Machine Learning with Java JSR 381 Visual Recognition

Gran Sasso

A Java-Friendly ML API

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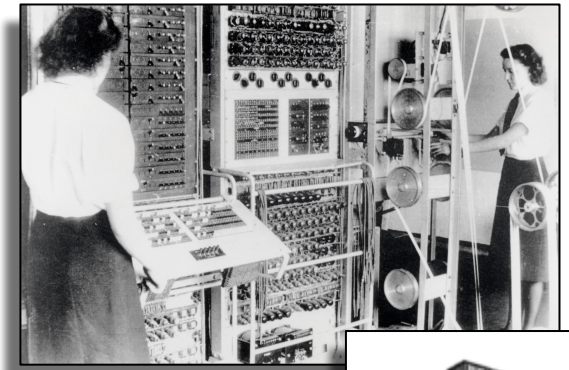
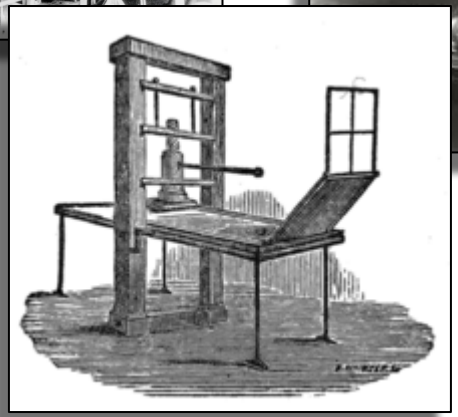
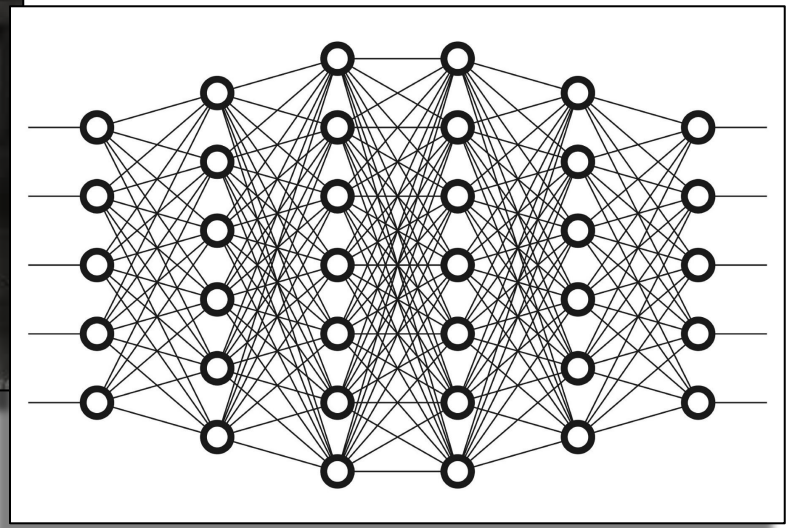
Goals

Instructional suggestions for educators and Java user group leaders on concepts, basic skills, and a code walkthrough that will motivate new Java developers to use the capabilities of JSR 381, a machine learning Java API for Visual Recognition.

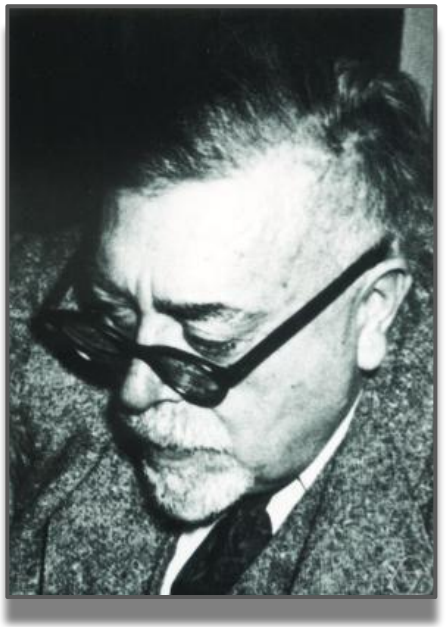
Machine Learning - Huge Impact on Everything...



