

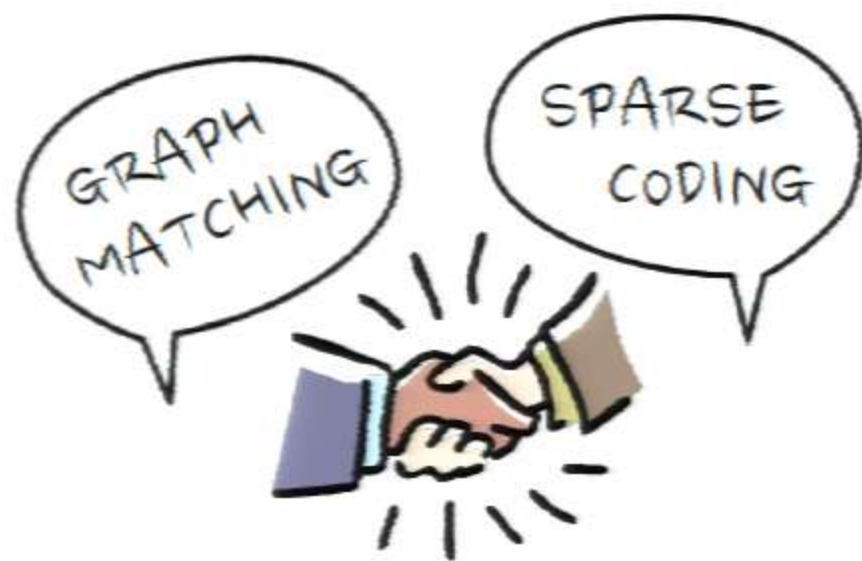
# Robust multimodal graph matching: sparse coding meets graph matching

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Joint work with

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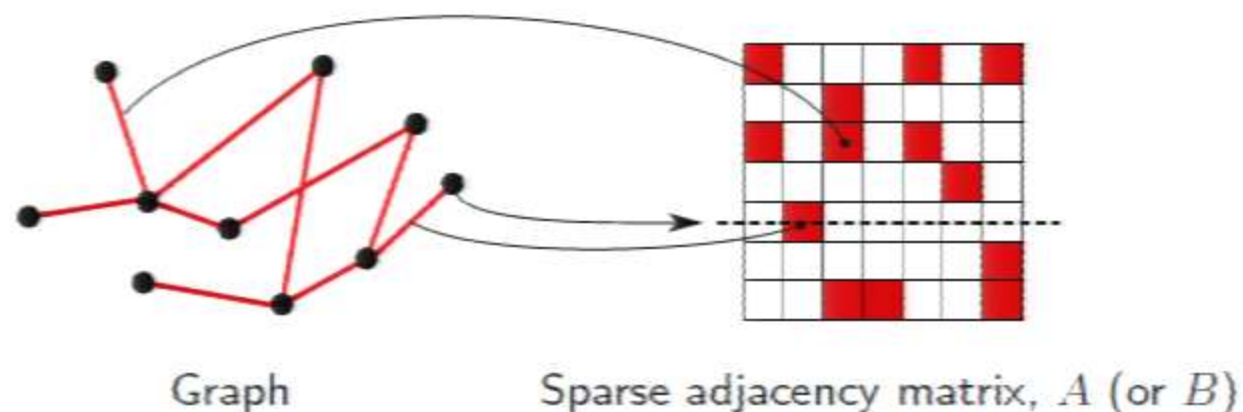
Poster: Sun22 (today)



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# The graph matching problem



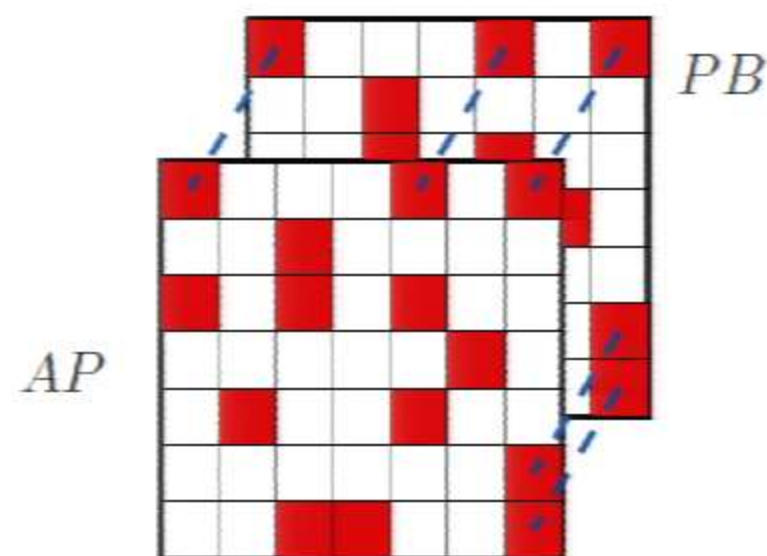
We seek a **permutation matrix**  $P \in \mathcal{P}$ ,

$$\hat{P} = \operatorname{argmin}_{P \in \mathcal{P}} \|AP - PB\|_F^2$$

↓ **convex relaxation**

$$\tilde{P} = \operatorname{argmin}_{P \in \mathcal{D}} \|AP - PB\|_F^2 \quad \text{and project } \tilde{P} \text{ onto } \mathcal{P}$$

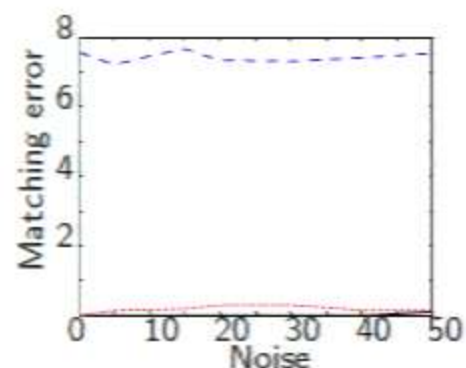
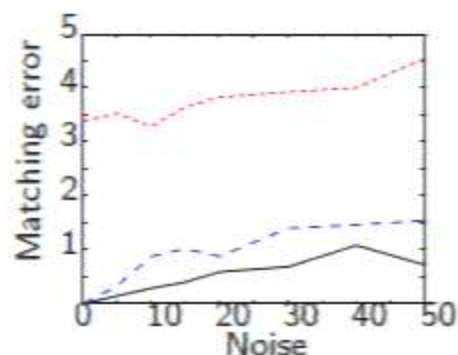
## Robust multimodal graph matching formulation:



$$\tilde{P} = \operatorname{argmin}_{P \in \mathcal{D}} \sum_{i,j} \|\overbrace{((AP)_{ij}, (PB)_{ij})}^{\text{vector of matched coeff.}}\|_2$$

- Group-lasso type of penalty: sparse number of matched coefficients.
- Well suited for multi-modal data.
- Elegantly fits into the joint graph inference/alignment.

## Graph matching with real graphs:



*C. elegans* connectome: electrical and chemical connection graphs.  
Compared to Zaslavskiy et al. 2009 and Vogelstein et al 2012.

## Collaborative FMRI graph inference:

Inverse covariance matrix estimation

In blue: complete 10 minutes study.

In red: collaborative with 6 minutes per study.

