IBM Watson Deep Learning: From research to real applications

Deep Learning Summit
Montreal, October 10th, 2017

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IBM

The new edition of IBM R&D Journal

Dedicated to Deep Learning (Sept. 2017)

- **Conversational speech recognition**
- **Sentence embedding models**
- **Algorithm for hyperparameter optimization**

http://researchweb.watson.ibm.com/journal/

Automatic forecasting of time series data

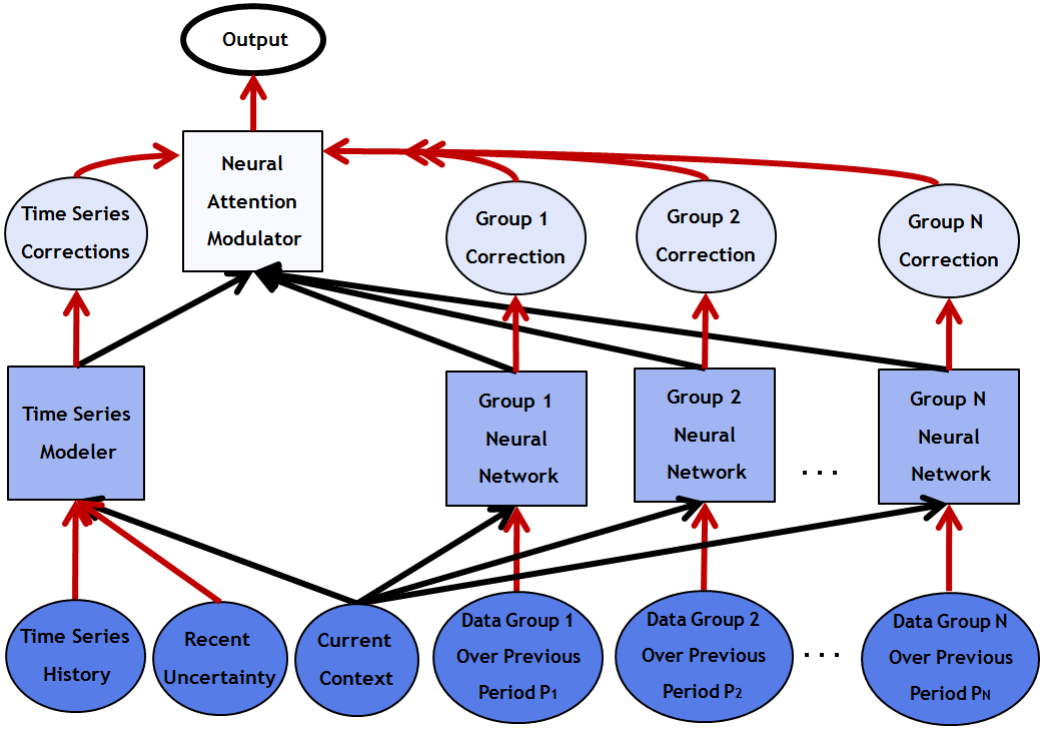
By including data representing external factors that may have a significant impact

- **Novel neural network attention mechanism**
- **Without feature engineering**
- **23.9% relative improvement**

Source: Matthew Riemer et al.
IBM T.J. Watson Research Center

Automatic forecasting of time series data

By including data representing external factors that may have a significant impact



Source: Matthew Riemer et al.
IBM T.J. Watson Research Center

- **Model provides evidence for the reasoning behind adjustments**
- **Model offers superior descriptive capabilities**