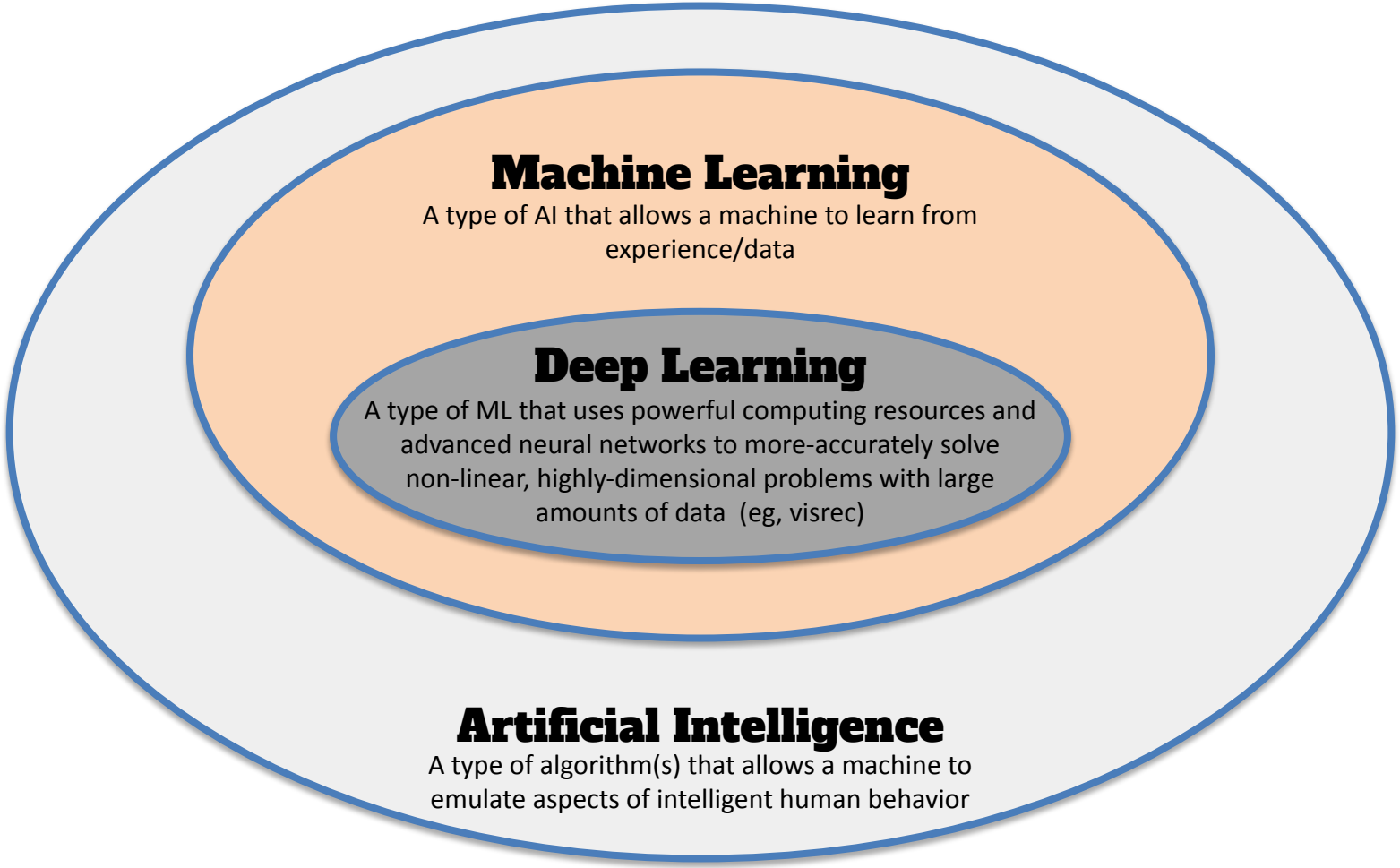


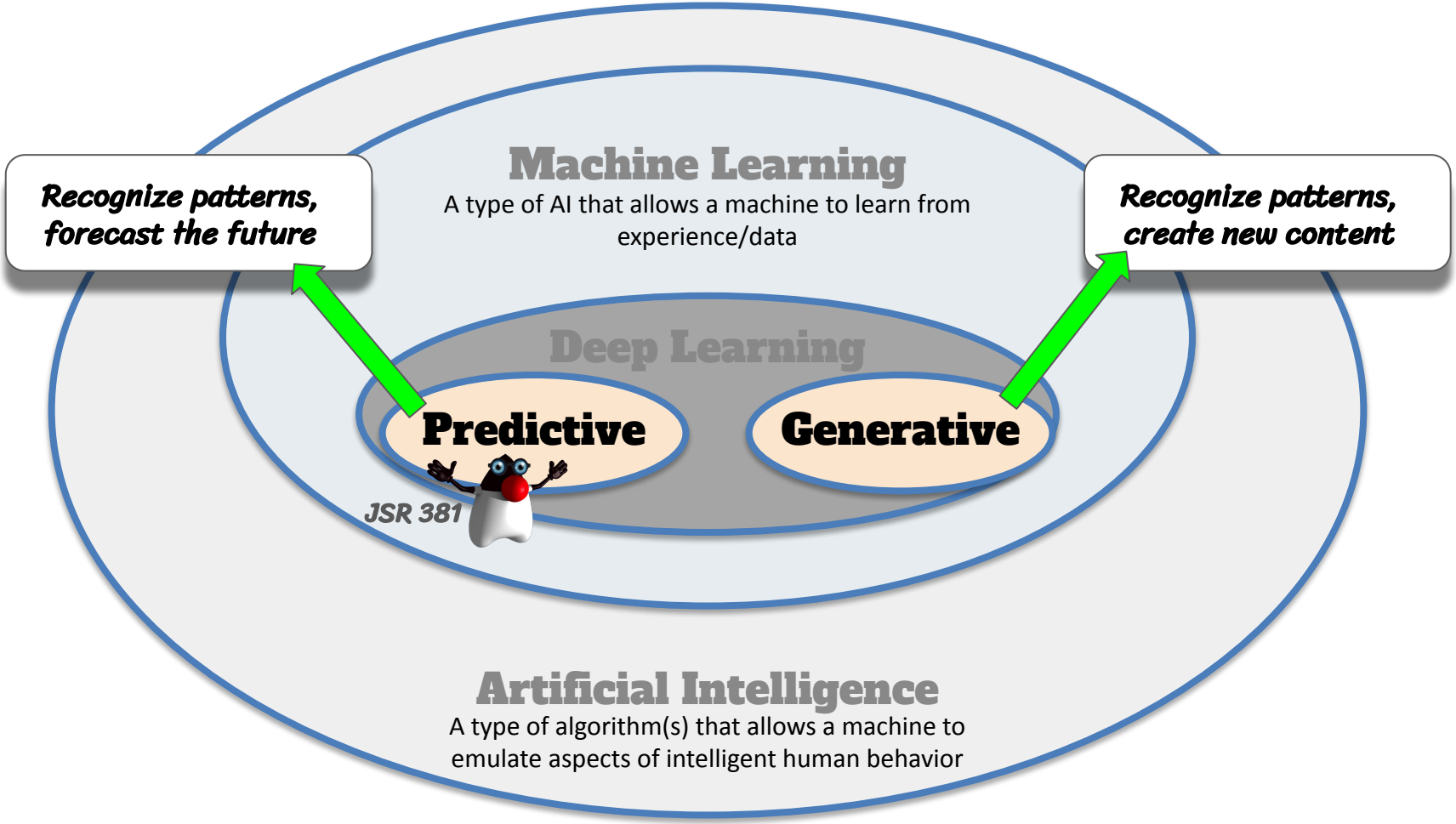


“One of the most interesting aspects of the world is that it can be considered to be made up of patterns”



