2. 广泛适用性：

模拟实验表明，该方法在各种网络和动态系统中具有良好的效果和鲁棒性。这意味着该方法不仅适用于特定类型的网络，还可以应用于其他类型的动态系统，如社会网络或生物网络。

3. 计算效率：

该方法的计算复杂度较低，适用于大规模网络的重建。这对于处理实际应用中的大规模数据集非常有利。

4. 详细的方法描述：

文章详细描述了逐步重建方法的具体步骤，包括将网络动态表示为节点状态的时间序列数据、采用逐步策略逐步引入高阶交互、通过优化技术求解方程等。这些详细的描述有助于您在复现过程中更好地理解和实现该方法。

5. 实验验证：

文章通过模拟实验验证了该方法的有效性和鲁棒性。实验结果提供了充分的证据支持该方法的优势，这为您在复现过程中提供了可靠的参考。

综上所述，该文章在方法创新性、适用性、计算效率、详细描述和实验验证等方面都表现出色，是一个值得选择并进行复现的研究成果。

2.2 拟复现的具体内容

时间序列数据预处理：导入和处理用于重构网络的时间序列数据（如节点随时间变化的状态值），确保数据格式与算法输入需求一致。

构建和求解双体和三体交互矩阵：

双体交互矩阵：基于时间序列数据，按照文中的算法流程，计算出初始的双体交互矩阵，并筛选出潜在的节点间双体交互关系。

三体交互矩阵：在得到初步的双体交互矩阵后，进一步筛选潜在的三体交互项，并通过代入时间序列数据进行求解，得到三体交互矩阵

迭代优化：根据文章中的逐步策略，基于初步得到的双体交互矩阵和三体交互矩阵，不断迭代更新双体和三体交互关系，直到达到收敛条件（例如误差满足要求或达到最大迭代次数）。

验证和可视化：复现结果的验证方式和可视化，如对比初始和最终重构结果，并可视化过去方法与文章创新方法的效果差别

原始方法与文章方法之间的对比：通过可视化对比直接建模与逐步建模之间的差异性(图 1)

实际网络上的应用：可视化数据描述文章方法在实际网络上的应用(图 2)

