



# Global and Local State Context Prediction

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# Introduction

- Context is used for adaptation of appliance behavior to human needs
  - Our target: foresee user's desires and act proactively
  - Humans act in certain behavior patterns
- Context prediction based on previous behavior patterns



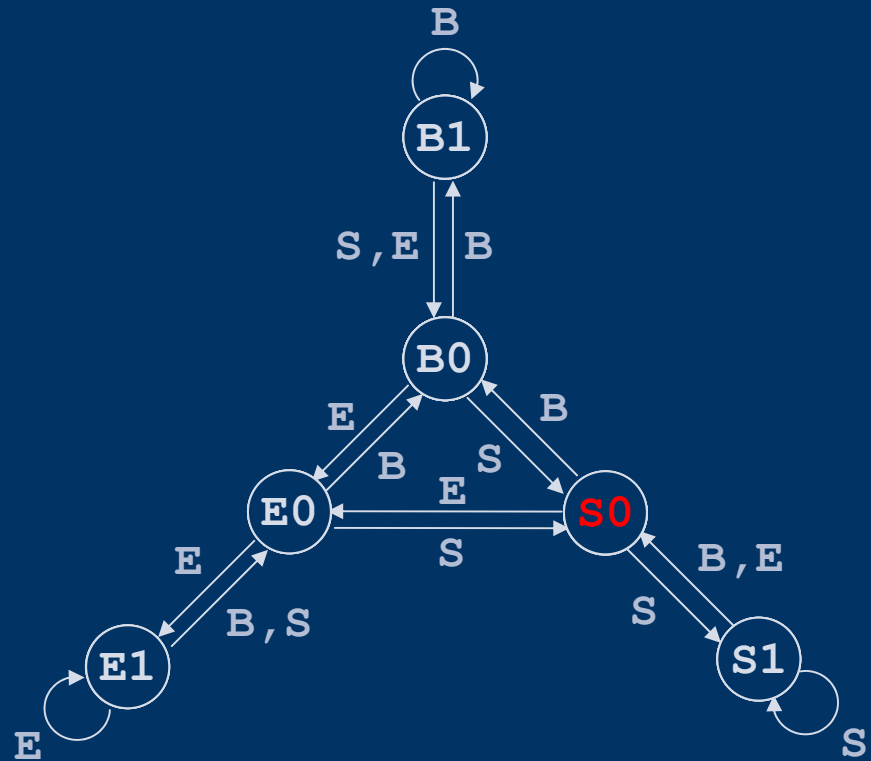
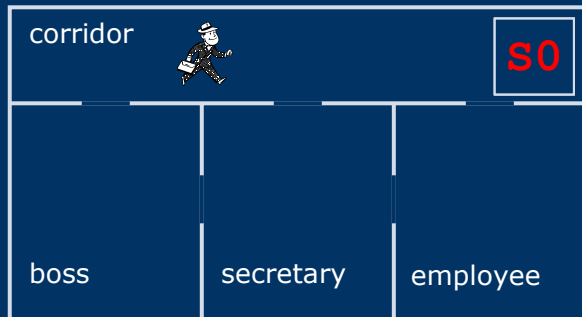
# Context Prediction

- Obvious candidates of prediction techniques
  - Neural Networks
  - Bayesian Networks
  - Markov Chains
- Completely different approach
  - The state predictor method
  - Motivated by branch prediction techniques of current high-performance microprocessors



# Algorithms

## ■ 2-State Context Predictor





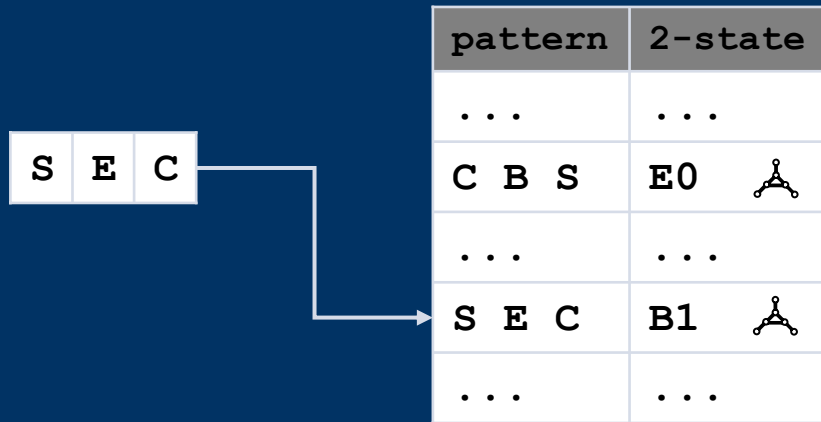
## Algorithms (2)

- 2-state predictor:
  - Fast training and retraining
  - Unable to learn complex behavior pattern
- Two-level 2-state predictor
  - Able to learn complex behavior pattern
  - Slow training and retraining



# Algorithms (3)

- Two-level 2-State Context Predictors



- Differentiation of global and local movement
  - global: CBSECBCSECBCEC
  - local (corridor): BBSBE



# Evaluation

- Synthetic behavior patterns
  - Simulation of weekly habits
  - Prediction accuracy up to 98%
- Real movement patterns
  - Recorded movement data of four employees at our institute
  - Prediction accuracy up to 83% with untrained predictors
  - Prediction accuracy up to 98% by training the predictors with the same datasets



# Outlook

- Prediction by partial matching
- Take confidence into account
- Hybrid predictors (e.g. 2-state predictor works as warming-up predictor and is substituted by the global two-level predictor afterwards)
- Include time dependencies