USING KNIME FOR OPTIMIZING DIE UTILIZATION

KNIME Fall Summit 2018

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How are we working to overcome the 3 legged stool problem using KNIME and Data Science at AMD?

- Optimizing Die Utilization
- Applied Machine Learning in Manufacturing
- Intelligent grouping of like die
- Drive a change in culture
What does Optimizing Die Utilization mean?

Matching the **Fit** and **Form** to the **Function** of the target product

- SKU
- Package
- Die Matching

Applying ML to Manufacturing to both Predict and Prescribe material flow allows for optimal utilization

Let’s take a look at some prototypes
Tree Ensemble to Predict Backend Test Fails

- Reduced Capacity Requirements
- Improved Yield
- Reduced Variability

1.25% INCREASE IN YIELD
1.32% VARIANCE IMPROVEMENT
MLP to Predict Backend Test Fails

- POC for no domain knowledge
- Auto-feature selection
- MVP for PMML based virtual insertion

0.67% INCREASE IN YIELD

1.16% VARIANCE IMPROVEMENT
Auto-Feature Selection and Gradient Boosted Trees for Debug

- Automated Feature Selection workflow to identify potential root causes
- Created model to predict units that will fail screen

91.7%
PREDICTION ACCURACY
Gradient Boosted Trees to Predict Required Coverage

- Reused basic workflow from debug project
- Used model to identify material that did not need specific testing based on above average quality

9.22%
REDUCTION ON TOP SKU

7.77%
REDUCTION ON TOTAL MATERIAL
How are we doing this?

Foundation
- Toolset for Rapid Prototyping
- Deployment Capability
- Access to Data

Culture
- Open Minds
- Technical Development
- Citizen Data Scientists

Empowerment
- Mentoring
- Management Support
- Self Service Analytics
How does KNIME fit in our stack?

**RAPID PROTOTYPING**
- Quickly put together a workflow to test ideas and develop a study
- Easily expandable to prototype and deployment phase

**SELF SERVICE ANALYTICS**
- User Empowerment
- Drag and Drop Data Science

**LOW BARRIER OF ENTRY**
- Coders and non-coders alike can use it
- Large amount of free E-Learning material available
Self Service Analytics Framework

Analytics
- KNIME Desktop
- Python/R

Workflow Automation
- KNIME Server
- Job Scheduler

Data Access
- KNIME Extensions
- REST API
- SQL Interface

Data Lake
- Datamart (RDBMS)
- Big Data Storage (HDFS)

Prototype → Pilot → Training → Scale Out
Machine Learning Initiative Pipeline

THIS IS HOW WE ARE DEVELOPING CITIZEN DATA SCIENTISTS

Open Minds
History of ML, Industry Use Cases, and Technical Overview
Open to All

Identify Candidates
Select people who are self motivated and have an interest in analytics
Use Case Presentation
Candidates get feedback and advice from mentors to guide development

Manager Support
20% Time Commit

Immersion Training
Directed training focused on techniques to develop use case
• KNIME
• Python
Mentoring
Provide guidance and support during the development of a functioning prototype

Operationalize
Scale out the prototype to a production worthy solution
Key Points

Applying Machine Learning to Manufacturing to Optimize Die Utilization

KNIME is Foundational in the Development of our Citizen Data Scientists

Supporting Technical Development of Motivated Power Users
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