

TIAgent: Enabling Code-Free Computational Pathology Workflows in Natural Language

Aakash Madhav Rao^{1,2}, Mark Eastwood^{1,2}, Danielle Belgrave³ & Fayyaz Minhas^{1,2}

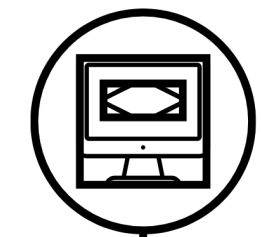
¹Tissue Image Analytics (TIA) Centre, Dept. Computer Science, University of Warwick

²PRISM Lab, TIA Centre, Dept. Computer Science, University of Warwick

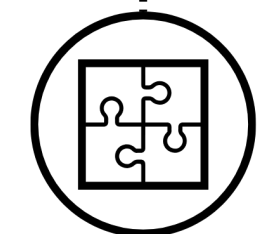
³GSK, Greater London, England, United Kingdom

1. Background

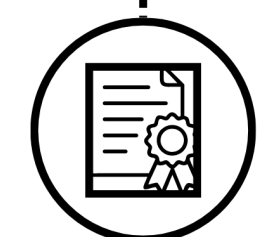
Computational pathology provides powerful tools for WSI analysis, but building reusable workflows remains difficult for non-technical users.



- Workflow construction often requires coding expertise.



- Models, viewers, and analyses are fragmented across tools.



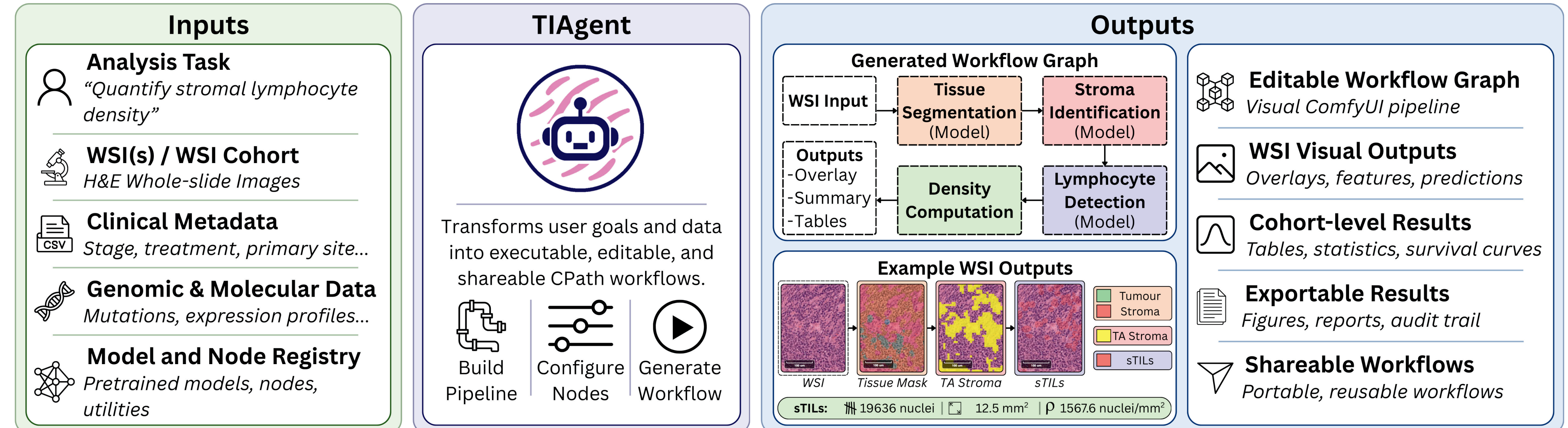
- Reusable workflows remain difficult to reproduce and share reliably.



