Bisected graph matching

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neuromatch conference

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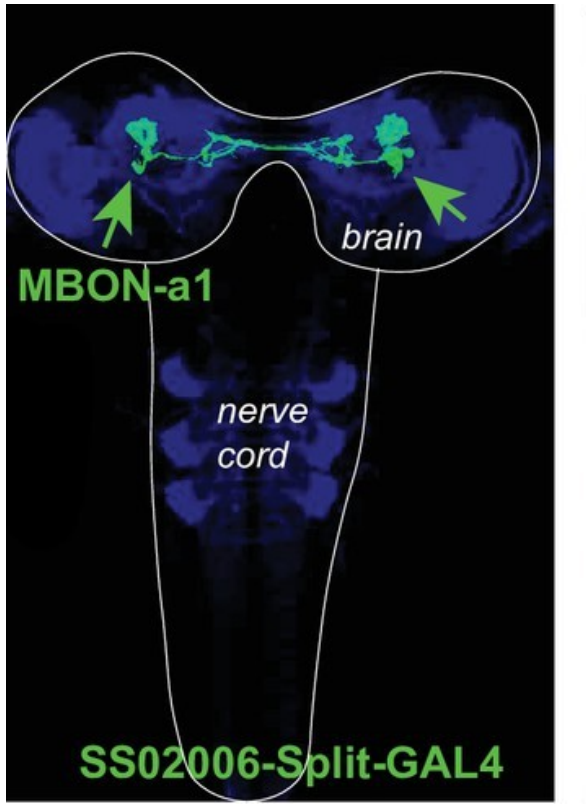
Paper: tinyurl.com/neuromatch-bgm

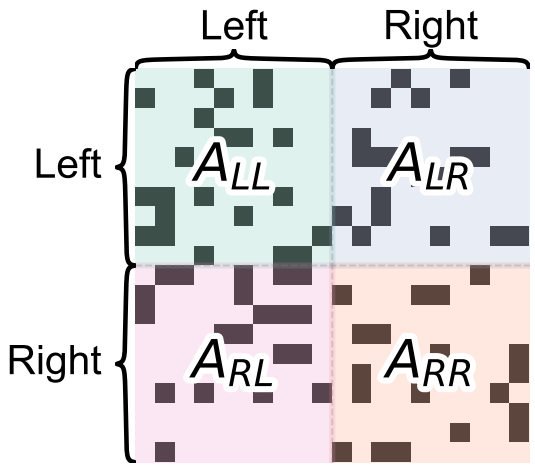
Graph matching (GM) for connectomics



Example bilateral neuron pair

Eschbach et al. 2021

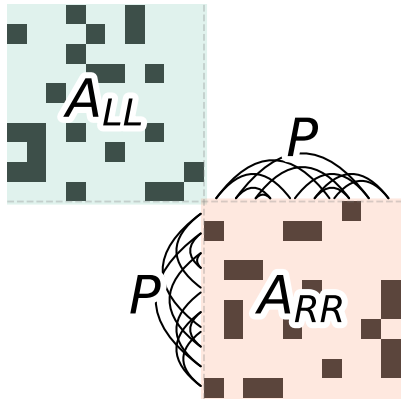
Adjacency matrix



Ipsilateral → A_{LL}, A_{RR}

Contralateral → A_{LR}, A_{RL}

Graph matching (GM)



$$\min_P \| A_{LL} - P\, A_{RR}\, P^T \|_F^2$$

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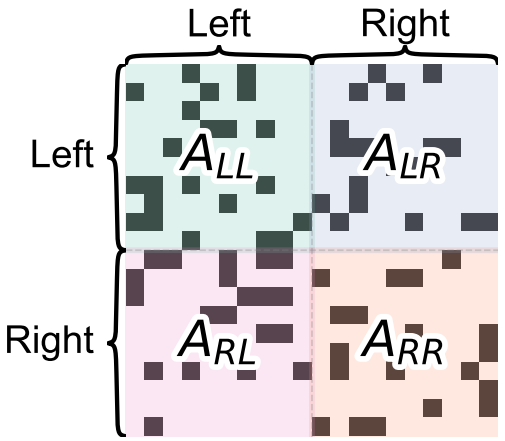
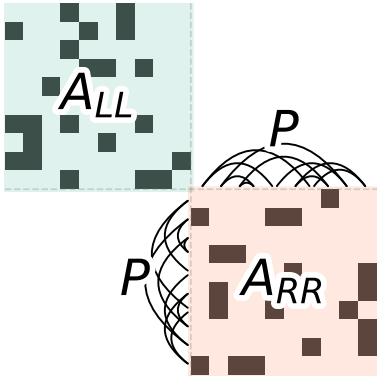
Bisected graph matching (BGM)

