

# Efficient Game-Theoretic Hypergraph Matching

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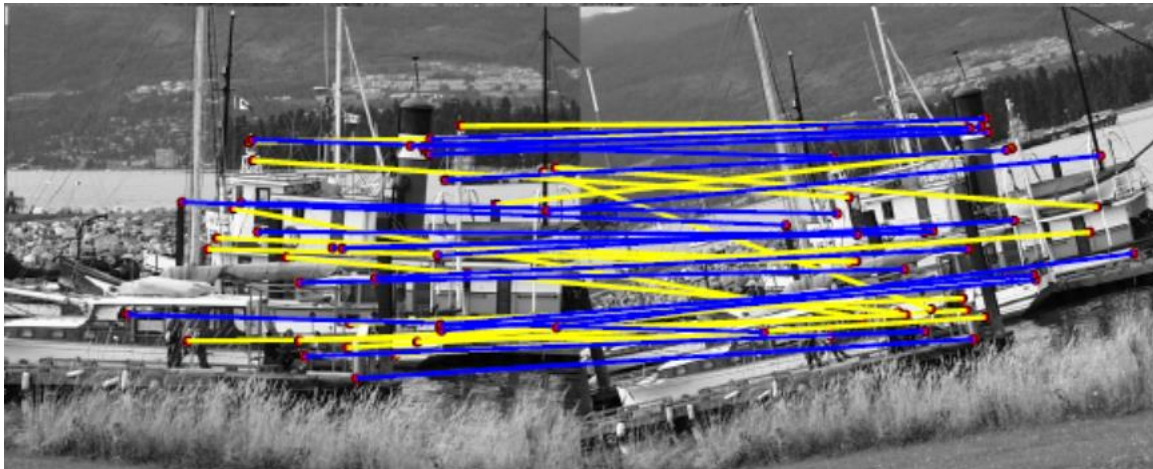
Harbin Institute of Technology

# Feature Matching

- Feature matching is a basic task in computer vision.
- Straightforward comparison of feature descriptors does not generate high-accuracy matching results.
- Graph matching uses pairwise relationship between features to improve accuracy.
- Hypergraph matching further uses higher-order constraints among multiple features.

# Hypergraph Matching

- Existing hypergraph matching algorithms usually solve an assignment problem.
- All model features, including outliers, are assigned matches.



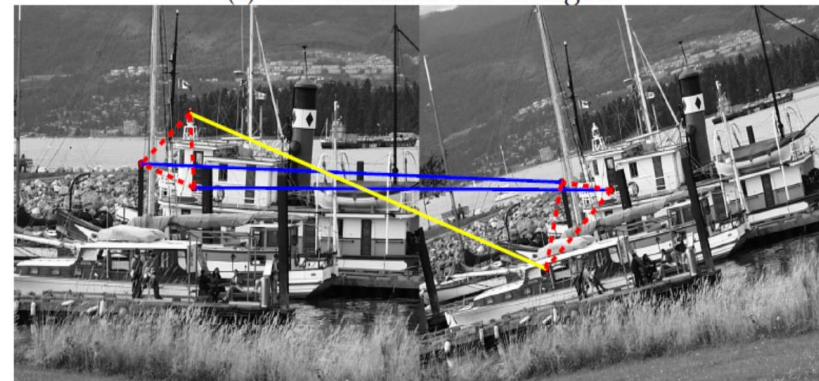
many false matches (yellow lines) are caused by outliers,  
with BCA algorithm

# Game-Theoretic Algorithm

- A game-theoretic algorithm
  - cast hypergraph matching of features as hypergraph clustering of matches
  - solve the problem with a game-theoretic approach
  - obtain a group of consistent matches



