

# PRESENTATION OUTLINE: — Newton-ADMM: A Distributed GPU-Accelerated Optimizer for Non-Convex Problems —

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## 1 Introduction

- Title of presentation
- Agenda of Presentation

## 2 Background

- First-order optimization techniques
- Key challenges in optimization for machine learning problems.
- Strategies of Existing Distributed Optimization Solvers
- The Trade-offs between Existing Strategies

## 3 Problem Formulation

- Notations
- Mathematical Formulation of the Problem.

## 4 Alternating Direction Method of Multipliers (ADMM) Framework

- Definition of ADMM
- Spectral Penalty Selection (SPS)
- ADMM method

## **5 Inexact Newton-CG Solver**

- Definition
- conjugate gradient (CG)
- Inexact Newton-type Method

## **6 GPU-accelerated Newton-type Method**

- Advantages and Disadvantages of Newton-type methods
- Hessian-free Newton-type method to solve the ADMM sub-problem
- Scaling

## **7 Computational Cost and Overheads of Numerical Schemes**

- Communication cost
- Computation cost
- Number of CPU-GPU transfers
- Complexity

## **8 Proposed Modification**

- Incorporation of Serial Non-Convex solvers
- Definition of Newton With Minimum Residual Sub-problems (Newton-MR)
- Derivation of Newton-MR
- Properties of Newton-MR

## **9 Discussion**

- Experimental Evaluation
- Data Sets
- Results
- Q and A

## **10 References**

- List of references
- List of resources

## 11 Vote of Thanks

- Gratitude and Acknowledgement