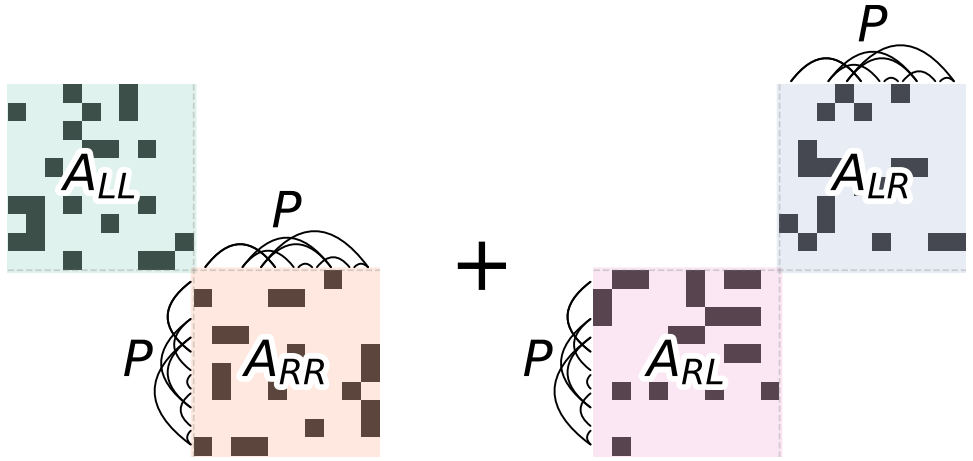
Adjacency matrix



Graph matching (GM)



Bisected graph matching (BGM)



Ipsilateral → A_{LL}, A_{RR}
Contralateral → A_{LR}, A_{RL}

$$\min_P \| A_{LL} - P A_{RR} P^T \|_F^2$$

$$\min_P \| A_{LL} - P A_{RR} P^T \|_F^2 + \| A_{LR} P^T - P A_{RL} \|_F^2$$

We adapt the FAQ algorithm (Vogelstein et al. 2015) to solve BGM

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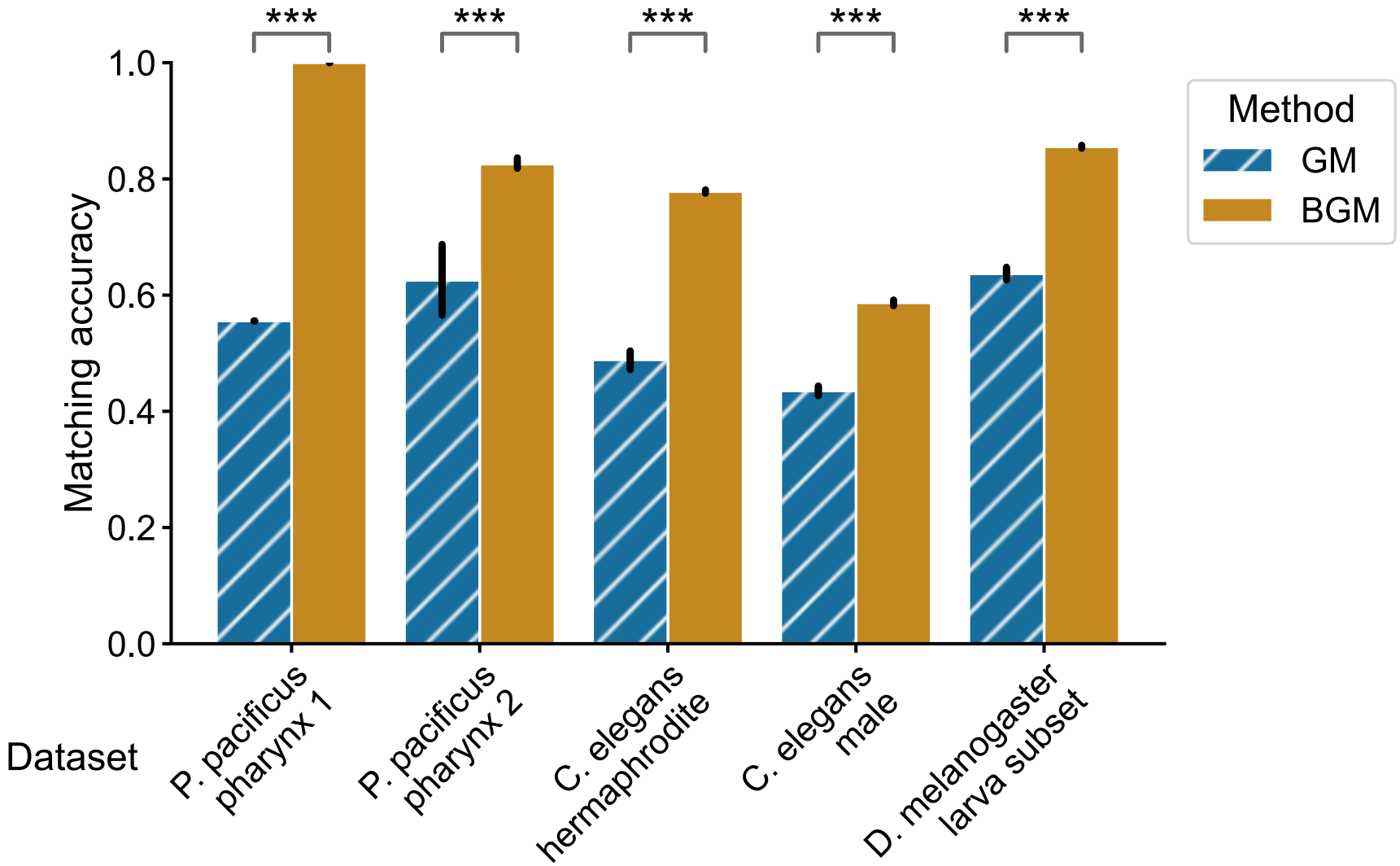
BGM increases matching accuracy