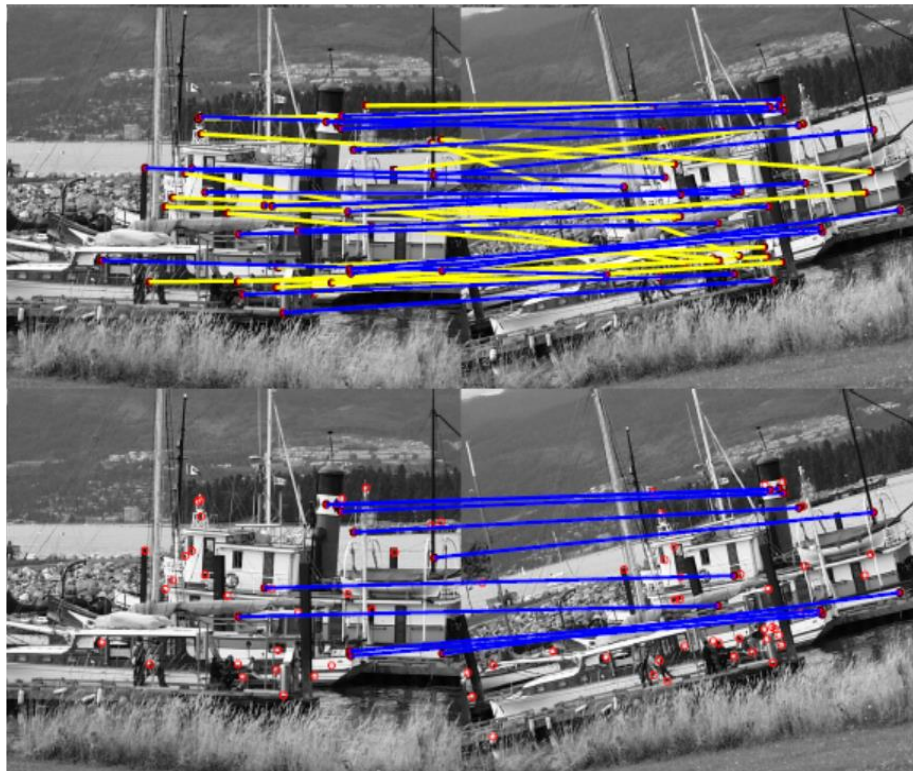
(a) true matches and triangles



(b) true and false matches, and triangles

# Game-Theoretic Algorithm

- generate accurate matching results
- but, the number of matches is small



with BCA algorithm

with game-theoretic  
algorithm

# Game-Theoretic Algorithm

- Reason
  - an over-strict constraint on the internal consistency among matches
  - some true matches may be associated with small similarities

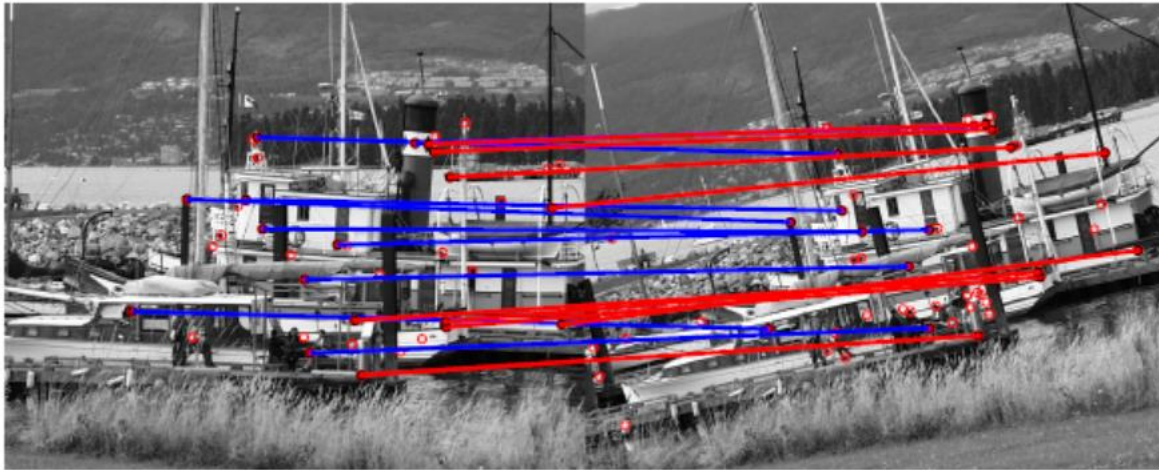
# Our Algorithm

- Relax the over-strict constraint
  - transform consistency among matches to densities of matches
  - define densities in the third-order hypergraph
  - do group expansion following the density peak algorithm



# Results

- increase the number of matches without degrading matching accuracy





Thanks