Future Research Directions

Model Transparency and Explainability

- **Why it matters:**Users and developers need to trust and understand model decisions.
- **Challenges:**
  - Transformer models are complex and act like black boxes
  - Hard to trace how visual cues influence outputs
- **Research Directions:**
  - Attention maps, saliency heatmaps, token attribution
  - Explanation-by-example, interactive debugging tools
- **Real-World Need:**Healthcare, law, education—where decisions must be justified.