Peer Review File

Article information: https://dx.doi.org/10.21037/jtd-21-761.

Comment 1: Well written article; however it doesn't add much to existing literature.

Reply 1: thank you for your comment. It is not easy to be concrete as the available literature is small and not homogeneous. We have tried to reinforce the clinical significance.

Comment 1: I would like to congratulate the authors for this narrative review which gives an extended overview of the literature in the field. But I have raised a number of concerns that need to be addressed before considering the review for publishing.
Why does Table 1 only talk about supervised learning? As the authors detail principles of unsupervised learning and reinforcement learning, readers would expect them to be also summarized in Table 1?

Reply 1: We thank the reviewer for this important comment; we found it very useful. We have added the description of unsupervised learning and reinforcement learning to the table 1. Please see the Table 1, page 1.

Comment 2: Table 2 to 5
The readers would expect to find main results or performance characteristics of the studies presented. It would outlined their relevance in the domain and for the objectives set. Detailing the study design of the articles cited would also help to evaluate the level of evidence. Columns with the year and journal could be replaced by the previous suggestions as they will appear in the bibliography.

Reply 2: Thank you, we really appreciate your comment. We modified the paper accordingly. Please see the Tables 2-5, pages 5-7-8.

Comment 3: Legal aspects, ethics and limits section
This section should be more developed by highlighting concrete examples on how AI has pushed various scientific societies to issue recommandations concerning it (United States National Academy of Medicine or French National Academy of Medicine). Moreover AI has raised serious concerns about patients privacy, especially in our era with big tech companies like Google, Amazon… Consequently, legal texts have been published to help protect the patients like the GDPR regulation in 2018 in Europe. Last but not least, rigorous research practice is necessary to produce scientific results without biases before algorithms can be approved. Citing examples of pathways to certification of AI algorithms and their clinical use would be a great addition.

Reply 3: Thank you for this valuable suggestion. We had the opportunity to expand the section on the legal issue. We have included scientific societies recommendations and the EU-GDPR 2018. We have also emphasized more the need for certifications; this possibility could lead to a more appropriate and more conscious use of these technologies. Please see pages 8-9.

Overall, this manuscript is a relatively short article that describes emerging roles of AI in thoracic surgery. The authors have covered broad topics which are relevant to the field of thoracic surgery. However, the authors provided a short description in several sub-topics which may not suffice for novice readers to follow the idea of referred articles. I have specific questions and concerns as below.

Comment 1: Page 1: Paragraph 3 – AI technologies include two main categories…...I disagree that natural language processing and machine learning are distinctive category. Technically, there are many overlapped features. Please re-check the references.

Reply 1: We thank the reviewer for this comment. Following your suggestions, we revised the definition of AI technologies to make it clearer, and we inserted the corresponding reference. Please see Introduction section, page 1.

Comment 2: Page 2: Paragraph 3 – Finally, reinforcement learning…...the core technique at the heart of robotic surgery. Need to elaborate more about the roles of reinforcement learning in surgery and provide a better definition of "reinforcement learning".

Reply 2: We thank you for the valuable suggestion. We provide a better definition of reinforcement learning and of its role in surgery. Please see Introduction section, page 2, paragraph 3.

Comment 3: Page 2: Paragraph 4 – The description of figure 1 in this paragraph is not quite correlated to the actual figure 1. Please revise.

Reply 3: We thank you for the precious comment. Following your advice, we revised the description of the actual figure 2 (we add a new figure 1 in the Introduction section). Please see Introduction section, page 2, paragraph 4.

Comment 4: Methods – What is the search output (number of articles) based on the search query? How did authors select articles to be included in this review?

Reply 4: We thank the reviewer for the constructive comments. We have inserted the article selection flow diagram. Please see the figure 4, Methods section, page 3.

Comment 5: The article by Krizhevsky et al. described the general image classification. How did CNN become a tool for radiologist in lung nodule classification?

Reply 5: We thank you for the comment. We revised the paper, clarifying how, after the publication of the paper by Krizhevsky et al., CNN become a tool for lung nodule classification. Please see page 4.

Comment 6: Page 4: Please elaborate more about CNN. Novice readers may not understand the concept of CNN.

