

Visual Recognition



VisRec JSR

Expert Group - Introduction



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Summary Statement

To simplify and standardize Java APIs for detecting, recognizing and annotating images.



Importance of Machine Learning

Forbes: Machine Learning Is Revolutionizing Sales and Marketing

- 76% of companies say they are targeting higher sales growth with machine learning
- At least 40% of companies surveyed are already using machine learning to improve sales and marketing performance
- 38% credited machine learning for improvements in sales performance metrics

Machine Learning is generating growth and driving innovation

Visual Recognition



retail experience

medical imaging



Machine Learning Is Redefining The Enterprise In 2016



Louis Columbus, CONTRIBUTOR
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Opinions expressed by Forbes Contributors are their own.

Bottom line: Machine learning is providing the needed algorithms, applications, and frameworks to bring greater predictive accuracy and value to enterprises' data, leading to diverse company-wide strategies succeeding faster and more profitably than before.

Industries Where Machine Learning Is Making An Impact

The good news for businesses is that all the data they have been saving for years can now be turned into a competitive advantage and lead to strategic goals being accomplished. Revenue teams are using machine learning to optimize promotions, compensation and rebates drive the desired behavior across selling channels. Predicting propensity to buy across all channels, making personalized recommendations to customers, forecasting long-term customer loyalty and anticipating potential credit risks of suppliers and buyers are Figure 1 provides an overview of machine learning applications by industry.



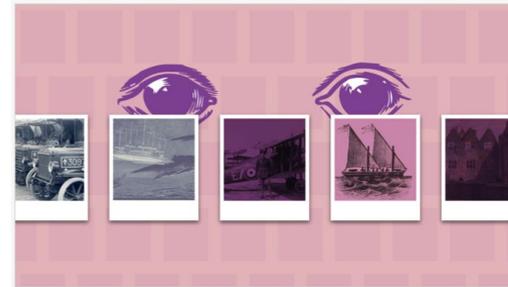
satellite imagery



self-driving cars

CRUNCH NETWORK Why image recognition is about to transform business

Posted Apr 30, 2016 by Ken Weiner



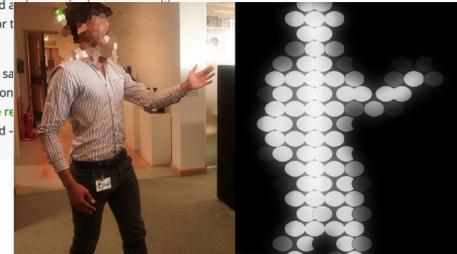
Ken Weiner
CONTRIBUTOR

Ken Weiner is the CTO of GumGum.

At Facebook's recent annual developer conference, Marc Zuckerberg outlined the social network's artificial intelligence (AI) plans to "build systems that are better than people in perception." He then demonstrated a technology for

in it out loud.

help the visually impaired and sa
zing untapped photo collection
ctures, the benefits of image re
make their way into the world-



augmented reality/vision

Why is this important for Java?

- Machine Learning is a huge industry trend
- Wide business implications for all applications across devices for many years
- Visual Recognition (VisRec) is an important subset of ML
- Java needs to play a major role in both VisRec and ML

What do Java Developers Need?

- A standard, easy-to-use and flexible set of high-level VisRec APIs
- Well-defined APIs essential for robust system architecture
- Ease of development and portability
- High-level abstractions for sustainable development of products and protect developers from lower-level changes (with hooks allowing lower-level access)
- Building *custom* Image Classifiers (not just using pre-trained Classifiers)

Existing Solutions?

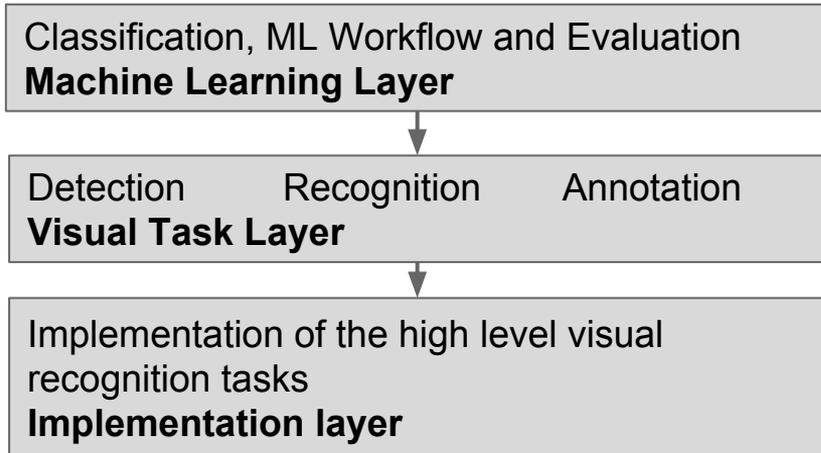
- Existing Frameworks, Packages and Libraries
 - [OpenCV](#), [BoofCV](#), [OpenIMAJ](#), [ImageJ](#), [DeepLearning4J](#), [Weka](#), [RapidMiner](#), etc...
- Existing Services and Engines
 - [IBM Visual Recognition \(Watson\)](#)
 - [Google Cloud Vision \(TensorFlow\)](#)
 - [AWS Recognition \(Deep Learning\)](#)
 - [Microsoft Computer Vision](#)

Issues with Existing Offerings

- Wide, disparate collection of open-source and proprietary ML engines, toolkits and packages
- Using different image classes, different algorithms and implementations, very often with native dependencies
- Each has its own set of APIs
- Reduced Portability for Image Recognition Apps
- Reduced Portability for lower-level Bitmap, Image, etc, pixel-level manipulation
- Some Toolkits are very complex for Average Java Developer

Our Plan

- Technical Strategy



- Transparency

- Github Repo - <https://github.com/sevarac/VisualRecognitionApi>
- Email list - google group
- Wiki - <https://github.com/sevarac/VisualRecognitionApi/wiki>

Example usage

Building an image classifier

```
ImageClassifier imageClassifier = new D14jImageClassifier();
Properties prop = new Properties();
prop.put("imagesPath", "/home/zoran/animals");
prop.put("imageWidth", "100");
prop.put("imageHeight", "100");
imageClassifier.buildClassifier(prop);
```

Using the image classifier

```
ImageRecognitionResults results = imageClassifier.classify(new File("00060.png"));

for(ImageRecognitionResult result : results) {
    System.out.println(result);
}
```

Status of Implementations

- Reference Implementations - DeepLearning4J, DeepNetts
- Working Implementations - Watson Visual Recognition Service

Interfaces	Classifier, Detector, Recognizer, Annotator
Abstract classes	ImageRecognitionProvider
Utility	ImageFactory

Tentative Schedule

JSR submittal	March 2017
Early Draft Review	August 2017
Public Draft Review	November 2017
Proposed Final Draft	March 2018
Final Approval Ballot	April 2018

Sponsors and Advisors

IBM

Ed Burns - Oracle

Guillaume LaForge - Google

Jim Weaver - Pivotal