Claims

1. An intelligent scoring method for a text objective question, characterized in that it comprises:

acquiring an answer image of a text objective question;

segmenting the answer image to obtain one or more segmentation results of an answer string to be identified;

determining whether any of the segmentation results has the same number of characters as that of a standard answer;

if not, determining that the answer is wrong;

otherwise, calculating identification confidence of the segmentation result having the same number of characters as that of the standard answer, and/or calculating the identification confidence of each character in the segmentation result having the same number of characters as that of the standard answer;

determining whether the answer is correct according to the calculated identification confidence.

2. The method according to Claim 1, characterized in that said acquiring the answer image of the text objective question comprises:

acquiring an image of an answer sheet;

according to layout information of the answer sheet, segmenting and extracting a target answer region of the answer sheet image;

extracting the answer image of the text objective question from the target answer region.

3. The method according to Claim 2, characterized in that said acquiring the image of the answer sheet comprises:

using an optical mark reader, a high-speed portable scanner, or a mobile terminal device to acquire the image of the answer sheet.

4. The method according to Claim 1, characterized in that said segmenting the answer image to obtain one or more segmentation results of the answer string to be identified comprises:

performing fine segmentation on the answer image to obtain a plurality of fine segmentation sub-blocks;

combining the fine segmentation sub-blocks and calculating combination confidence;

determining combination results according to the confidence, and obtaining one or more segmentation results of the answer string to be identified.

5. The method according to Claim 4, characterized in that said calculating combination confidence comprises:

extracting a character feature of the character obtained from the combination;

using a rule statistical model obtained from pre-training and the character feature to calculate confidence of said combination.

6. The method according to any one of Claims 1 to 5, characterized in that,

said calculating identification confidence of the segmentation result having the same number of characters as that of the standard answer comprises:

aligning the segmentation result having the same number of characters as that of the standard answer with the text string of the standard answer;

on the basis of an acoustical model of a complete character set and a general language model, performing handwriting decoding and identification on the segmentation result having the same number of characters as that of the standard answer, to obtain a likelihood score of each identification result;

selecting a likelihood score of a path with a decoding path consistent with the standard answer in each identification result;

calculating a posteriori score of said path, and using the posteriori score as the identification confidence of the segmentation result having the same number of characters as that of the standard answer;

said determining whether the answer is correct according to the calculated identification confidence comprises:

if there is any segmentation result having the same number of characters as that of the standard answer having an identification confidence greater than a first confidence threshold, determining that the answer is correct; otherwise, determining that the answer is wrong.

7. The method according to any one of Claims 1 to 5, characterized in that,

said calculating identification confidence of each character in the segmentation result having the same number of characters as that of the standard answer comprises:

aligning the segmentation result having the same number of characters as that of the standard answer with the text string of the standard answer;

on the basis of an acoustical model of a complete character set, calculating a likelihood score of the identification result of each character in the segmentation result having the same number of characters as that of the standard answer;

selecting a likelihood score of the identification result of the character that is consistent with the standard answer in the identification results;

calculating a posteriori score of the selected identification result, and using the posteriori score as the identification confidence of the character;

said determining whether the answer is correct according to the calculated identification confidence comprises:

if the identification confidence is greater than a second confidence threshold for all characters in any segmentation result having the same number of characters as that of the standard answer, determining that the answer is correct; otherwise, determining that the answer is wrong.

8. The method according to any one of Claims 1 to 5, characterized in that,

said calculating identification confidence of each character in the segmentation result having the same number of characters as that of the standard answer comprises:

aligning the segmentation result having the same number of characters as that of the standard answer with the text string of the standard answer;

on the basis of an acoustical model of a complete character set and a general language model, performing handwriting decoding and identification on the segmentation result having the same number of characters as that of the standard answer, to obtain a likelihood score of each identification result;

calculating a posteriori probability of each identification result, and, according to the posteriori probability of each identification result and for each character in the segmentation result, accumulating the posteriori probability that the identification result of said character in each identification result is consistent with the standard answer, and using the posteriori score as the confidence of the character;

said determining whether the answer is correct according to the calculated identification confidence comprises:

if the identification confidence is greater than a third confidence threshold for all characters in any segmentation result having the same number of characters as that of the standard answer, determining that the answer is correct; otherwise, determining that the answer is wrong.

