InFeRno - an Intelligent Framework for Recognizing Pornographic Web pages

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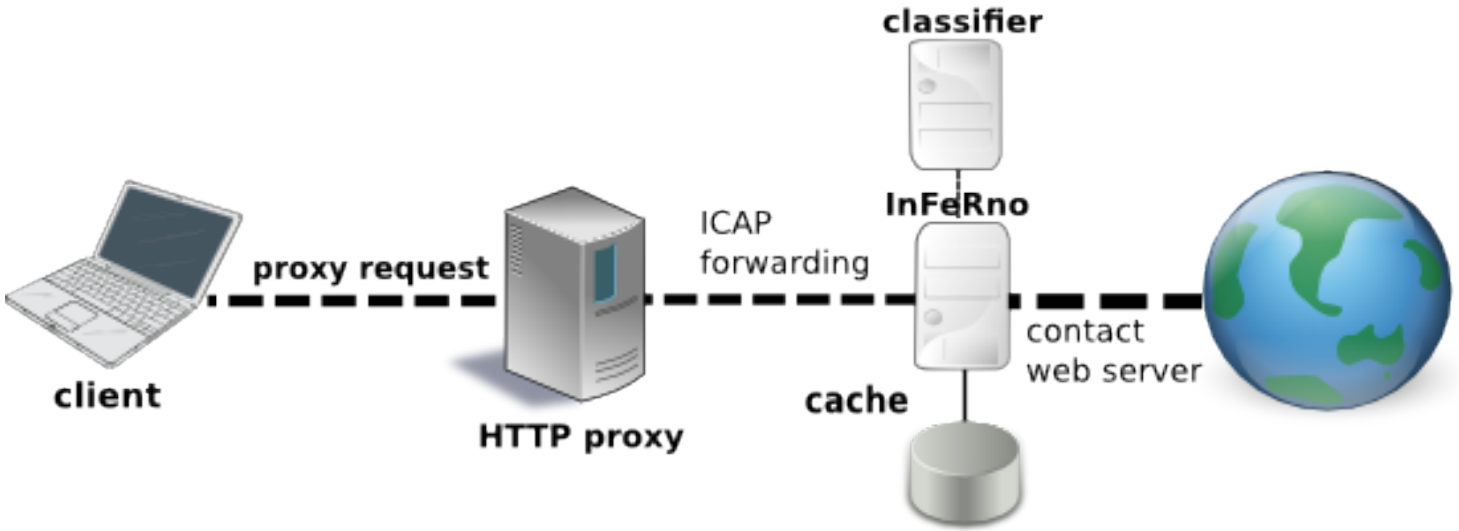
Problem preliminaries and intuition

- *InFeRno* offers to users multi-mode transparent nude content elimination in the browser environment (no exploitable browser plug-in software)
- Despite the plethora of useful information scattered on the Web, the Internet has become a hostile place for unprotected people (e.g. children)
- The main characteristics of our system are
  1. An implementation of the pornography elimination system (allowing ICAP / HTTP proxy integration)
  2. A minimal but powerful vector space
  3. An extra 'bikini' class that is observed to improve SVM performance
  4. A highly accurate and fast classification scheme

InFeRno architecture

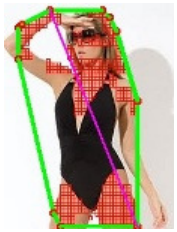


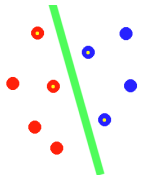
1. Standalone implementation of the InFeRno core as an ICAP module (integrates well with most HTTP proxy servers)
2. Decoupled image classification and web page preprocessing (network I/O, web page fusion)
3. Using a fast ISAM-based cache for fast I/O (classification lookups, updates, etc)
4. The administrator can tweak classification / network parameters (flexible configuration)

Classification System


original image


skin detection


contour extraction

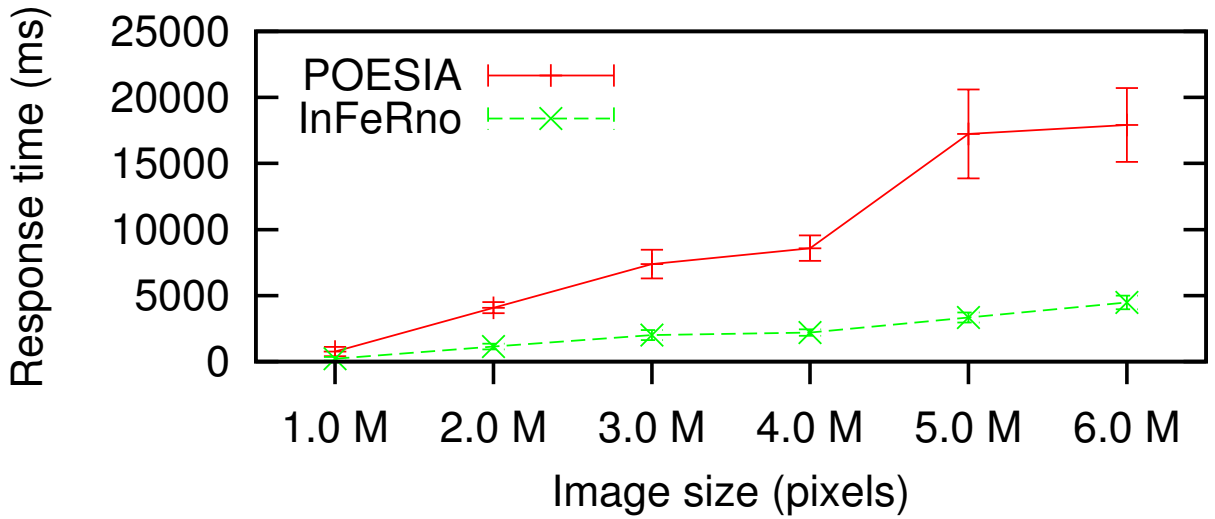

SVM

Three stages

1. Skin detection (Rule-based)
2. Contour extraction (region splitting scheme)
3. Feature extraction and Classifier
   - Extracted 15 features: RGB color statistics, skin-to-nonskin ratio, contour orienation, Hu moments
   - SVM classifier with RBF kernel

Experimental results

- Training dataset: manually collected 680 bikini images, 660 porn images and 4260 benign images from the Web
- Comparison with the EU-funded *POESIA pornography elimination system*
- Results:



  - **4x speedup** improvement
  - Accuracy: 98% for porn, 97% for bikini, 98.8% for benign class (comparable to POESIA)

Thank you for your attention! ☺