Norbert Wiener (1948) - 1894-1964 - MIT


Machine Learning
A type of AI that allows a machine to learn from experience/data
Deep Learning
A type of ML that uses powerful computing resources and advanced neural networks to more-accurately solve non-linear, highly-dimensional problems with large amounts of data (eg, visrec)
Artificial Intelligence
A type of algorithm(s) that allows a machine to emulate aspects of intelligent human behavior


Recognize patterns, forecast the future
Machine Learning
A type of AI that allows a machine to learn from experience/data
Recognize patterns, create new content
Deep Learning
Predictive
Generative
JSR 381
Artificial Intelligence
A type of algorithm(s) that allows a machine to emulate aspects of intelligent human behavior

Predictive AI and Generative AI

Most of AI value (03/24) comes from PredAI: weather, image detection and classification, financial services, buying behavior, up/cross-selling...

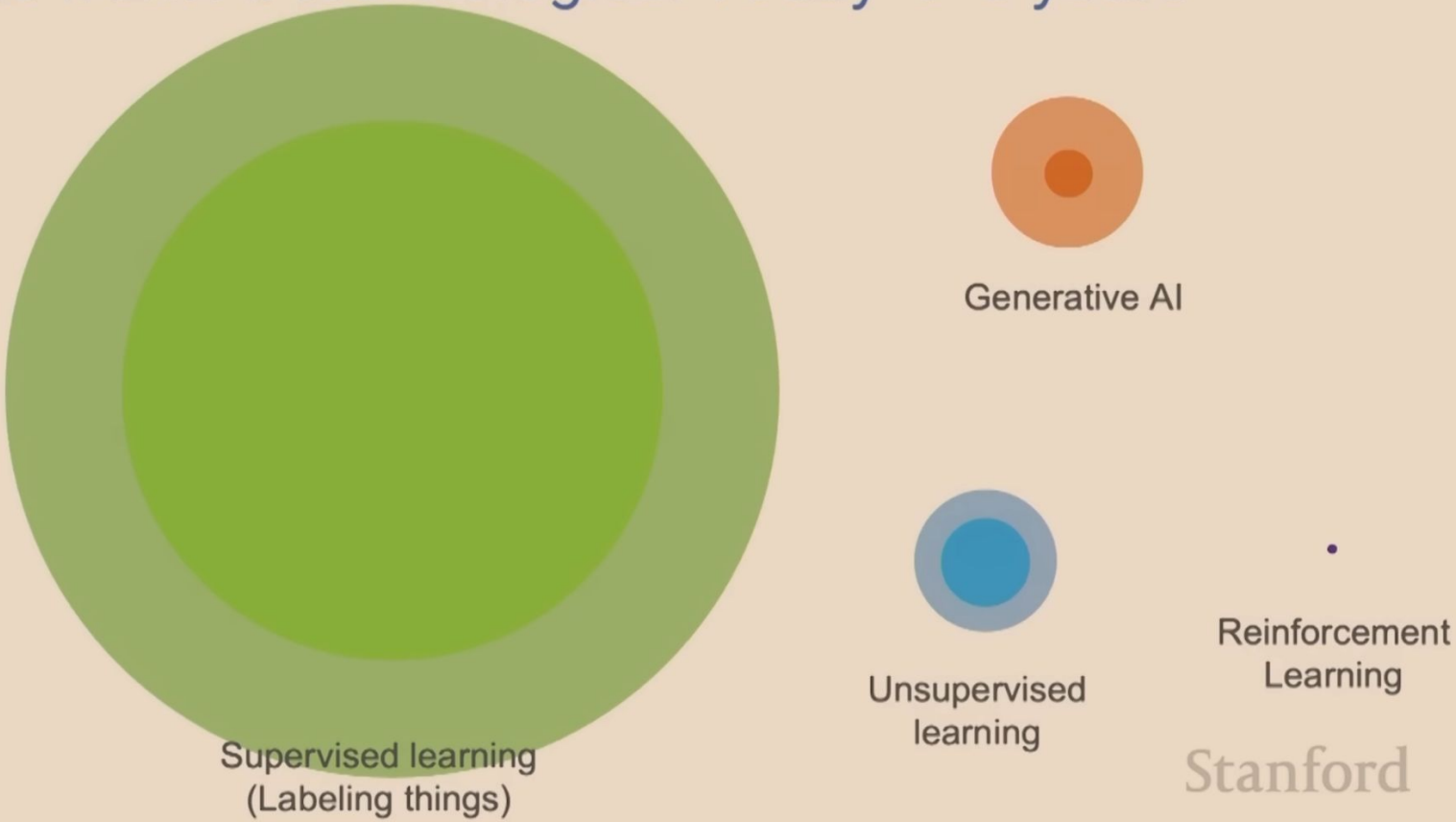
PredAI has been deployed successfully for past 10-15 yrs