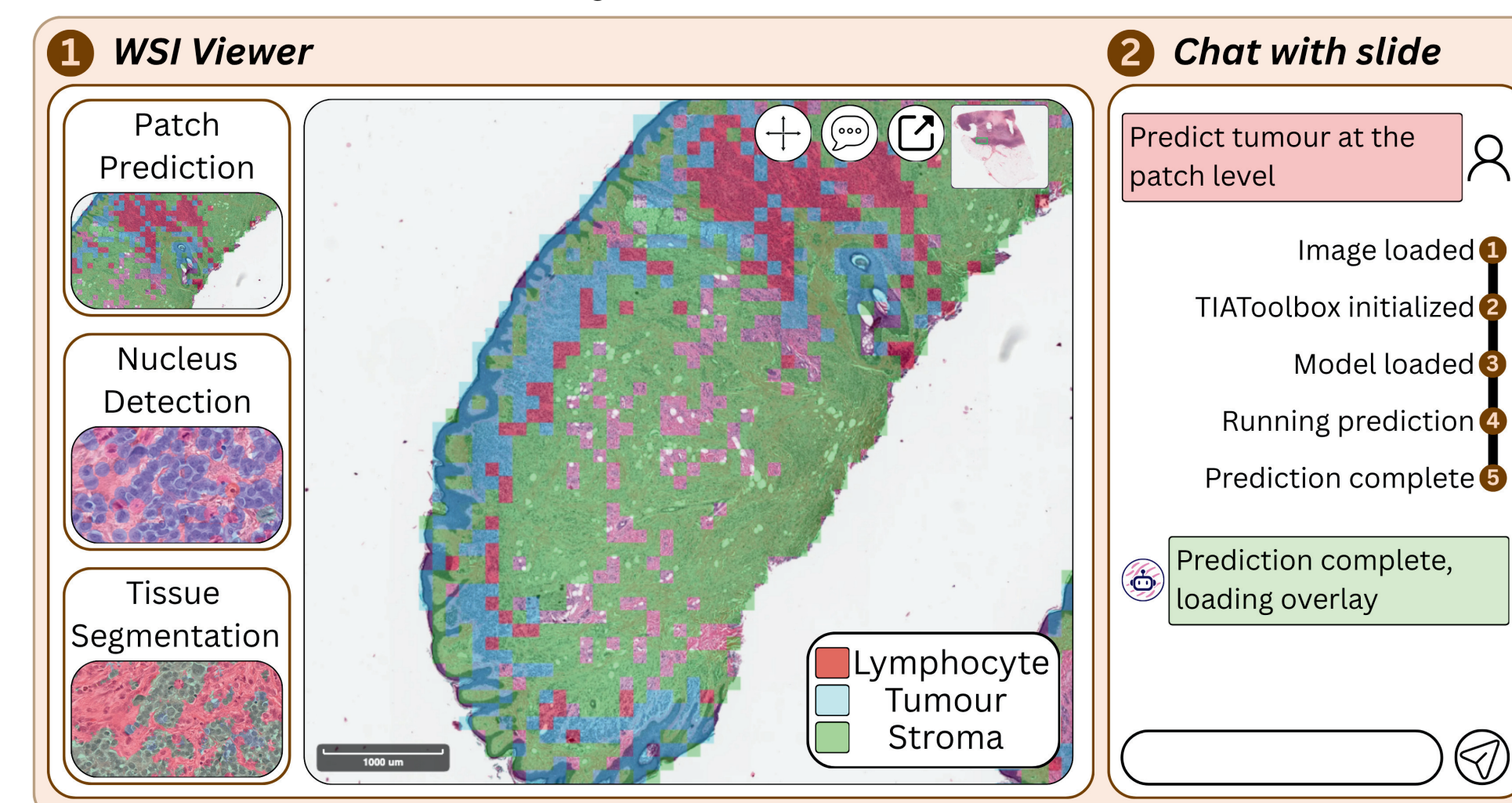
Motivation: Lower the barrier to transparent, reproducible computational pathology workflows.

