

# Algoritmos e Incerteza

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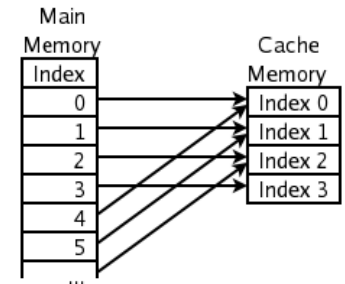
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# Motivacao

Em muitos problemas nao vemos a entrada inteira *upfront*, ou temos apenas informacao parcial:

1. Decidir quais informações devem ser mantidas em **cache sem saber** quais serão acessadas num futuro próximo?



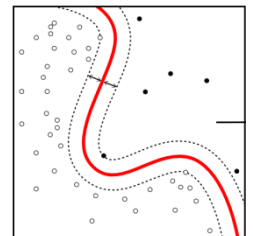
2. Como o Google utiliza previsão de **buscas futuras** para otimizar a **alocação de anúncios**?

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3. Existem problemas de aprendizado de máquina mais difíceis que outros? Quantos exemplos são necessários para aprendizado?



# Objetivos

**Objetivo 1:** Ver diferentes formas de se **modelar** incerteza na entrada

- Online algorithms, random order models, online learning, PAC learning

**Objetivo 2:** Desenvolver “huerísticas”/**intuicao** em como desenhar algoritmos tolerantes a incerteza. **Conexoes**

- Focar nos problemas/approaches mais simples, nao modelos mais realistas ou melhores resultados

**Objetivo 3:** Aprender **ferramentas tecnicas** que ajudem a pensar sobre/analisar algoritmos sob incerteza

# Pre-requisitos

- Confortavel com analise de algoritmos padrao (PAA)
- Maturidade matematica
  - Vamos ter discussoes informais e dar conexoes com aplicacoes, mas o curso é baseado em **demonstracoes**
- Probabilidade discreta
  - Valor esperado, varianca, independencia, condicionamento, (Central Limit Theorem)

# Acknowledgment

Inspired by the program *Algorithms and Uncertainty* at Simons Institute – UC Berkeley (2016.2)

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Simons Institute – UC Berkeley (2016.2)



# Avaliacao

## Trabalhos (40%)

- 2 trabalhos
- Em duplas
- Questoes teoricas e de implementacao (simples)

## Scribing (20%)

Veja instrucoes sobre o projeto na pagina e comece a pensar no seu topico **agora**

## Projeto final (40%)

- Apresentacao de ~45 min + documento de ~5 paginas
- Artigo, capitulo de livro, projeto de implementacao *nao trivial*
- Proposta no meio do semestre, documento ~2 paginas

# Pagina do curso

Material, esclarecimentos, anuncios: pagina do curso em

<http://www.inf.puc-rio.br/~mmolinaro>



# Antes que esqueça

Quem é o(a) *scribe* da aula de hoje?