PredAI is probably worth at least $100B just to Google

GenAI typically used for more "creative", content generation

GenAI growth and potential is huge. Market value may match PredAI in 3-5 yrs

Value from AI technologies: Today → 3 years



Stanford

https://www.youtube.com/watch?v=5p248yoa3oE

July 26, 2023
Andrew Ng

Java Needs to be a First Class Citizen for ML

- Don’t want another JavaScript single-language scenario
- Python is a good language
  - There should be others to express the world’s creativity.
- Java - An awesome language with a huge ecosystem with 10-12M developers
- Majority of ML APIs aren’t Java-friendly or AppDev-friendly

Don’t boil the ocean… [heat up some coffee first]

VisRec - JSR #381 Visual Recognition for Java

Spec Leads and Expert Group

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- James Weaver (IBM)
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- Jyoti Buddha
- Guillaume Laforge (Google)
- Ed Burns (fmr Oracle)
- Nishant Raut (Mumbai JUG)
- Sandhya Kapoor (fmr IBM)

JSR #381 - Visual Recognition API

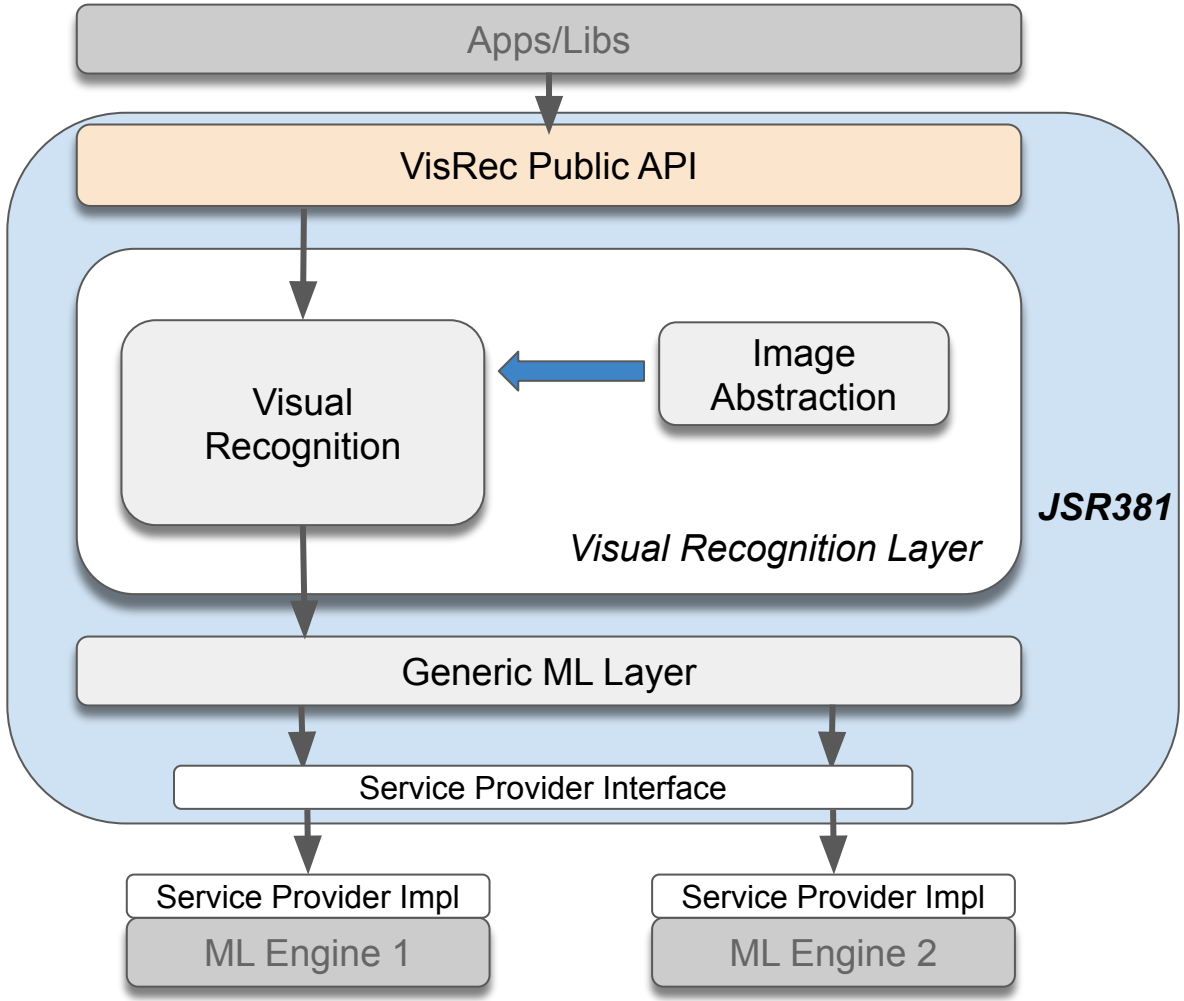
- Java-friendly standard API for computer vision tasks using ML
- Also provides generic ML API
- Designed for Java app devs
- Multiple implementations
- High level abstractions
- More readable and easier to use

VisRec JSR #381

https://github.com/JavaVisRec/visrec-api/wiki/Getting-Started-Guide

VisRec Design goals and principles

- Easy to use by non-experts in VisRec/ML domain
- Enable Java Developers to leverage their Java skills
- Easy to implement for existing ML and imaging libraries
