TAC Price Prediction

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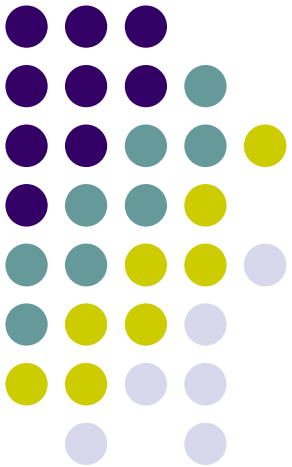
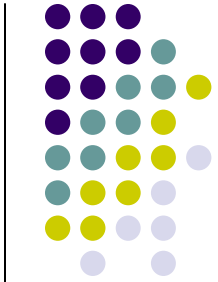


Why predict closing hotel prices?



Why predict closing hotel prices?

- Choice of flights depends on hotel prices on the included travel days

- Compute accurate bid prices for hotels

How can we predict the hotel prices?

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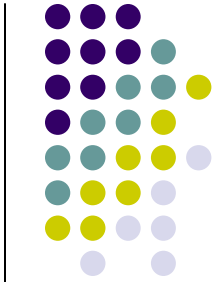


- Just use current price quote
- Adjust current price quote using historical data
- Fit a curve to price points seen in current game
- Predict based on closing prices from past games
- Utilize hotel closing times with historical information on price predictions
- Learn a mapping of features from the current game to closing prices based on historical data
- Hand construct rules based on associations between abstract features

How can we predict the hotel prices?

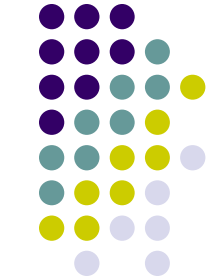
- Historical data
  - Based on historical averages and past closing prices
- Current game data
  - Based on known data of current game
- Mix of historical and current data
  - Models built on historical data to map current game features to closing prices

What data is most relevant for price prediction?

What data is most relevant for price prediction?

- Historical price averages
- Current price quotes
- Flight prices
- Opponent profiles
- Client demand

Initial vs. Interim Price Predictions



- Initial Price Predictions
  - Beginning of the game
  - Before any hotel price information has been received
- Interim Price Predictions
  - Includes quotes from ongoing hotel auctions
  - Ongoing revision of predictions as auctions close

How can we predict hotel prices initially using current game data?

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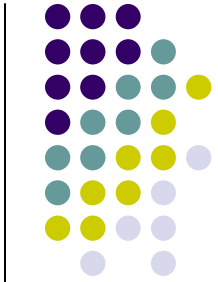
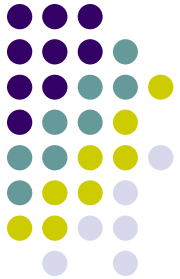


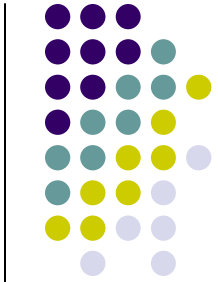
- Initial flight prices
- Identity of agents

- Neural Networks
- Boosting algorithms
- Competitive Equilibrium Analysis

How would the flight prices affect the hotel prices?



How would the flight prices affect the hotel prices?



- More hotel demand expected during days with cheaper flights

Flight	Day 1	Day 2	Day 3	Day 4
Incoming	100	50	100	100
Outgoing	100	100	50	100

One Example: kavayaH

- Separate neural network for each hotel
- Trained using back-propagation
- Inputs are thresholded differences between flight prices on adjacent days
- Output is a discrete set of prices based on historical prices

Comparison of initial price prediction strategies in TAC02

- Historical Predictors
  - The best these predictors can hope to do is predict the average closing price over a series of games
- Current Game Predictors
  - ATTac, kavayaH, walverine
  - Significantly better than historical game predictors