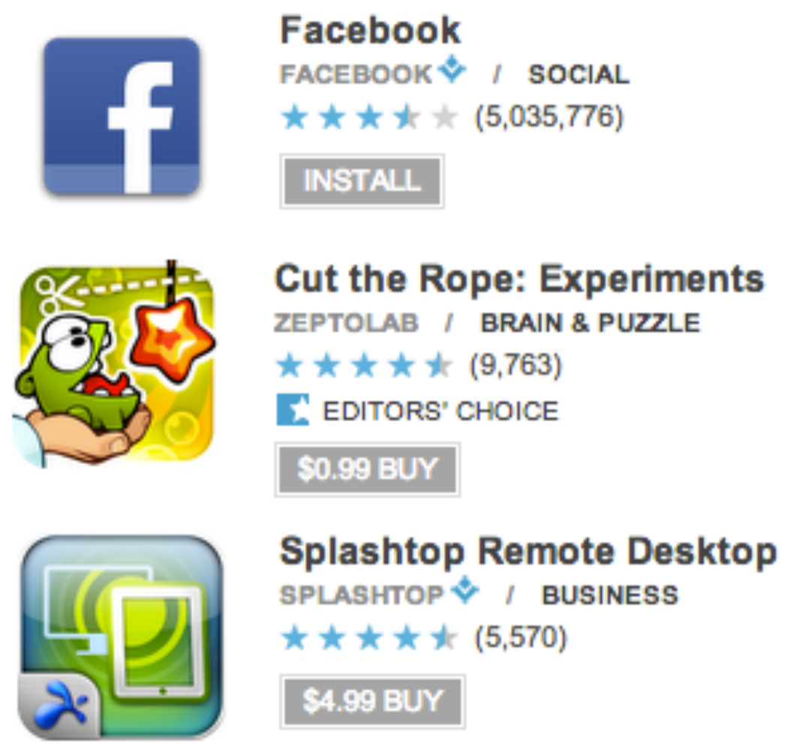
CERIAS

The Center for Education and Research in Information Assurance and Security



Facebook
FACEBOOK / SOCIAL
★★★★★ (5,035,776)
INSTALL

Cut the Rope: Experiments
ZEPTOLAB / BRAIN & PUZZLE
★★★★★ (9,763)
EDITORS' CHOICE
$0.99 BUY

Splashtop Remote Desktop
SPLASHTOP / BUSINESS
★★★★★ (5,570)
$4.99 BUY

Using Probabilistic Generative Models for Ranking Risks of Android Apps

Peng, Gates, Li, Qi, et. al.

presented: CCS '12

Problem:

- Android *relies on the User* to make security relevant decisions regarding permissions during installation
- In Android, *permissions are difficult to understand and often ignored*

Data

~325,000 apps from Google Play in Feb2012

~400 malware apps

Extract Permission Requests as Features

Models Explored:

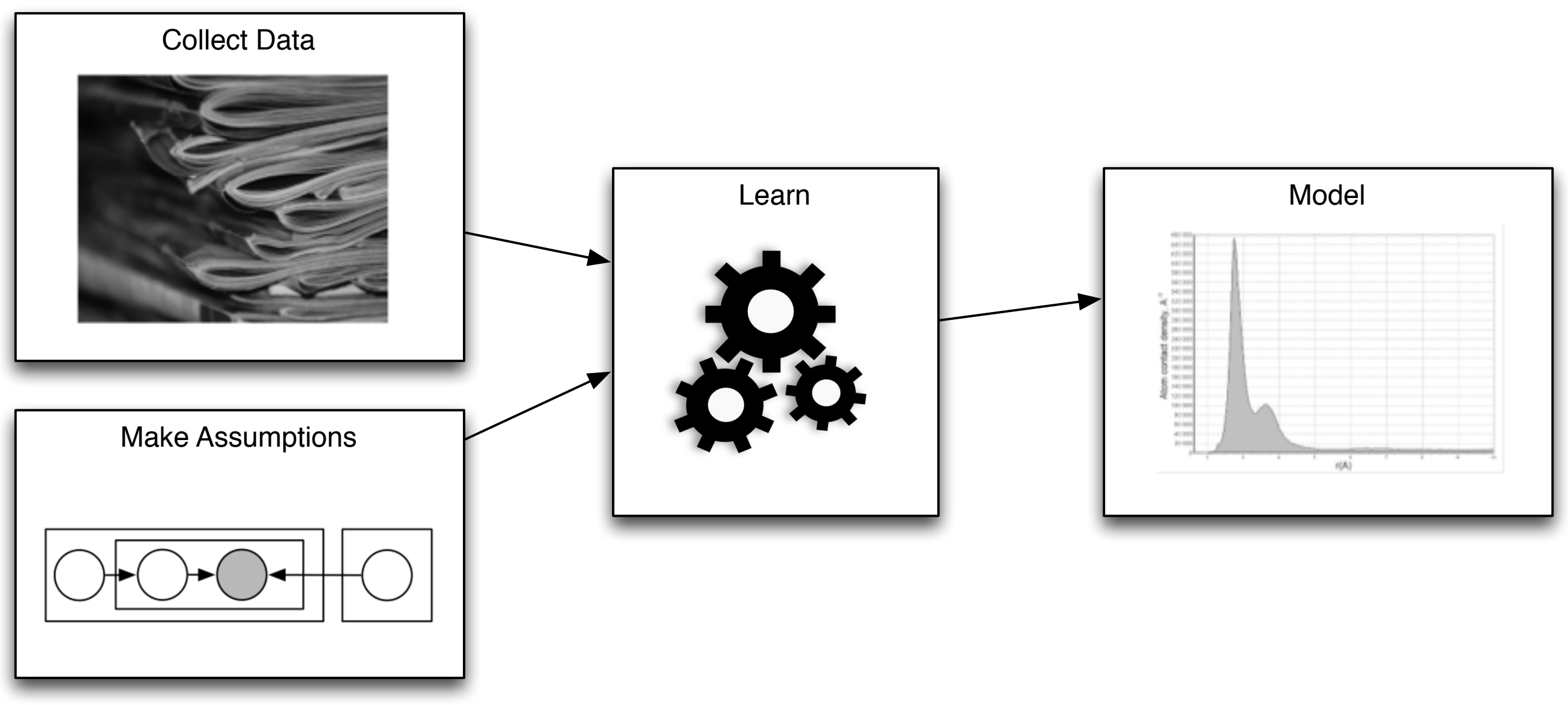
- Naïve Bayes
- Naïve Bayes with Informative Prior
- Mixture of Naïve Bayes
- Hierarchical Mixture of Naïve Bayes

Goal:

- Create a principled method to *calculate the risk* of apps, that is…
  - Simple to understand
  - Monotonic
  - Ranks Malware generally as High Risk

Method:

- Use Probabilistic Generative Models
- Train on large amount of unlabeled data
- Create an expectation, measure distance from the expectation to create risk score