- Reusable design for applied ML applicable to other domains



JSR 381 Architecture

JSR381 API
Code Walkthrough

Pains, barriers and preferences for PredAI in Java

- Many different incompatible data formats
- Many different machine learning algorithms
- Many confusing configuration parameters
- Clear task oriented interface that hides implementation details
- Usage does not require understanding of implementation and configuration (like `Collections.sort()`)
- Simple and portable integration into existing Java apps and devices

VisRec API Reference Implementation

Based on Deep Netts Community Edition

https://www.deepnetts.com/blog/deep-netts-community-edition

A Java based deep learning library provided by www.deepnetts.com

Deep Netts Professional edition

- Free for personal and educational use
- Higher performance implementation
- Advanced visual AI tools
- https://www.deepnetts.com/deep-netts-platform/

How to get started

github.com/JavaVisRec/visrec-api/wiki/Getting-Started-Guide

JSR381 Information

- JCP.org https://jcp.org/en/jsr/detail?id=381
- JSR project on GitHub github.com/JavaVisRec
- Getting Started

  github.com/JavaVisRec/visrec-api/wiki/Getting-Started-Guide
- API github.com/JavaVisRec/visrec-api
- RI github.com/JavaVisRec/visrec-ri
- Examples github.com/JavaVisRec/jsr381-examples
- Mailing list visrec@groups.io

JSR 381
Visual Recognition for Java

Finally,
A Java-Friendly ML API

Please provide feedback and **contribute**!

Java is a **great** language for ML!

Thanks!

Questions / Comments?

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