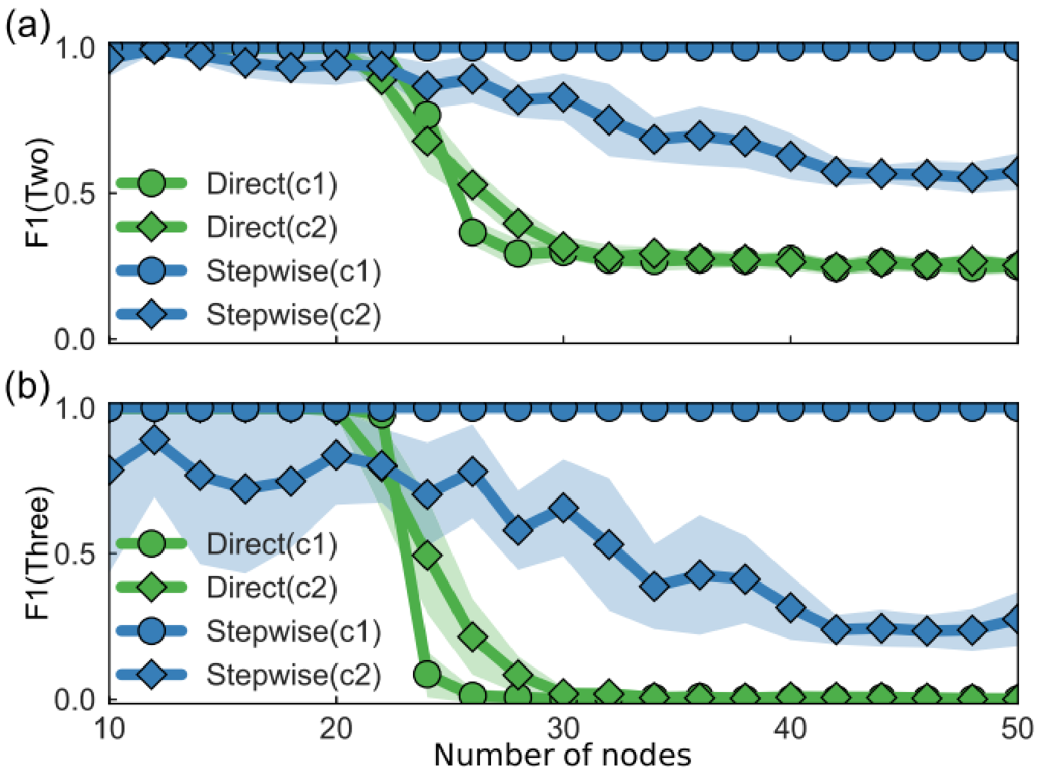

图 1.过去方法与文章方法对比

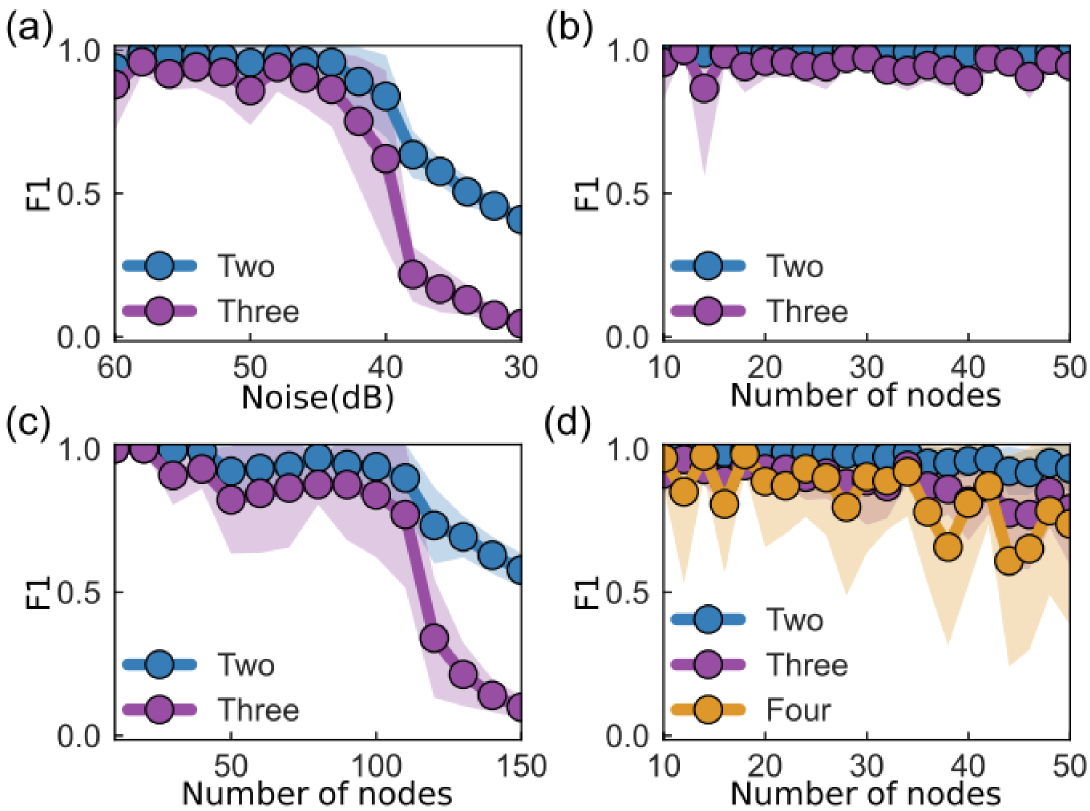

图 2.实际网络的应用

2.3 预期结果和演示

高阶网络重建精度：复现后，能够验证该方法在不同类型的网络和动态系统中重建高阶交互的准确性。预期结果是该方法能够有效地识别出重要的高阶交互，并且重建的网络结构与真实网络结构高度一致。

鲁棒性测试：通过在不同的噪声水平和数据缺失情况下测试该方法，验证其鲁棒性。预期结果是在一定范围内的噪声和数据缺失情况下，该方法仍能保持较高的重建精度。

结果可视化：通过可视化工具展示重建的高阶网络结构，帮助直观理解方法的效果。预期结果是可视化结果清晰、易于理解，能够直观展示高阶交互的重要性和分布

与现有方法的比较：将该方法与现有的高阶网络重建方法进行对比，评估其性能优势。预期结果是该方法在重建精度、计算效率和鲁棒性等方面优于或至少不劣于现有的方法。

3 复现工作计划进度

表 1. 预期复现计划进度安排

时间安排	预计进度
2024 年 10 月 22 日 - 2024 年 10 月 31 日	论文阅读整理
2024 年 11 月 01 日 - 2024 年 11 月 11 日	论文复现
2024 年 11 月 12 日 - 2024 年 11 月 22 日	撰写论文报告
2024 年 11 月 23 日 - 2024 年 11 月 28 日	制作论文汇报 PPT

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