

### Goal

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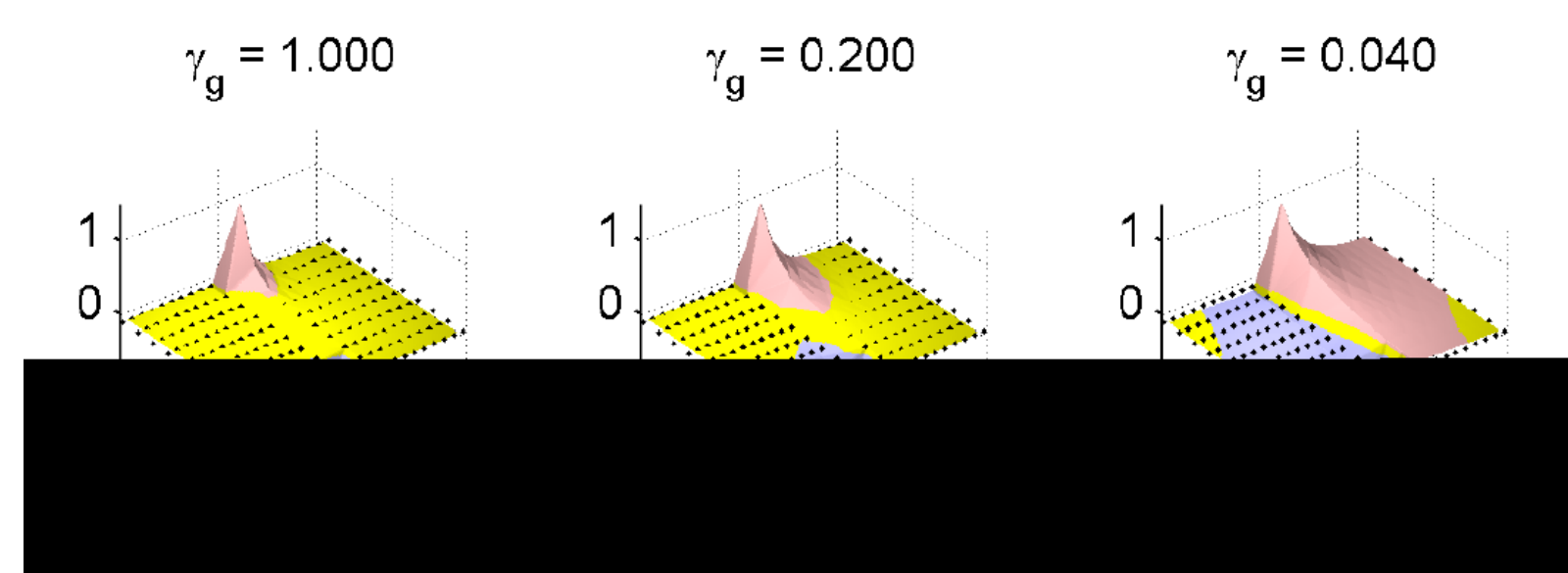
### Approach

Supervised Learning

Online Semi-

### Background

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### Online Learning

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### Data Quantization

- $k$  (OO)
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- multiplicities.

### Online Algorithm for Quantized Harmonic Solution

$$\ell^q[t] \leftarrow \underset{\ell}{\operatorname{argmin}} \ell^T (L^q + \gamma_g V_t) \ell$$

$$\text{s.t. } \ell_i = y_i \text{ for all } i \in l$$

$$\hat{y}_t = \operatorname{sgn}(\ell_t^q[t])$$

### Prediction Error Analysis

$$\frac{1}{n} \sum_{t=1}^n (\ell_t^{\text{oa}}[t] - y_t)^2 \leq \frac{9}{2n} \sum_{t=1}^n (\ell_t^* - y_t)^2$$

$$+ \frac{9}{2n} \sum_{t=1}^n (\ell_t^{\text{o}}[t] - \ell_t^*)^2$$

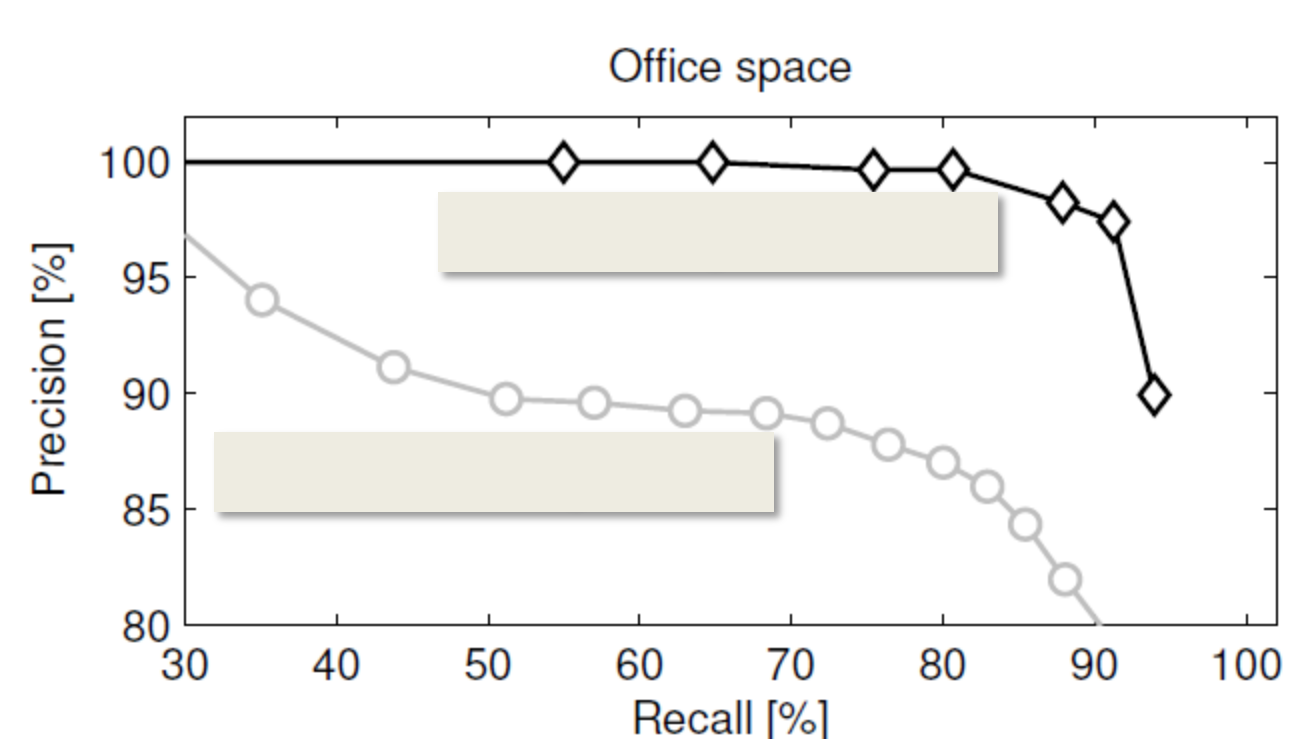
$$+ \frac{9}{2n} \sum_{t=1}^n (\ell_t^{\text{oa}}[t] - \ell_t^{\text{o}}[t])^2$$