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Deep learning ensembles

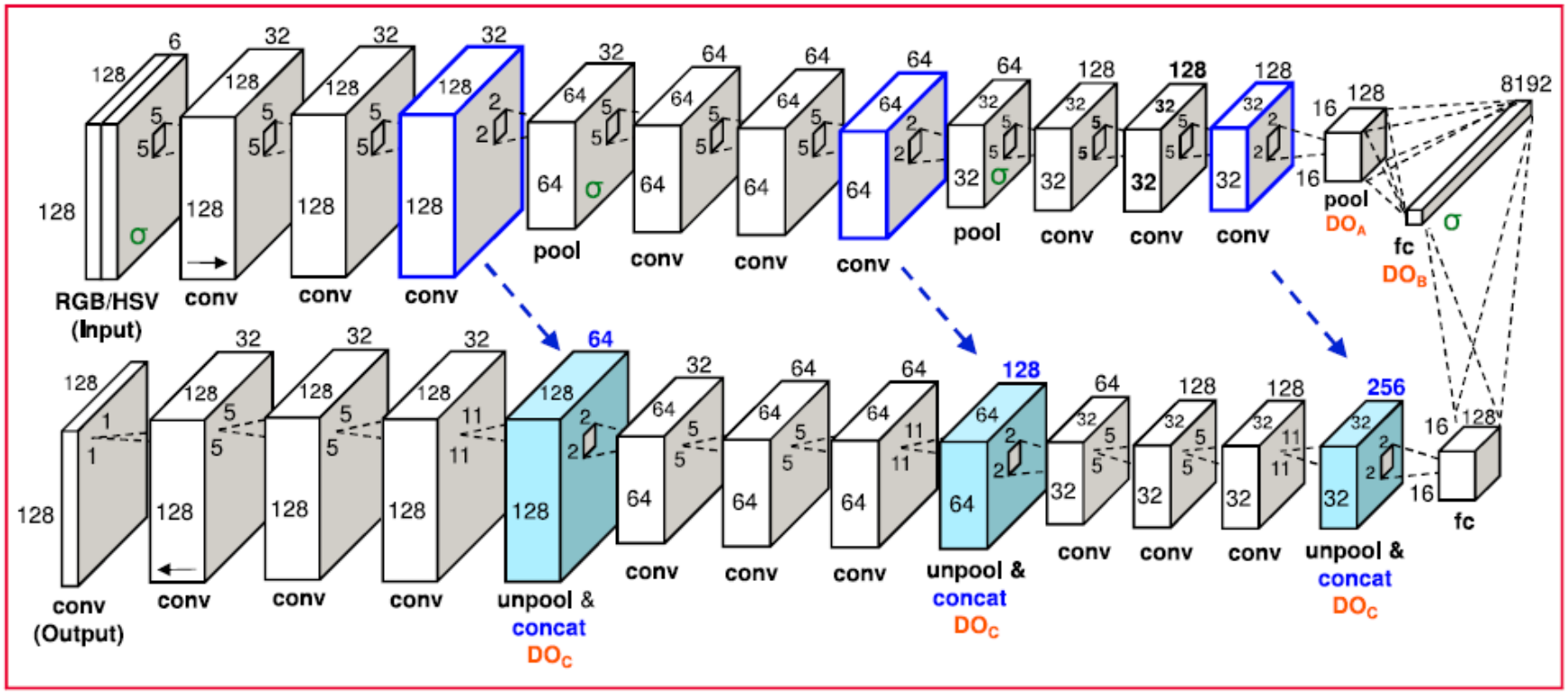
For melanoma recognition in dermoscopy images

Source: Codella et al

- **Compared to the average of eight expert dermatologists, the proposed system produces a higher accuracy (76% versus 70.5%), and specificity (62% versus 59%).**

For lesion segmentation

A fully convolutional network structure (similar U-Net architecture)