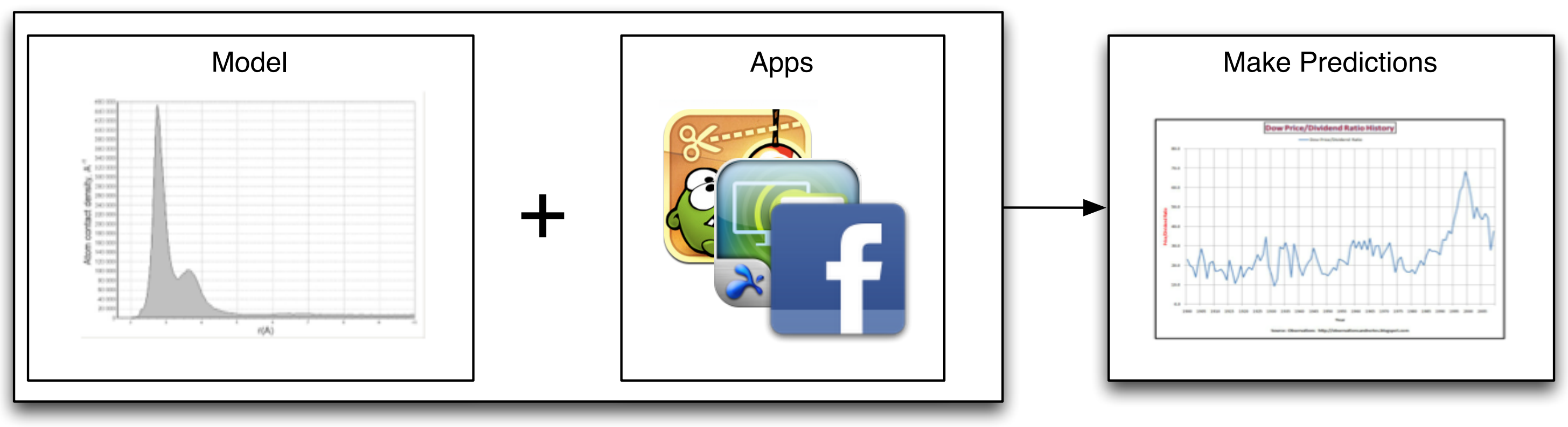


Collect Data

Make Assumptions

Learn

Model



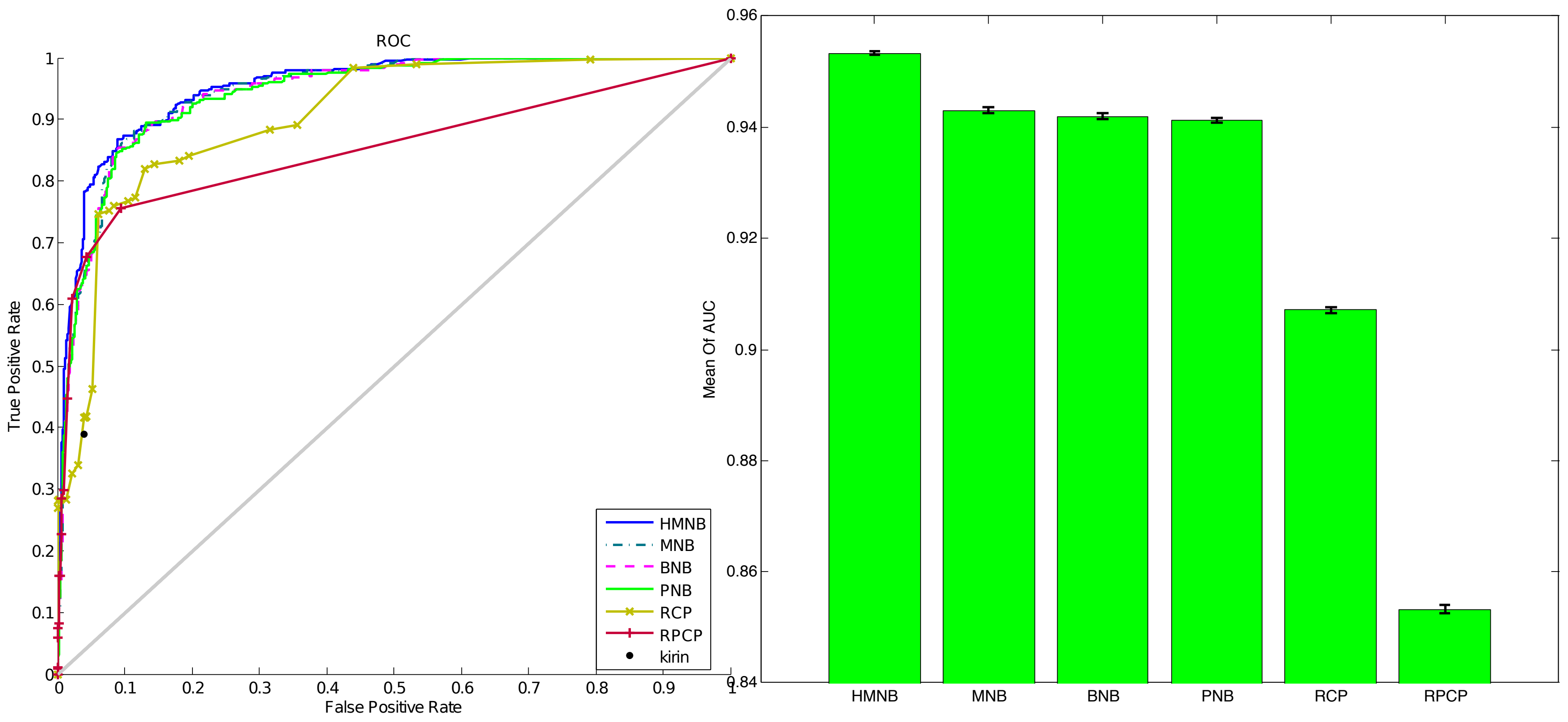
