

# Robot-Assisted Feeding: From Bite Acquisition to Bite Transfer

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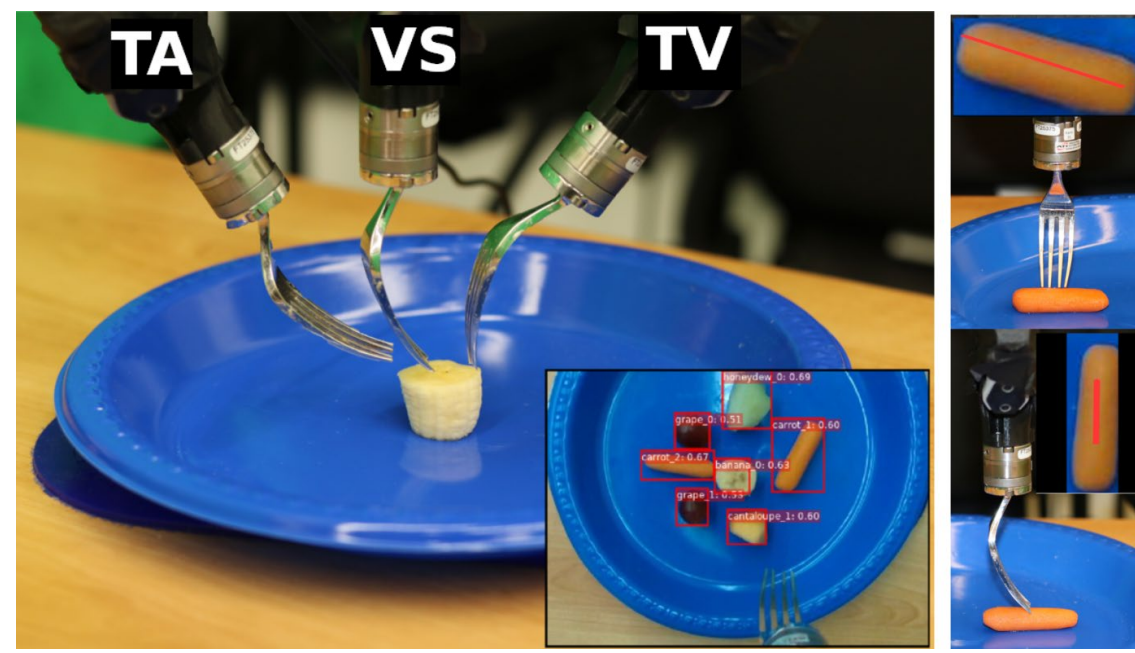
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## Acquisition: Handling New Food

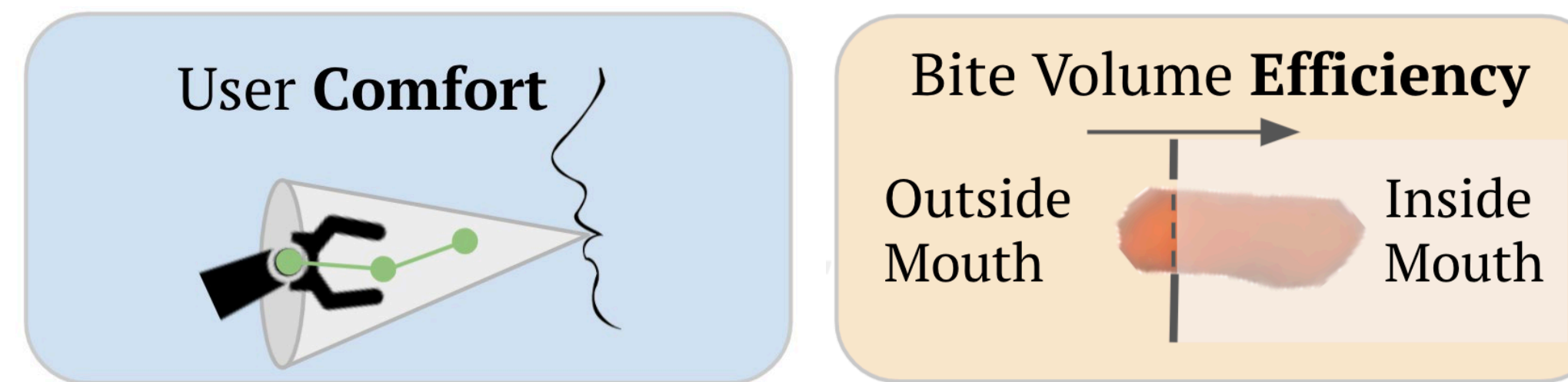
Goal: Choose best action for previously-unseen food.

