Evacuation Bottleneck

Simulating a Panic on a Cruise Ship

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Outline

Our Research Object

- ► Costa Voyager
- ► Capacity: 836 passengers
- ► 8 Rescue Boats
- ► In distress at sea in 2005

Source: http://www.shipspotting.com,
Picture taken by Roy Batty

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Outtakes

Input
Forces
Filled Exits

The Deck Plan

- ► Colormap
  - ► Allows any number of zones
- ► Scaling
- ► Greatly simplyfied

Source: http://www.kreuzfahrtberater.de

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Configuration File

- ▶ Simulation parameters intialized from a file:
  - ▶ Deck configuration
  - ▶ Plotting options
  - ▶ Physical and behavioral parameters
- ▶ Simple syntax makes automated generation easy

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Forces

- ► As described in Helbing's paper "Simulating dynamical features of escape panic"
- ► Three main forces act on agents:
    - ► Desired direction
    - ► Repulsion & friction between agents
    - ► Repulsion & friction from walls

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Filled Exits

- Rescue boats modeled with limited capacities
- If a boat gets full, information spreads to the agents
- Two implementation approaches:
    - Instantaneous update
    - Gradual circle-shaped spreading of information

- TODO

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Passenger Distribution
Panic Level
Summary and Outlook

Distribution of the Agents to the Exits

- ▸ The distribution depends strongly on the geometry of the ship.
- ▸ There was no case where the agents really distributed over the exits
    - ▸ Weakness in the model
    - ▸ More realistic: go for the shortest individual evacuation time

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► TODO: more plots and explanations

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- TODO: tell how good and/or bad we did

► TODO: MATLAB – how we love it!