Model

+

Apps

Make Predictions

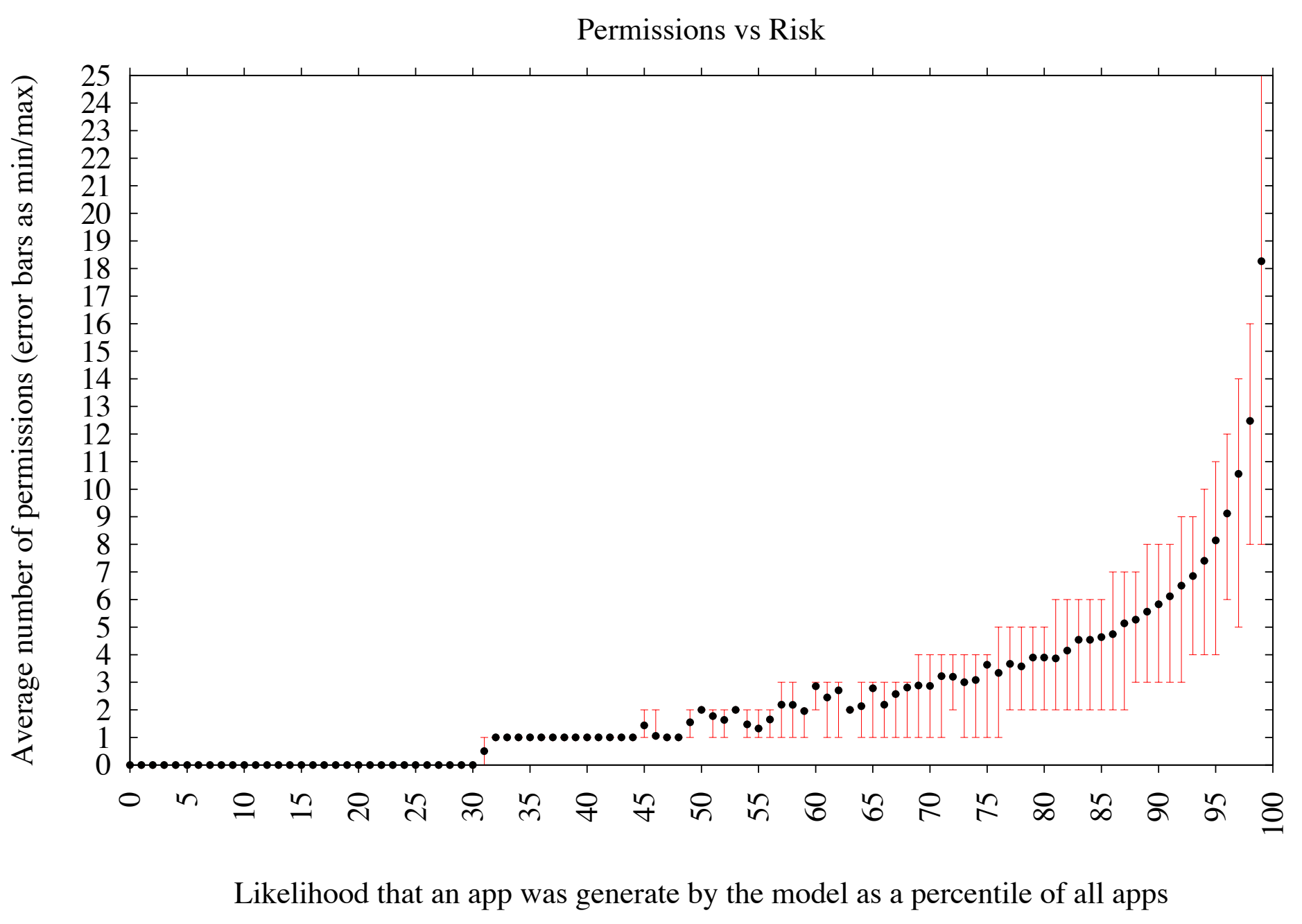
Risk: Malware vs Market Apps



Monotonic Property:

