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Closing the loop: fully automated radiotherapy planning for head and neck cancer

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Closing the Loop: Fully Automated Radiotherapy Planning for Head and Neck Cancer

1. Future progress in general medical image segmentation will depend more on the quality of prompts and training strategies than on increasingly larger backbone models. *(This thesis, Chapter 2)*
2. For radiotherapy dose prediction, anatomical geometry is more informative than imaging data alone. *(This thesis, Chapter 3)*
3. By directly optimizing the metrics used in clinical plan evaluation, even a standard 3D U-Net can achieve clinically satisfactory dose predictions. *(This thesis, Chapter 4)*
4. A dose prediction model has limited clinical value unless its predictions can be translated into deliverable treatment plans. *(This thesis, Chapter 5)*
5. Marginal performance gains do not justify unlimited computational cost.
6. Compared with image segmentation, progress in AI-based radiotherapy treatment planning is more severely constrained by the limited availability of public datasets.
7. A model that fails transparently is safer than one that succeeds unpredictably.
8. The role of AI is not necessarily to replace human planners but rather to rapidly generate a clinically reasonable initial plan that can be efficiently reviewed and refined by experts.
9. A PhD is not only an academic journey but also an exercise in self-management: setting priorities, managing time, and allocating effort wisely across different projects.
10. As useful as vibe coding may be, the success of real-world software projects ultimately depends on human expertise and judgment.