- True risk close to empirical risk.
- Difference between the offline and online prediction.
- Quality of quantization.

$$\frac{1}{n} \sum_{t=1}^n (\ell_t^{\text{oa}}[t] - y_t)^2 \leq \frac{9}{2n_l} \sum_{i \in l} (\ell_i^* - y_i)^2 + O(n^{-\frac{1}{2}})$$

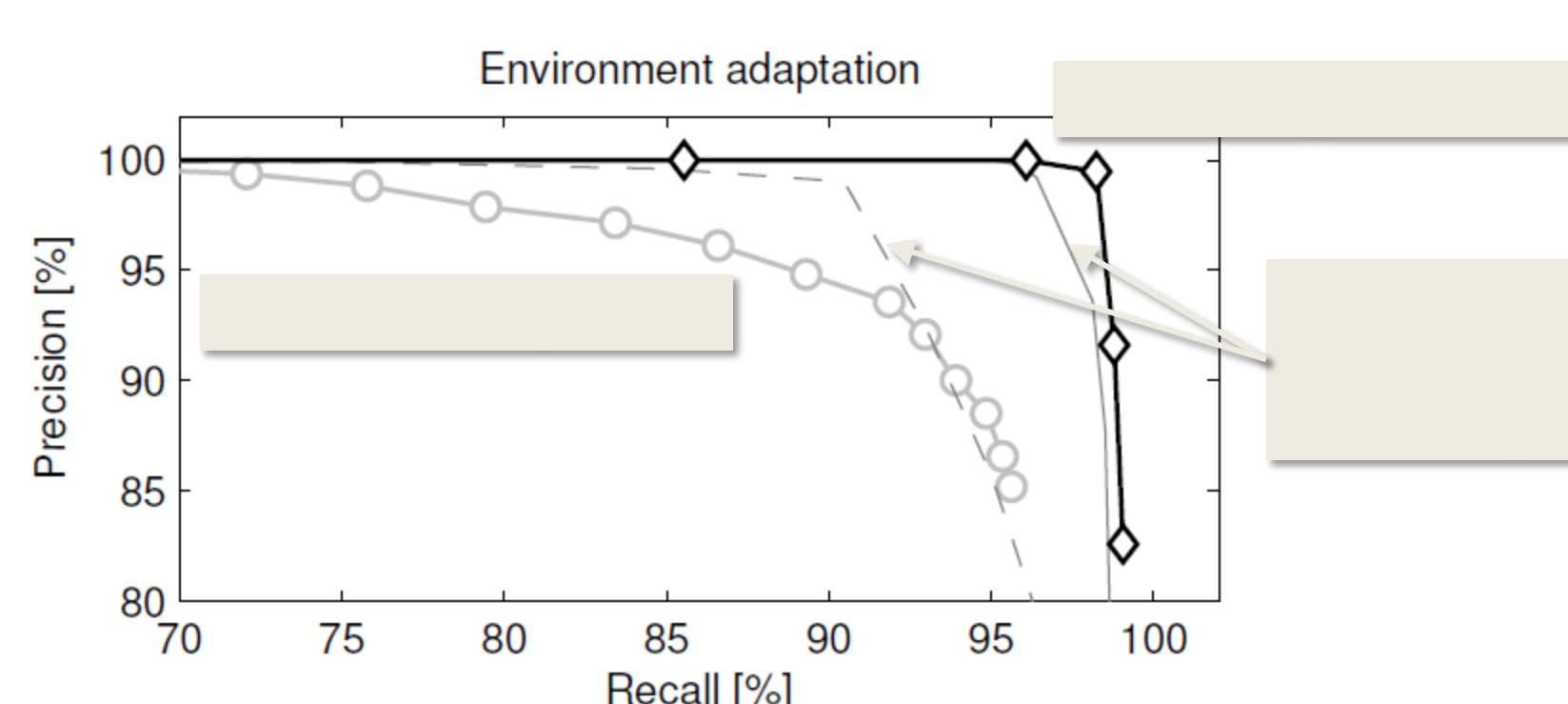
### Office space dataset

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### Environment adaptation dataset

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### UCI Letter recognition

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