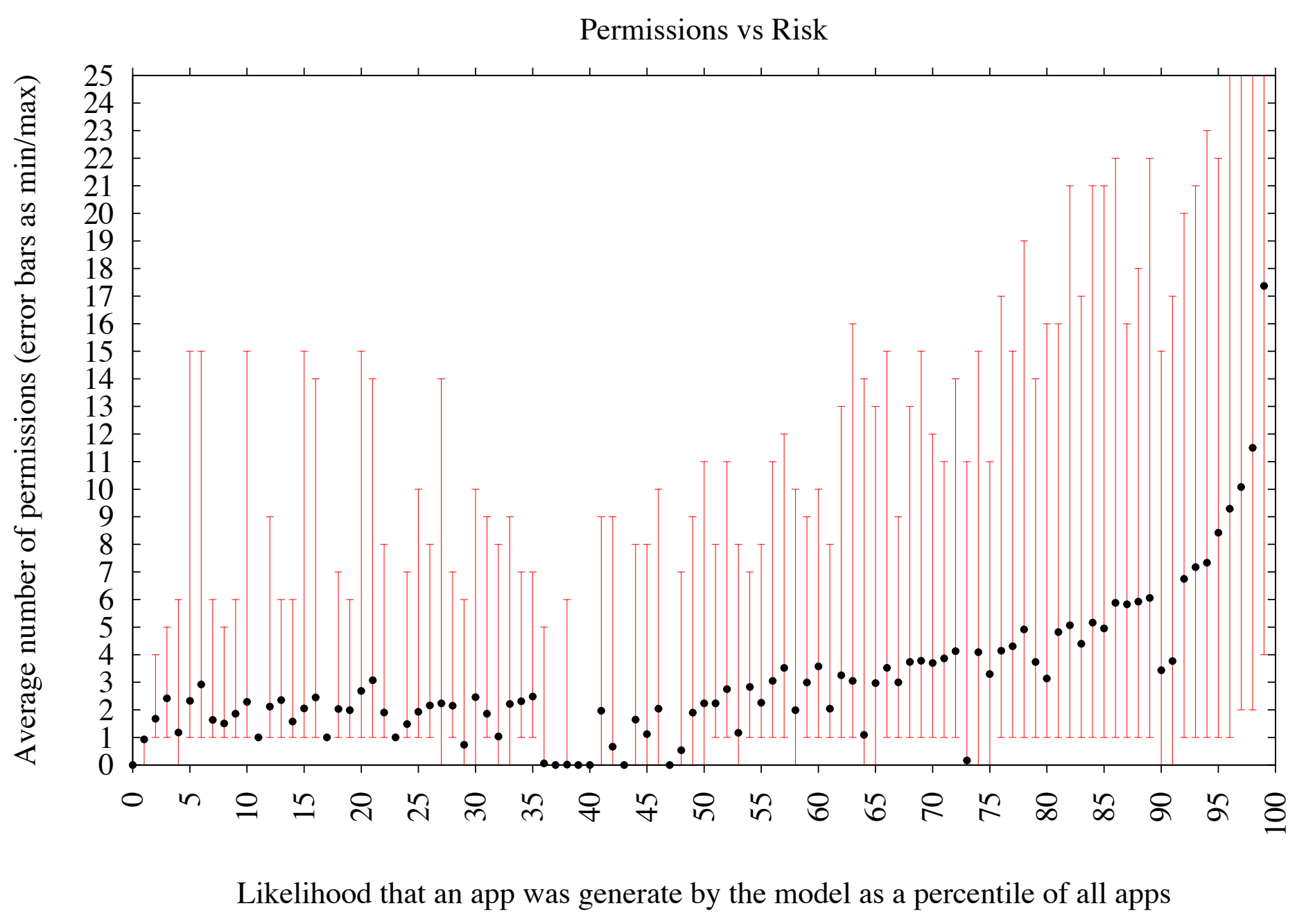
Naïve Bayes with Informative Prior

Monotonic



Hierarchical Mixture of Naïve Bayes

Not Monotonic



Conclusion:

- Naïve Bayes with Prior is suggested
  - Performance + Simplicity + Monotonic