2. System Overview: What TIAgent does

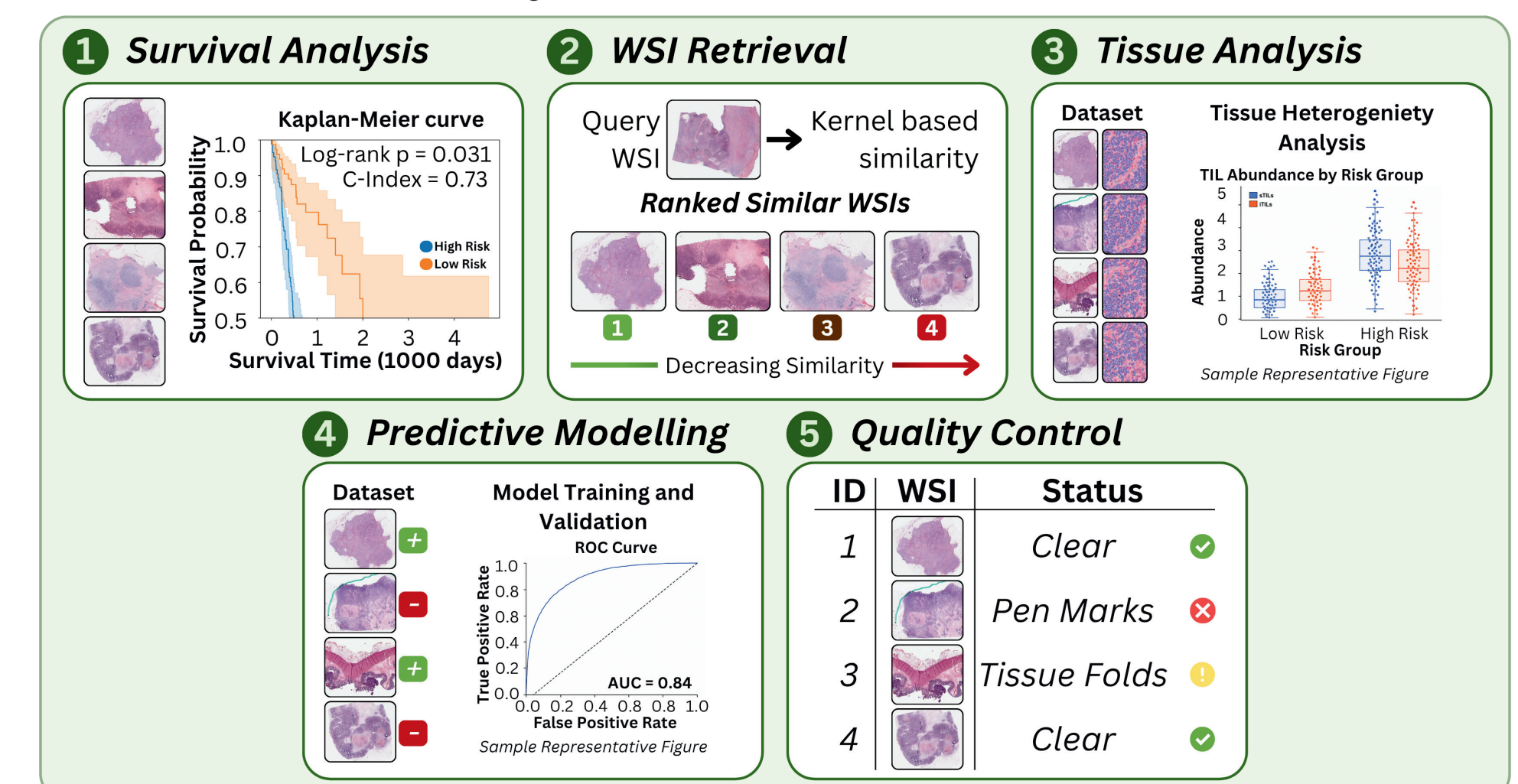
A. TIAgent computational pathology workflow generation



