

What is claimed is:

1. An auxiliary endoscopy system, comprising:

an anatomic-site identification module configured to identify collected endoscopy images frame by frame, determine each observation point site corresponding to each endoscopy image, and map each observation point site to a preset station site separately;

an attention degree recording module configured to determine a station site observation sequence according to recorded observation times of the observation point sites and observation integrity degrees of the station sites determined by the anatomic-site identification module; and

a guide module configured to determine a target station that an endoscope is to be transferred to according to a current station site corresponding to a current endoscopy image determined by the anatomic-site identification module, the station site observation sequence and a preset physical depth of the current station site, and guide endoscopy according to the current station site and the target station;

the attention degree recording module comprises a time recording unit, and the guide module comprises a probability prediction guide unit and a prompt guide unit;

the time recording unit is configured to record the observation integrity degrees of the station sites and the observation times of the observation point sites determined by the anatomic-site identification module frame by frame, and determine the station site observation sequence according to the observation times of the observation point sites and the observation integrity degrees of the station sites;

the probability prediction guide unit is configured to determine a station site transfer probability matrix according to the current station site, the station site observation sequence and the preset physical depth of the current station site, and determine a maximum value in the station site transfer probability matrix as the target station; and

the prompt guide unit is configured to draw a station guide line between the current station and the target station on a preset digestive tract user interface (UI) in response to determining that the target station is different from the current station site; and alternatively, prompt a standard endoscopic operation of endoscopy according to a preset observation orientation of a target observation point site, that an endoscope is to be transferred to, determined by the probability prediction guide unit in response to determining that the target station is the same as the current station site.

2. The auxiliary endoscopy system according to claim 1, wherein the probability prediction guide unit is further configured to determine a station site transfer probability by means of a first objective function, and determine the target observation point site by means of a second objective function according to an observation time of the current station site and an observation site set of the current site;

the first objective function is:

$$s_{i'} = \text{Sigmoid} \left(\frac{1 - M_k(i')}{|D_i - D_{i'}| + \lambda} \times \left(\frac{2}{1 - e^{(D_i - D_{i'})}} - 1 \right) \right), i' \in k$$

wherein $s_{i'}$ represents a probability of transferring to the target station i' , $M_k(i')$ represents an observation integrity degree of the target station i' , $D_{i'}$ represents a physical depth of the target station i' , D_i represents a physical depth of a station site i , and λ is an arbitrary constant; and

the second objective function is:

$$s_n = \frac{1}{1 - e^{(b(n) - M_n(n))}}, n \in O(i)$$

wherein s_n represents a probability of transferring to the target observation point site n , $M_n(n)$ represents an observation time of the target observation point site n , $b(n)$ represents an optimal observation time of the target observation point site n , and $O(i)$ represents a target observation point site set corresponding to the station site i .

3. The auxiliary endoscopy system according to claim 1, wherein the attention degree recording module further comprises a thermodynamic diagram display unit;

the time recording unit is configured to record the observation integrity degrees of the station sites and the observation times of the observation point sites determined by the anatomic-site identification module frame by frame, and determine an observation point site observation sequence according to the observation times of the observation point sites and the observation integrity degrees of the station sites; and

the thermodynamic diagram display unit is configured to display the observation point site observation sequence on the digestive tract UI in a thermodynamic diagram form.

4. The auxiliary endoscopy system according to claim 1, further comprising a monitoring module, wherein the monitoring module comprises an endoscopic operation identification unit and a deviation warning unit;

the endoscopic operation identification unit is configured to identify a current

endoscopic operation; and

the deviation warning unit is configured to give a prompt on the digestive tract UI in response to determining that the current endoscopic operation is inconsistent with the standard endoscopic operation.

- 5 5. The auxiliary endoscopy system according to any one of claims 1-3, wherein the anatomic-site identification module comprises a model training unit, an identification unit and an anatomic-site mapping unit;

the model training unit is configured to construct a network structure according to a convolution layer of a spatial grouping structure, a self-attention network layer, a
10 fully-connected layer and a prediction layer, train a pre-labeled sample picture as input information of the network structure, and obtain a neural network multi-label identification model;

the identification unit is configured to identify the collected endoscopy images frame by frame by means of the neural network multi-label identification model trained by the
15 model training unit, and determine each observation point site corresponding to each identification image; and

the anatomic-site mapping unit is configured to map each observation point site to a preset station site according to a preset mapping relation between the observation point sites and the station sites.

- 20 6. The auxiliary endoscopy system according to claim 5, wherein the model training unit is specifically configured to perform dimensional transformation and feature extraction on the input sample picture by means of the convolution layer of a spatial grouping structure, and output a feature vector F_0 ;

obtain a feature vector Q_0 by performing self-attention weighting on the feature
25 vector F_0 by means of a first group of self-attention network layers; obtain a feature vector $\widetilde{F}_0$ by performing self-attention weighting jointly on the feature vector F_0 and the feature vector Q_0 by means of a second group of self-attention network layers;

obtain a one-dimensional feature vector F by performing linear projection on the feature vector $\widetilde{F}_0$ and the feature vector F_0 by means of the fully-connected layer;

- 30 obtain a multi-label identification probability by deriving each preset category separately by means of the prediction layer according to the one-dimensional feature vector F ;

perform calculation by using a loss function according to a multi-label result marked in advance, obtain a loss value, and then update a model parameter by using reverse propagation; and obtain the neural network multi-label identification model by stopping when a preset number of rounds is reached or the loss value is less than a preset value.

5 7. An auxiliary endoscopy method, comprising:

identifying collected endoscopy images frame by frame, determining each observation point site corresponding to each endoscopy image, and mapping each observation point site to a preset station site separately;

10 determining a station site observation sequence according to recorded observation times of the observation point sites and observation integrity degrees of the station sites;

determining a target station that an endoscope is to be transferred to according to a current station site corresponding to a current endoscopy image, the station site observation sequence and a preset physical depth of the current station site; and

guiding endoscopy according to the current station site and the target station,

15 wherein the determining a station site observation sequence according to recorded observation times of the observation point sites and observation integrity degrees of the station sites comprises:

20 the observation integrity degrees of the station sites and the observation times of the observation point sites are recorded frame by frame, and the station site observation sequence is determined according to the observation times of the observation point sites and the observation times of the station sites

the determining a target station that an endoscope is to be transferred to according to a current station site corresponding to a current endoscopy image, the station site observation sequence and a preset physical depth of the current station site comprises:

25 a station site transfer probability matrix is determined according to the current station site, the station site observation sequence and the preset physical depth of the current station site, and a maximum value in the station site transfer probability matrix is determined as the target station;

30 a station guide line between the current station and the target station is drawn on a preset digestive tract user interface (UI) in response to determining that the target station is different from the current station site; and alternatively, a standard endoscopic operation of endoscopy is prompted according to a preset observation orientation of a target observation point site, that an endoscope is to be transferred to, determined by the

probability prediction guide unit in response to determining that the target station is the same as the current station site.

8. An auxiliary endoscopy device, comprising a memory, a processor, and a computer program stored in the memory and runnable on the processor, wherein

5 the computer program implements steps of the auxiliary endoscopy method according to claim 7 when executed by the processor.

9. A computer-readable storage medium, storing an auxiliary endoscopy program, wherein the auxiliary endoscopy program implements steps of the auxiliary endoscopy method according to claim 7 when executed by a processor.

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