9. An intelligent scoring system for a text objective question, characterized in that it comprises: an image acquisition module, a segmentation module, a first determination module, a calculation module, a second determination module, and an output module, wherein:

said image acquisition module is configured to acquire an answer image of a text objective question;

said segmentation module is configured to segment the answer image acquired by said image acquisition module to obtain one or more segmentation results of an answer string to be identified;

said first determination acquisition module is configured to determine whether any of the segmentation results obtained by said segmentation module has the same number of characters as that of a standard answer, and when the determination result is that there is no segmentation result having the same number of characters as that of the standard answer, trigger said output module to output a prompt message that the answer is wrong; otherwise, trigger said calculation module to calculate identification confidence;

said calculation module comprises a first calculation module and/or a second calculation module; said first calculation module is configured to calculate identification confidence of the segmentation result having the same number of characters as that of the standard answer, and said second calculation module is configured to calculate the identification confidence of each character in the segmentation result having the same number of characters as that of the standard answer;

said second determination module is configured to determine whether the answer is correct according to the identification confidence calculated by said calculation module, and when it is determined that the answer is correct, trigger said output module to output a prompt message that the answer is correct; when it is determined that the answer is wrong, trigger said output module to output a prompt message that the answer is wrong.

10. The system according to Claim 9, characterized in that said image acquisition module comprises:

an image acquisition unit configured to acquire an image of an answer sheet;

an answer region extraction unit configured to, according to layout information of the answer sheet, segment and extract a target answer region of the answer sheet image;

an answer content extraction unit configured to extract the answer image of the text objective question from the target answer region.

11. The system according to Claim 10, characterized in that said image acquisition unit is specifically an optical mark reader, a high-speed portable scanner, or a mobile terminal device.

12. The system according to Claim 9, characterized in that said segmentation module comprises:

a segmentation unit configured to perform fine segmentation on the answer image to obtain a plurality of fine segmentation sub-blocks;

a confidence calculation unit configured to combine the fine segmentation sub-blocks and calculate combination confidence;

a combination result determination unit configured to determine combination results according to the confidence, and obtain one or more segmentation results of the answer string to be identified.

13. The system according to Claim 12, characterized in that said confidence calculation unit comprises:

a combination subunit configured to combine the fine segmentation sub-blocks;

an extraction subunit configured to extract a character feature of the character obtained from the combination;

a calculation subunit configured to use a rule statistical model obtained from pre-training and the character feature to calculate confidence of said combination.

14. The system according to any one of Claims 9 to 13, characterized in that said first calculation module comprises:

an alignment unit configured to align the segmentation result having the same number of characters as that of the standard answer with the text string of the standard answer;

a first identification unit configured to, on the basis of an acoustical model of a complete character set and a general language model, perform handwriting decoding and identification on the segmentation result having the same number of characters as that of the standard answer, to obtain a likelihood score of each identification result;

a first selection unit configured to select a likelihood score of a path with a decoding path consistent with the standard answer in each identification result;

a first calculation unit configured to calculate a posteriori score of said path, and use the posteriori score as the identification confidence of the segmentation result;

said second determination module is specifically configured to, if there is any segmentation result having the same number of characters as that of the standard answer having an identification confidence greater than a first confidence threshold, determine that the answer is correct; otherwise, determine that the answer is wrong.

15. The system according to any one of Claims 9 to 13, characterized in that said second calculation module comprises:

an alignment unit configured to align the segmentation result having the same number of characters as that of the standard answer with the text string of the standard answer;

a second identification unit configured to, on the basis of an acoustical model of a complete character set, calculate a likelihood score of the identification result of each character in the segmentation result having the same number of characters as that of the standard answer;

a second selection unit configured to select a likelihood score of the identification result of the character that is consistent with the standard answer in the identification results;

a second calculation unit configured to calculate a posteriori score of the selected identification result, and use the posteriori score as the identification confidence of the character;

said second determination module is specifically configured to, if the identification confidence is greater than a second confidence threshold for all characters in any segmentation result having the same number of characters as that of the standard answer, determine that the answer is correct; otherwise, determine that the answer is wrong.

16. The system according to any one of Claims 9 to 13, characterized in that said second calculation module comprises:

the alignment unit configured to align the segmentation result having the same number of characters as that of the standard answer with the text string of the standard answer;

the first identification unit configured to, on the basis of an acoustical model of a complete character set and a general language model, perform handwriting decoding and identification on the segmentation result having the same number of characters as that of the standard answer, to obtain a likelihood score of each identification result;

a third calculation unit configured to calculate a posteriori probability of each identification result, and, according to the posteriori probability of each identification result and for each character in the segmentation result having the same number of characters as that of the standard answer, accumulate the posteriori probability that the identification result of said character in each identification result is consistent with the standard answer, and use the posteriori score as the confidence of the character;

said second determination module is specifically configured to, if the identification confidence is greater than a third confidence threshold for all characters in any segmentation result having the same number of characters as that of the standard answer, determine that the answer is correct; otherwise, determine that the answer is wrong.