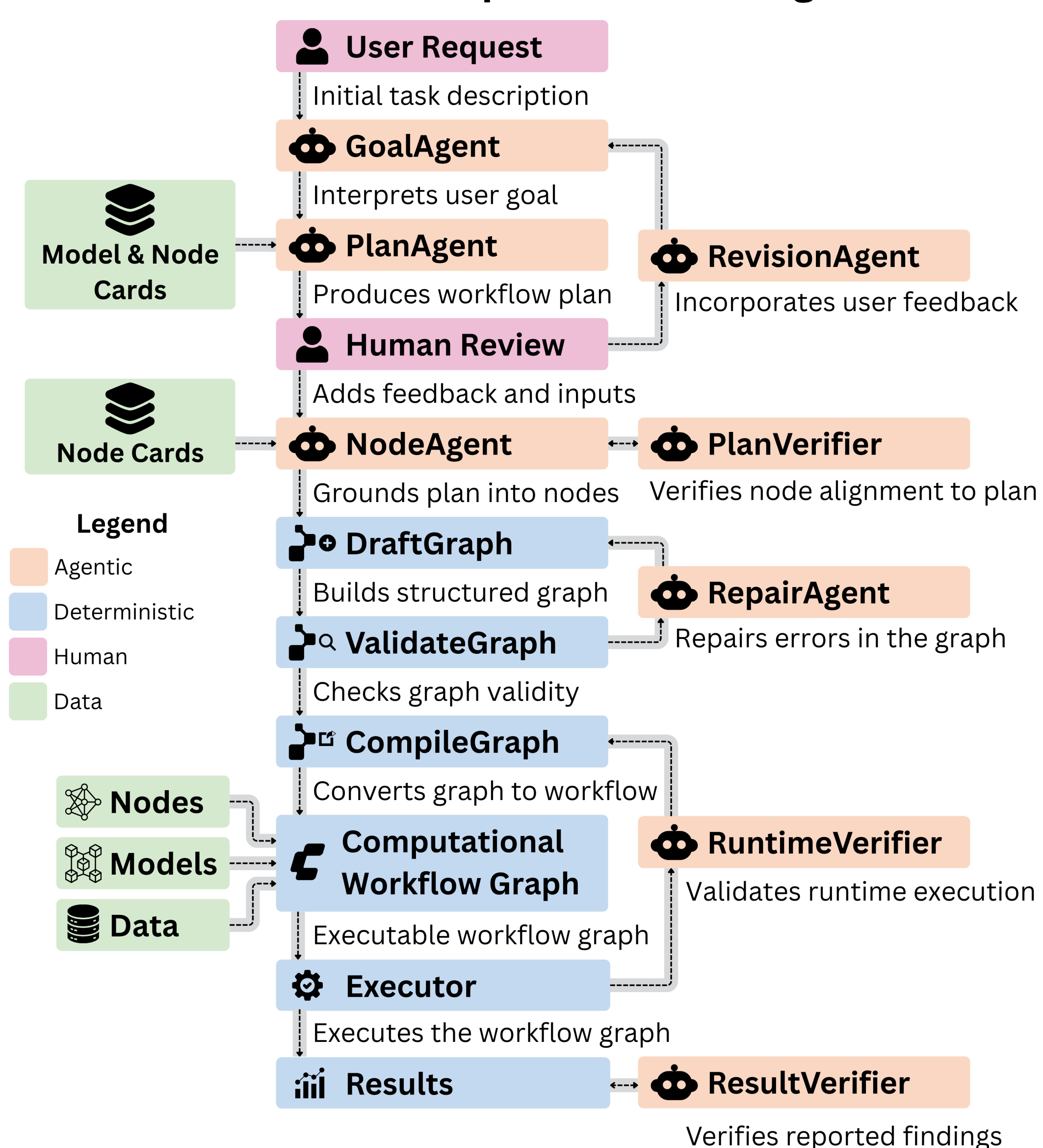
B. Interactive WSI Analysis



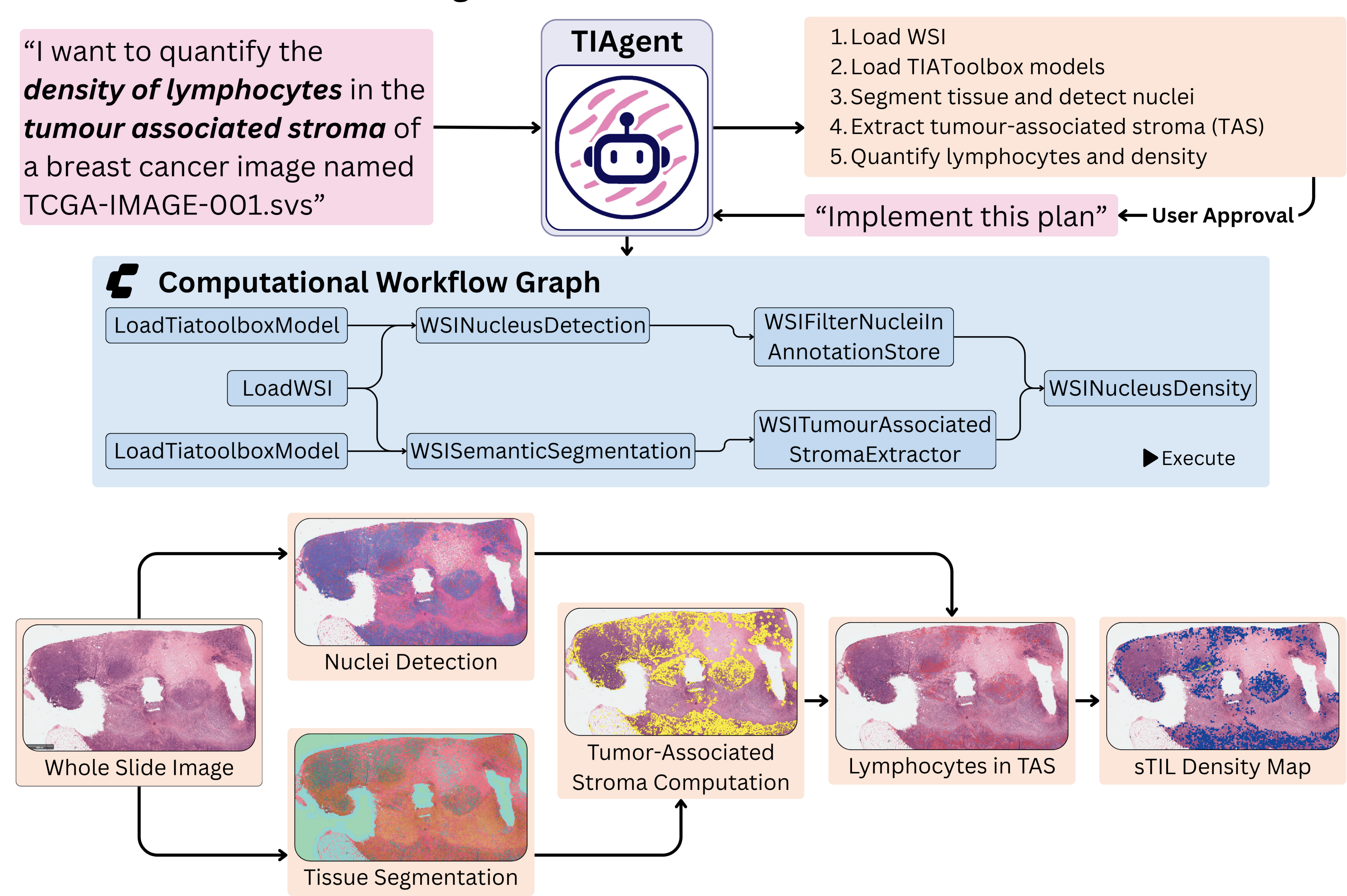
C. Cohort-level Analysis



3. Workflow Generation Pipeline: How TIAgent works



4. Demonstration: What TIAgent can do



5. Evaluation

We evaluated our pipeline using current state-of-the-art locally hosted and cloud based LLMs