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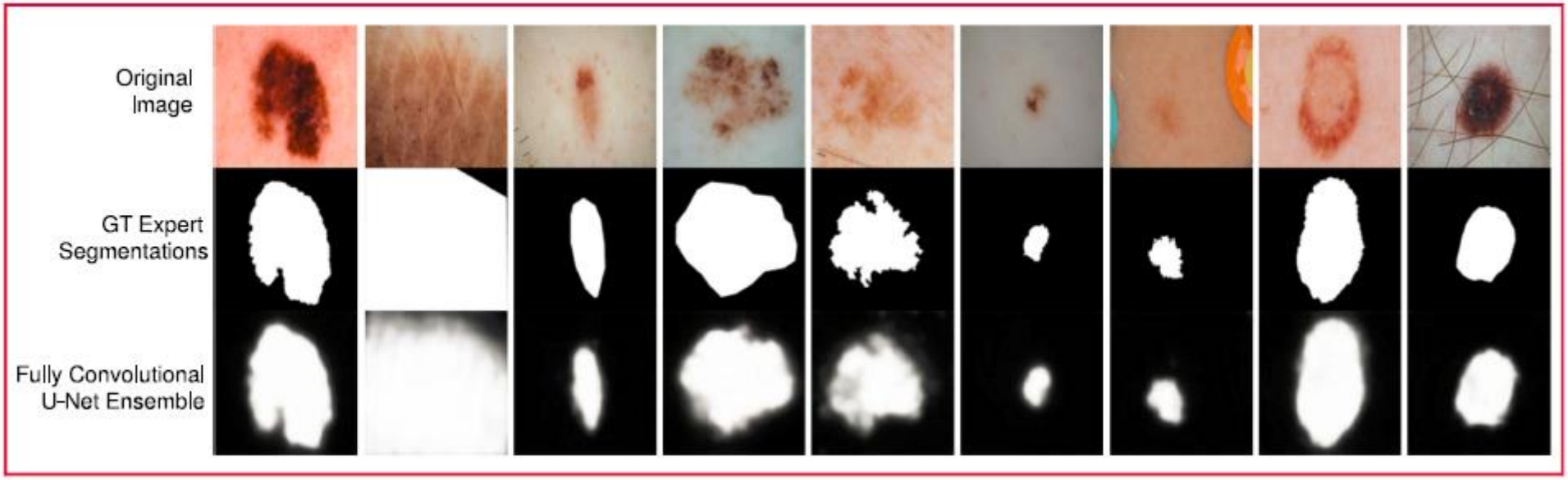
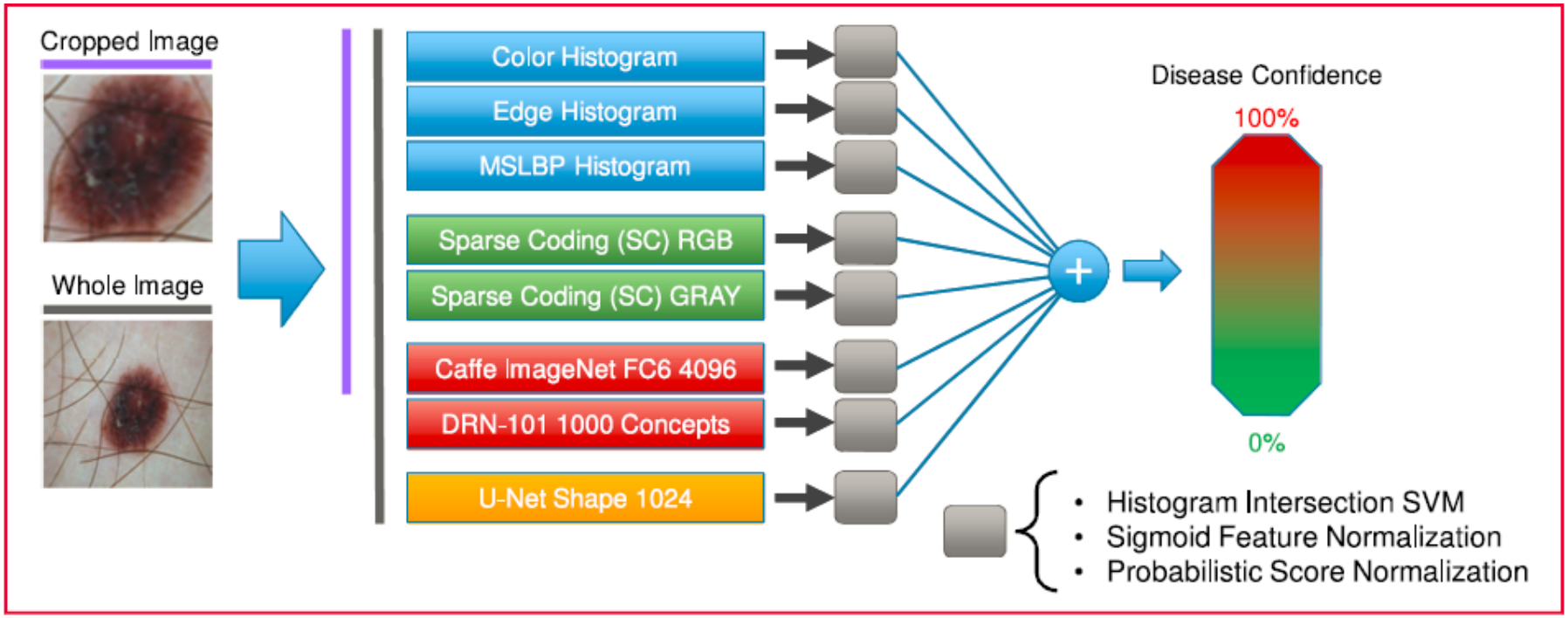