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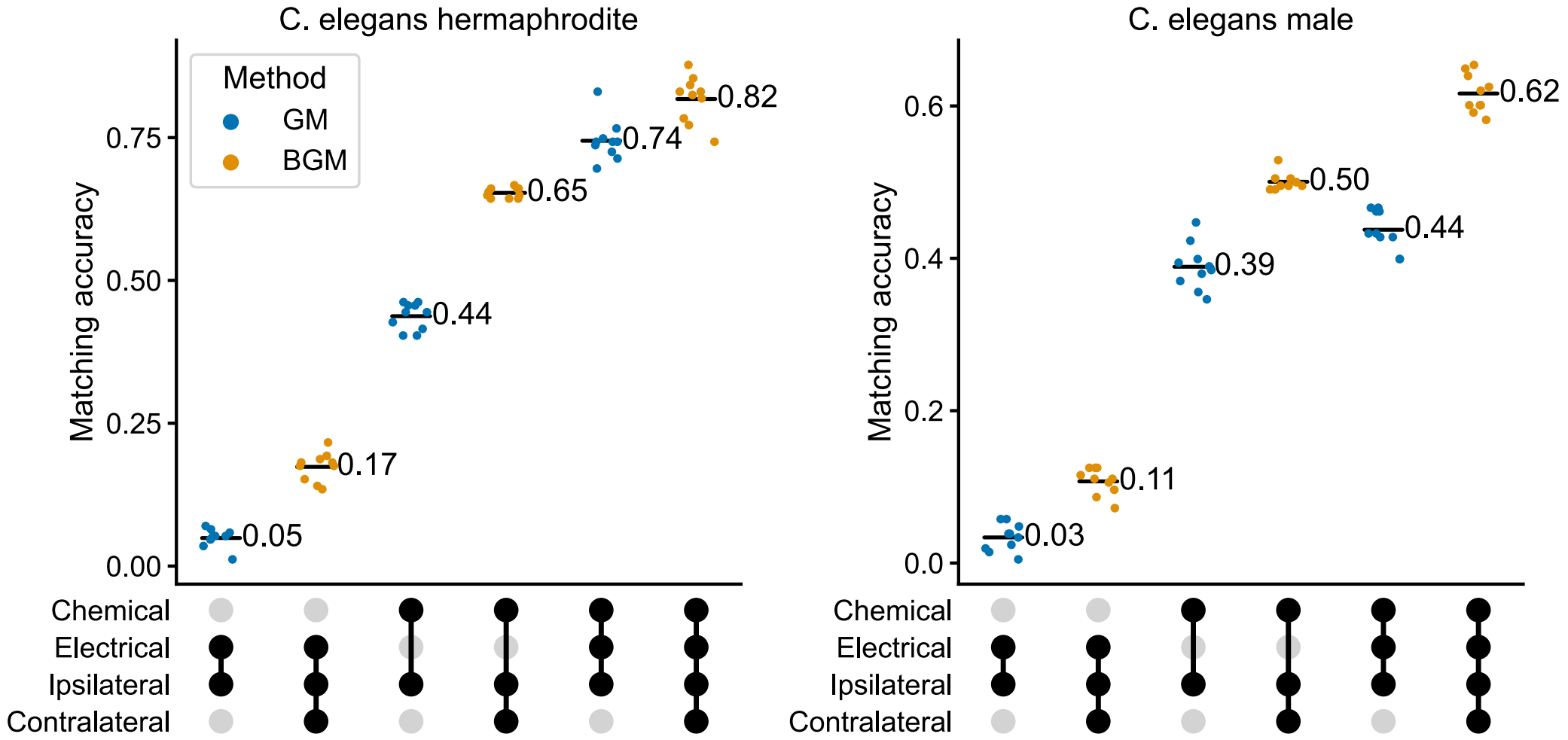
Extensions to BGM: multiplex networks



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Summary

- Matching approaches can help find paired neurons between connectomes
- BGM uses more of the data to improve matching between hemispheres
- Manuscript on bioRxiv: tinyurl.com/neuromatch-bgm
- Code for all experiments: github.com/neurodata/bgm
- Matching algorithm: github.com/microsoft/graspologic
- Contact: bpedigo@jhu.edu

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