No Imperfections

Can be used directly

Clear & Usable

Fixable Imperfections

Minor fixes needed

Missing Parameter

Missing Nodes

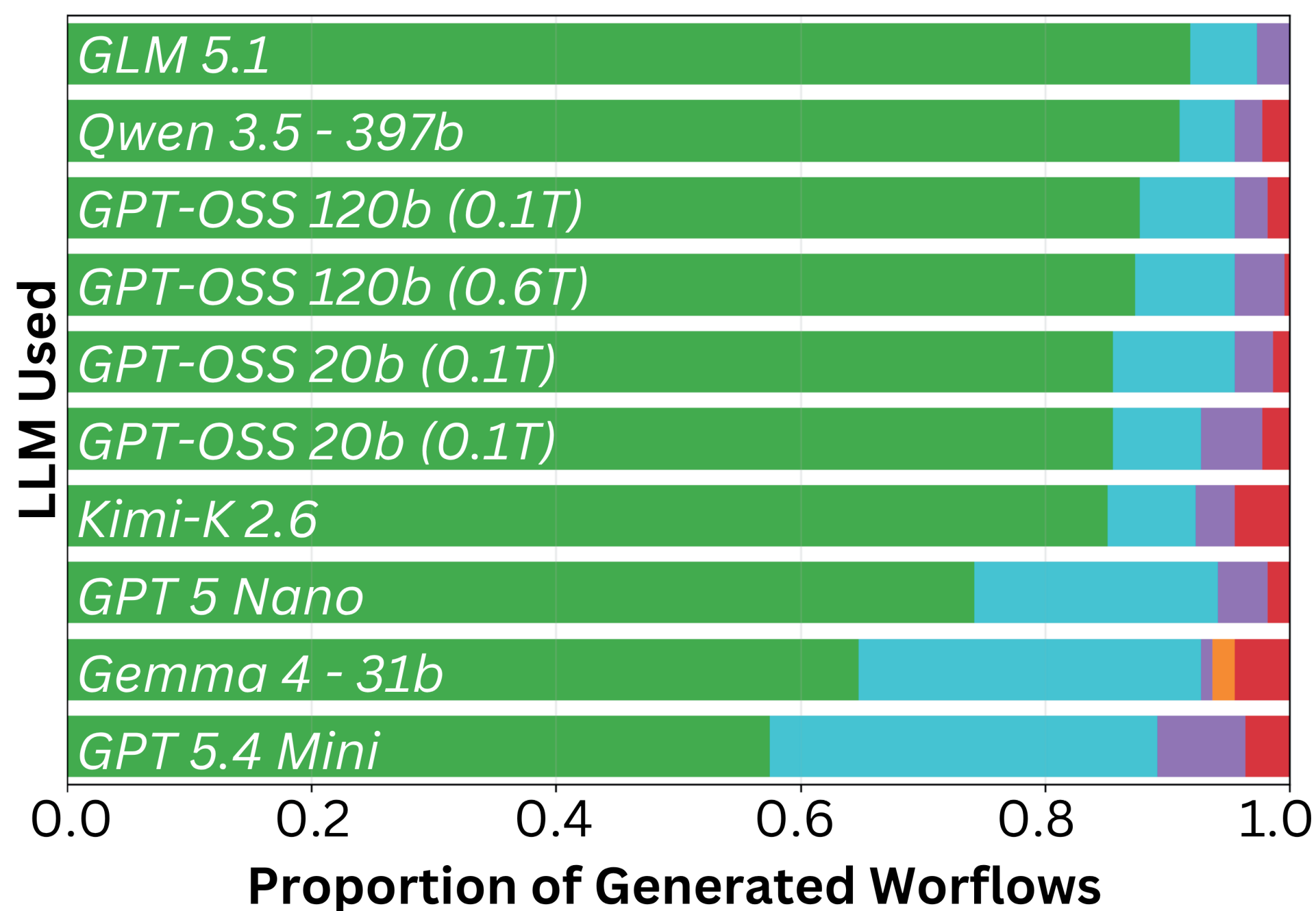
Fatal Imperfections

Unusable workflows

Format Issues

Failure

n = 224 Unique Tasks



6. Current Capabilities & Limitations

Capabilities

- ✓ Natural-language workflow generation
- ✓ Human-in-the-loop refinement
- ✓ Node-level workflow grounding
- ✓ Graph validation and repair
- ✓ ComfyUI execution
- ✓ Single-WSI and cohort-level task support

Limitations

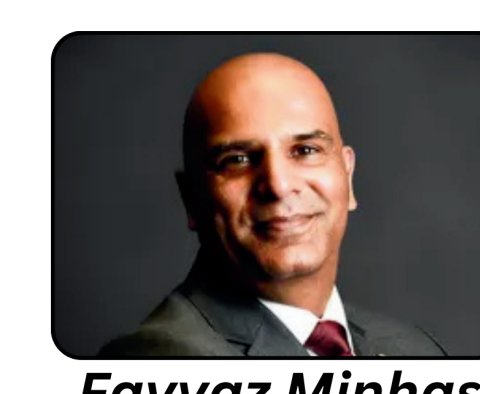
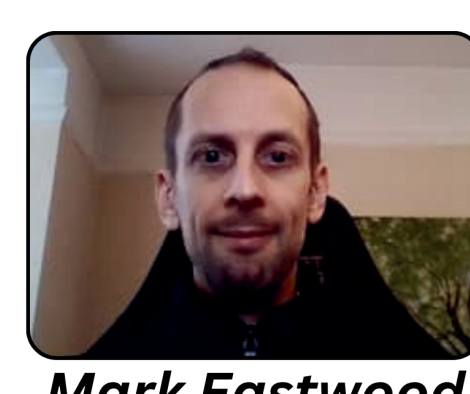
- ⚠ Requires curated model/node registries
- ⚠ Depends on available models and metadata
- ⚠ Complex tasks may need clarification
- ⚠ Clinical validation remains future work



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Presenter
Contact:
Aakash.Rao@warwick.ac.uk



Scan for Demos