Classification uses ensembles methods

For melanoma recognition in dermoscopy images



PowerAI

A powerful Deep Learning infrastructure

IBM PowerAI Platform

PowerAI Software Distribution

Deep Learning Frameworks

- Caffe
- NVIDIA Caffe
- IBM Caffe
- torch
- TensorFlow
- theano
- Chainer

Supporting Libraries

- DIGITS
- OpenBLAS
- Distributed Frameworks
- Bazel
- NCCL

IBM Power System for HPC, with NVLink

Breakthrough performance for GPU accelerated applications, including Deep Learning and Machine Learning.

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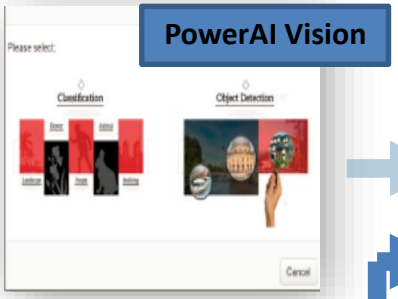
PowerAI Vision enables AI

From Datacenter to Advanced Driver Assistance Systems in Cars

1. Data Labeling for vehicle, motorcycle, pedestrian

Productivity

2. Object detection training.



Productivity

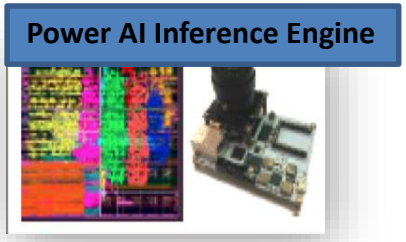
3. Visualize the training progress.

