Multi-Task Learning
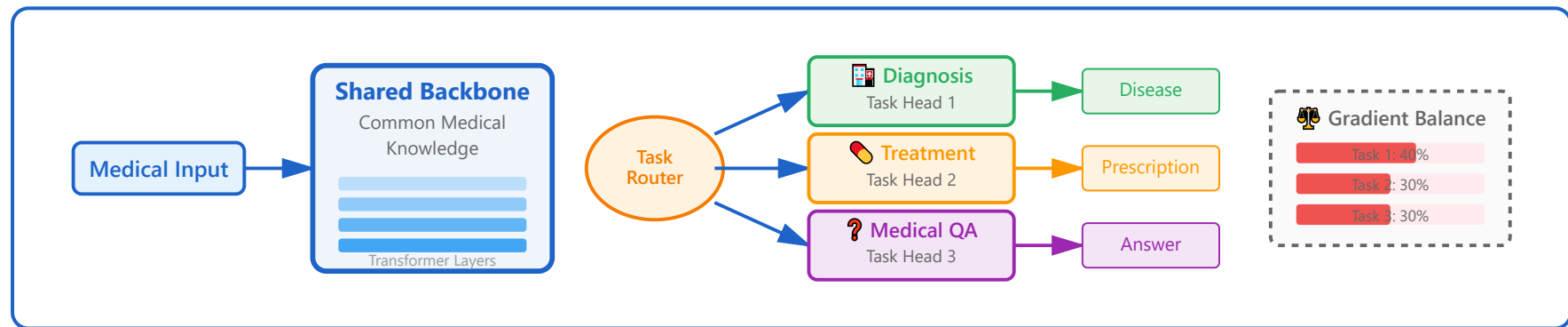
Simultaneous Training on Multiple Medical Tasks
Share representations while preventing negative transfer

Medical Input → **Shared Backbone** Common Medical Knowledge / Transformer Layers → Task Router →
- 🏥 **Diagnosis** Task Head 1 → Disease
- 💊 **Treatment** Task Head 2 → Prescription
- ❓ **Medical QA** Task Head 3 → Answer

⚖️ Gradient Balance
- Task 1: 40%
- Task 2: 30%
- Task 3: 30%

⚖️ Task Weighting Strategies

- **Uniform:** Equal weight for all tasks
- **Loss-based:** Weight by inverse of loss magnitude
- **Uncertainty:** Weight by task uncertainty/difficulty
- **Dynamic:** Adjust weights during training

🚫 Preventing Negative Transfer

- Monitor per-task validation performance
- Use task-specific batch normalization
- Implement task clustering (group similar tasks)

- Apply gradient surgery techniques