Insight: Bite Acquisition is a **Contextual Bandit**



## Transfer: Comfort vs Efficiency

Goal: Formalize metrics to enable **comfortable** and **efficient** transfer



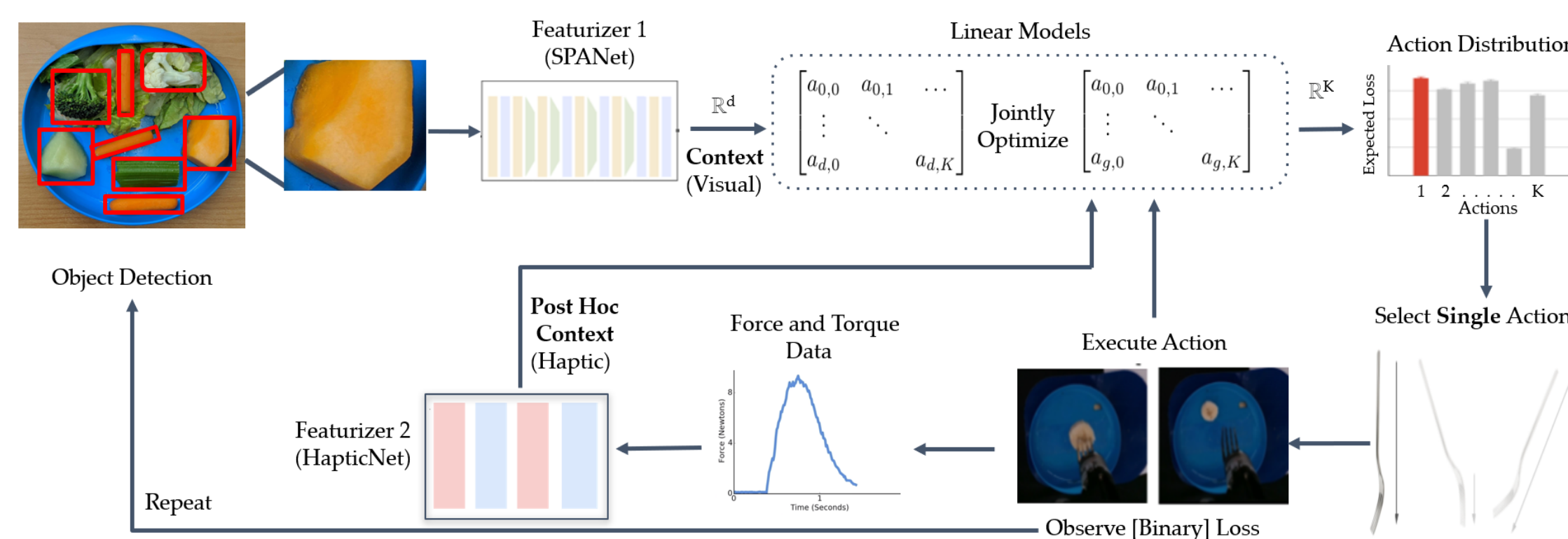
## Scientific Impact

- Robust autonomous acquisition of deformable hard-to-model objects with varying physical properties (food items)
- Human-aware trajectories that balance efficiency and comfort in proximity to human face (bite transfer trajectories)

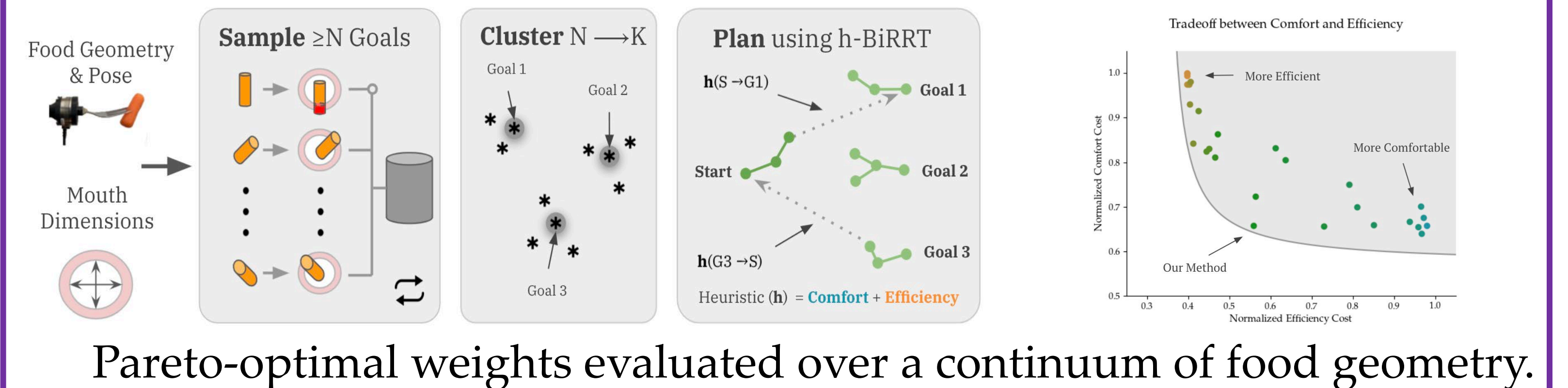
## Leveraging Post Hoc Context

Use haptic context collected *during action execution*.

A good post hoc model offsets the limitations of *bandit feedback*.



## Heuristic-Guided Planning



Pareto-optimal weights evaluated over a continuum of food geometry.

## Societal Impact

24 million people in US with motor impairments need assistance with *activities of daily living* like eating

**Robust autonomous food acquisition and transfer increase independence, self-confidence, and caregiver time.**

## Education Impact

Results (to-be) presented in:

- SoNIC Workshop at Cornell for under-represented minorities in the US,
- AI mentoring program at Stanford,
- various demos for middle-school, high-school, and undergraduates at Cornell and UW such as during UW Engineering Discovery Days

## Potential Impact

Quote from a person with CI Quadriplegia: **"...The technology allows me to do more things on my own, of course giving me more independence, making me feel more free ... and gives me something to look forward to."**