Productivity

5. Deploy the new model for ADAS simulation testing in data center.

Performance

6. Generate the DNN accelerator and download into chip for road-test.



Save cost and enhance productivity

7. Road-test with DNN accelerator in the car.

4. During the training, developer could get the training analysis from DL insight.

Productivity and Performance

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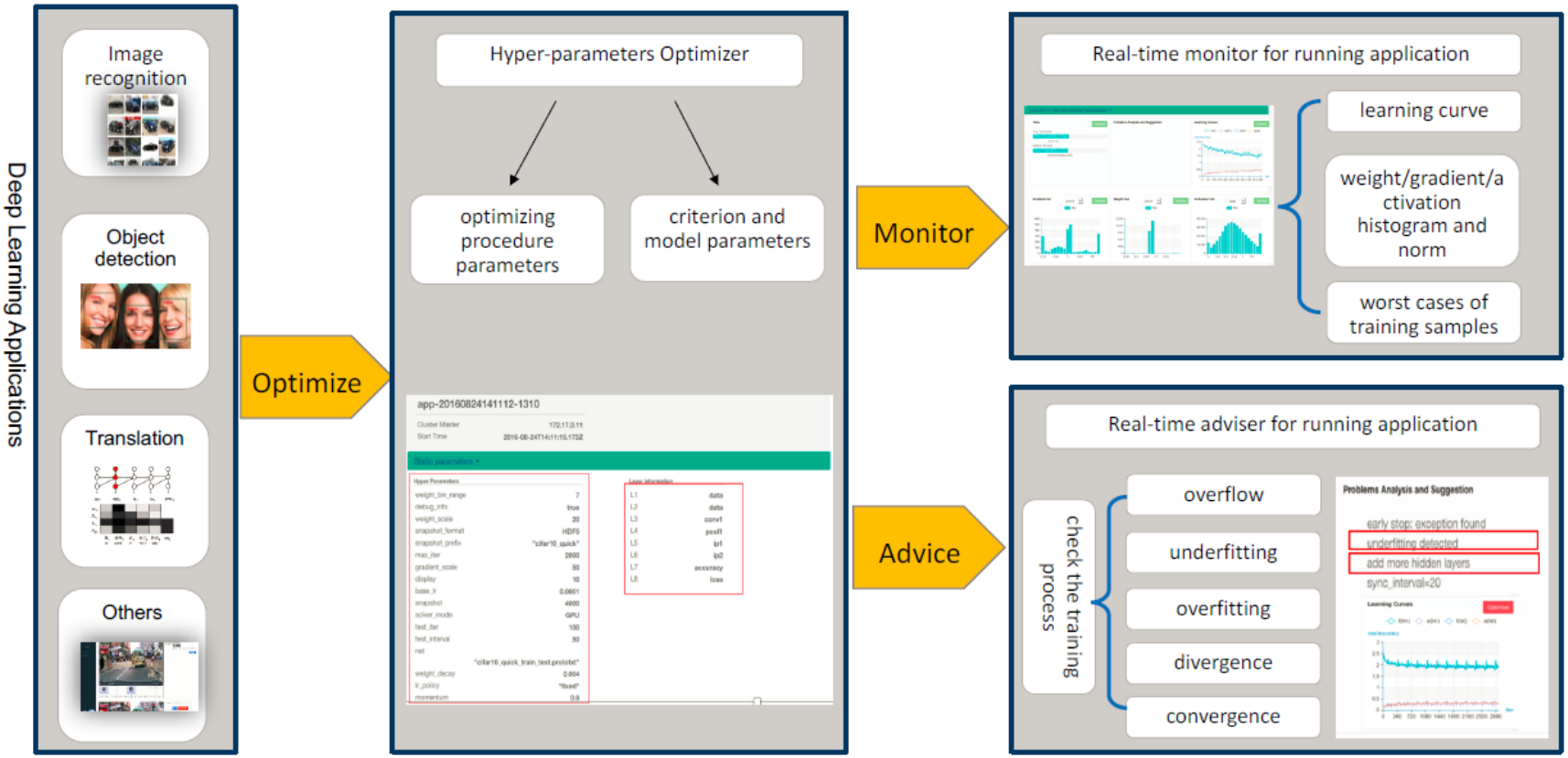
PowerAI Vision DL Impact