Reply 6: We thank you for the comment. Following your suggestion, we further explored the concept of CNN, to make it clearer. Please see page 4.

Comment 7: Reference #32, this reference describes general roles of AI in thoracic surgery. The authors should specifically describe which integrated risk scores that they cites in this manuscript.

Reply 7: We thank the reviewer for this comment. Following your advice, we revised this paragraph, integrating the corresponding references of the cited risk scores. Please see Risk-assessment section, page 5.

Comment 8: Page 6: Robotic surgery, the author should mention that robotic-assisted surgery is then by definition not AI. AI robotic is not autonomous robotic surgery. It required full supervision by human surgeon.

Reply 8: We thank the reviewer for this comment. Following your suggestions, we revised the paragraph of robotic surgery, to make it clearer. Please see Surgical performance section, page 6.

Comment 9: Page 7: Prognosis/ reference 58, it seems to be out of place with prior section (pathology). Consider revision.

Reply 9: We thank the reviewer for this valuable comment. Following your advice, we revised the paper, separating the prognosis part from the pathology section. Please see Prognosis section, page 7-8.

Comment 10: Page 7: Limits, legal and ethical issues – There are many more limitations, legal and ethical issues about AI applications in thoracic surgery. The authors need to expand this section.

Reply 10: We thank the reviewer for these constructive comments. We have expanded this section by deepening the current legislative limits. We have also clarified the concept of adequate certifications and recognized training courses. Please see Limits, legal and ethical issues section, pages 8-9.

Comment 11: Table 1 – Deep learning: deep belief networks have mostly fallen out of favor and are rarely used, even compared to other unsupervised or generative learning algorithms. Consider removal.

Reply 11: We thank the reviewer for this comment. We consider deep learning a still useful technique, and we believe it should be mentioned for completeness.

Comment 12: Table 2,3,4,5 – this table requires more details – performance, clinical application, source of dataset. Why choose these articles to be part of the tables?

Reply 12: Thank you, we really appreciate your comment. We modified the tables accordingly. Please see the Tables 2-5, pages 5-7-8.

Comment 1: For background, deep learning should also be mentioned as an independent part. I personally recommend to use a chart or figure to explain the mechanism and relationship among these technique (NLP\ML\DL\AI etc.).
Reply 1: Thank you for this valuable suggestion. We had the opportunity to describe deep learning technique in details, and to insert a figure to explain relationships among AI-based techniques. Please see Introduction section and Figure 1, pages 1-2.

Comment 2: For method, deep learning should be considered as a key word.
Reply 2: Thank you for your suggestion. We incorporated deep learning into the keywords and performed the consensual literature search. Please see Methods section, page 3.

Comment 3: Thoracic lesion management: there are far more lesion types than pulmonary nodule, more diseases should be mentioned. In addition, it is better to demonstrated more details and studies about researches on pulmonary nodule, for example, segmentation, classification, monitoring, followup, etc.
Reply 3: We thank the reviewer for this precious comment. We had the opportunity to revise current literature and further develop the section about AI application on the management of pulmonary nodules, and of other thoracic diseases as well. Please see Thoracic lesions management section, page 4-5.

Comment 4: Robotic surgery itself is not the AI technique, its only a machine that operated by human. Is there any study that mention any AI technique combined with robotic surgery?
Reply 4: We thank your valuable comment. We revised the definition of robotic surgery, to make it clearer. Please see Surgical performance section, page 6. Moreover, we re-examined current literature, but we were not able to find specific papers about AI-techniques application and robotic thoracic surgery, other than the previously cited ones.

Comment 5: For pathology and prognosis, many studies have explored pathological classification based on CT scan or frozen section or paraffin section, please do some extend work on this, Besides, some researches also explore the application using CT scan to predict sensitive mutation or drug response (TKI, PD-1 inhibitors), please add some content.
Reply 5: We thank you for this precious comment. Following your suggestions, we had the opportunity to perform a literature search of this content, and we modified the manuscript accordingly. Please see page 8.

Comment 6: Overall, good review, need more content
Reply 6: Thank you, we appreciate your comment. We have sought to strengthen the clinical significance, even taking advantage of the valuable guidance of Reviewers.