MIDA: Opportunities

- MI and EDA are both growing
  - AI/ML to add $15.7 trillion in global economy by 2030.  [Reference: PwC report]
  - Design Automation Market to hit $14 billion by 2024.  [Reference: GMI report]

Can EDA capture exponential growth of MI?
MIDA: Opportunities

- **AI/ML research rate is phenomenal**
  - Papers: well over 100k per year. [Reference: ScienceDirect APIs]
  - Funding: AI/ML research is over 1% of total global research.

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Can EDA make use of ML research?
MIDA: Opportunities

Yes, EDA is ready to make use of MI research

- The change will likely come in the form of product features, not new products or flows.
- MI features will bring better usability, accuracy and performance.
- MI won’t bring a disruptive change to EDA unlike other industries.
Paripath MI Platform

Mathematics
- Algebra
- Calculus
- Statistics
- Probability

CAD Infrastructure
- Python
- TensorFlow
- Numpy
- Pyplot
- CLI
- EDA Algorithms
- TCL
- C++

Proprietary
- Community apps
- Third party apps

Paripath MI Platform
- Guna
- PASER
- Google Colab
- Jupyter
- TCL

Third party apps
- C++

Community apps
- Third party apps

Python
- TensorFlow
- Numpy
- Pyplot
- CLI
- EDA Algorithms
- TCL
- C++
Char Case Study: VCC Classification

VLSI Cell Classification

Train a machine learning model to classify the type of IP with a fully extracted netlist.
VCC Applications

- **VCC** is a common design automation problem used for detecting patterns in ASIC, AMS and Custom flows.

- It is a pattern detection algorithm in its generalized form and applicable to many other problems including DRC, Extraction, Circuit Simulation and others.
VCC Dimensionality
GUNA: MI enabled Char Platform

- Guna is built on Paripath’s MI platform to offer machine learning in the cloud with VCC and other MI features.
- VCC repository dramatically improves ease of on pre-characterized cells.
  - Helps with setup for re-characterization, multiple corners new process nodes.
- VCC feature adds to QA confidence of models.
MIDA: Challenges

- Clear Value Proposition
- Use Model
- Data Engineering
- High Dimensionality
- MI Technology Selection
- Integration into Legacy Systems
- Acceptance of Probabilistic Results
MIDA: Applications

- Capacitance estimation
- Wire load Models estimation
- RC-tree estimation
- Early timing analysis
- RTL power analysis
- Cell and IP classification
- Verification Coverage
- Fast extraction
- Speed up circuit simulation
- Design Segmentation
Guna is a ML enabled characterization platform that integrates and adds value to simulation environments.

Paripath offers community MIDA platform to quickly customize several well known MI techniques in design automation.

MI will likely change the way EDA software is written.