Monitor, Adviser and Optimizer Tools for Deep Learning Applications



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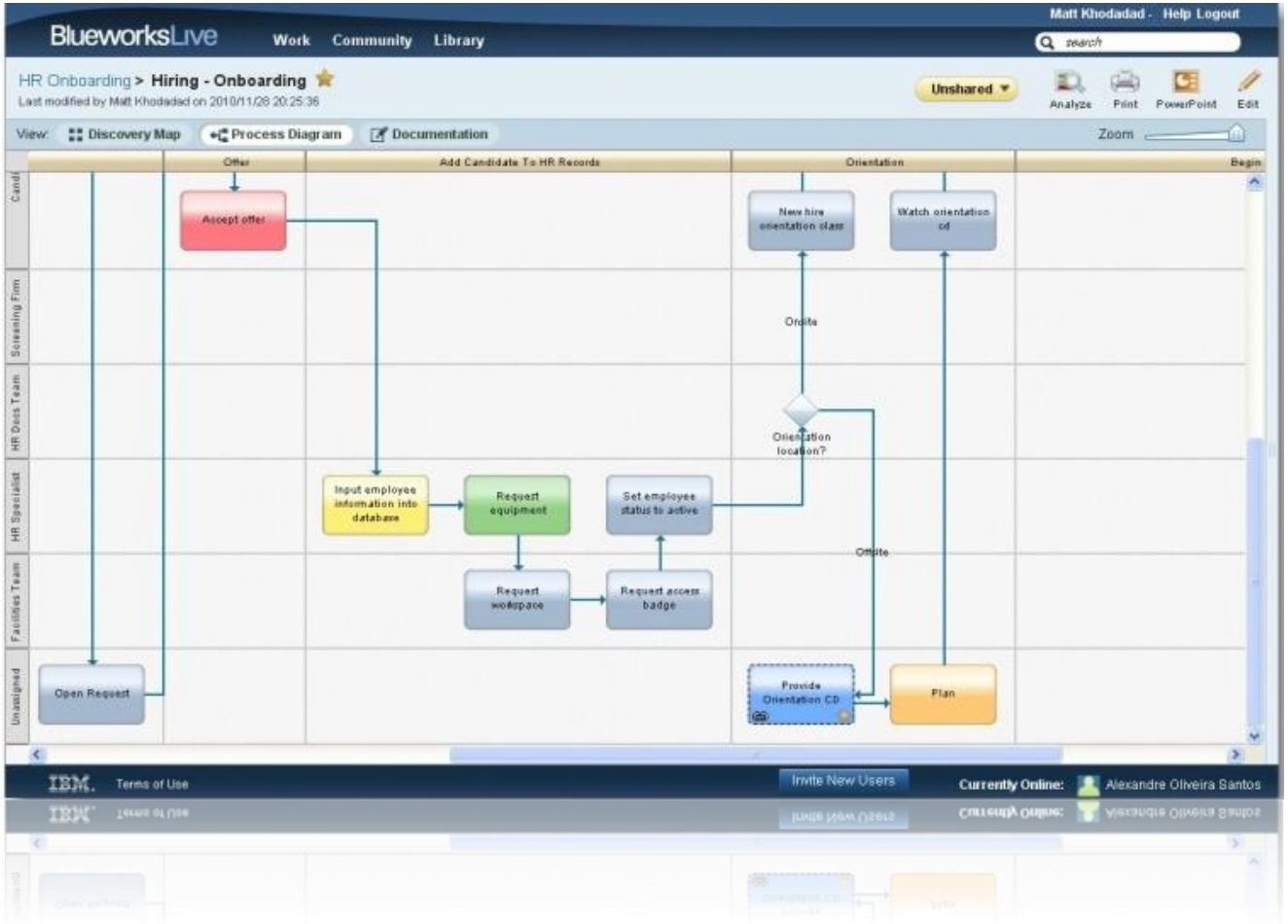
Process Automation

How does Machine Learning & Deep Learning impact Business Processes?



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Announcement

you IBM

IBM Panel Workshop

October 11, 2017– 1:40 pm

Find out more about IBM Power AI Announcement

Adel El-Hallak, *Director Deep Learning*
Michael Gschwind, Chief Engineer, Deep Learning
Jean-François Barsoum, *Senior Managing Consultant , Smarter Cities, Water and Transportation*
Bassem Monla, *AI Subject Matter Expert*

IBM Booth