wherein performing a similarity comparison between the side face image and the recorded side face image comprises:

adjusting the side face image to obtain a standard side face image, wherein the standard side face image is of a specific size, and the side face in the standard side face image has a specified posture;

extracting a first side face feature vector of the to-be-identified user according to the standard side face image;

acquiring a second side face feature vector corresponding to the recorded side face image; and

calculating a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector; and

identifying whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity; and

making a deduction operation on the payment electronic account if it is identified that the to-be-identified user is an authorized user of the payment electronic account.

wherein the adjusting the side face image to obtain a standard side face image comprises:

determining positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and

adjusting the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.

~~18~~9. A storage medium configured to store computer-executable instructions, wherein execution of the executable instructions implements the following steps:

acquiring a frontal face image, and a side face image from at least one side, of a to-be-identified user;

identifying whether the to-be-identified user is an authorized user of a payment electronic account according to the frontal face image and the side face image, wherein the identifying whether the to-be-identified user is an authorized user comprises:

performing a similarity comparison between the frontal face image and a recorded frontal face image corresponding to the payment electronic account, and

performing a similarity comparison between the side face image and a recorded side face image corresponding to the payment electronic account, wherein performing a similarity comparison between the side face image and the recorded side face image comprises:

adjusting the side face image to obtain a standard side face image, wherein the standard side face image is of a specific size, and the side face in the standard side face image has a specified posture;

extracting a first side face feature vector of the to-be-identified user according to the standard side face image;

acquiring a second side face feature vector corresponding to the recorded side face image; and

calculating a similarity between the side face image and the recorded side face image based on the first side face feature vector and the second side face feature vector; and

identifying whether the to-be-identified user is an authorized user of the payment electronic account according to the frontal face similarity and the side face similarity; and

making a deduction operation on the payment electronic account if it is identified that the to-be-identified user is an authorized user of the payment electronic account,

wherein the adjusting the side face image to obtain a standard side face image comprises:

determining positions of key points on the side face image, wherein the key points at least comprise an ear hole center and a tip of nose; and

adjusting the side face image based on a position of the ear hole center on the side face image, a position of the tip of nose on the side face image, and relative positions of the ear hole center and the tip of nose, to obtain the standard side face image.