Machine Learning Systems are Stuck in a Rut!
(two original TensorFlow authors agree) [HotOS2019]

Problems:
- Inflexibility of ML framework APIs halts innovation
- Lack of extensibility of ML systems due to highly optimized opaque operators
- Prototyping new ideas often requires new operators in the IR

A Modular Pattern-based Approach

- Expressing Computations in Terms of Patterns as Basic Building Blocks:
- High performance on heterogenous hardware by using the RISE rewriting system:

RISE as MLIR Dialect

Functional Lambda Calculus:

Function abstraction:

Function application:

Matrix-Matrix Multiplication in MLIR RISE:

Expressing Computations in Terms of Patterns as Basic Building Blocks:

RISE: A Functional Pattern-based Dialect

A Modular Pattern-based Approach

RISE-lang.org/mlir