COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY
Lamar Smith, Chairman

For Immediate Release
July 12, 2018

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Statement by Chairman Randy Weber (R-Texas)

Big Data Challenges and Advanced Computing Solutions

Chairman Weber: Good morning and welcome to today's joint Energy and Research and Technology Subcommittee hearing. Today, we will explore the application of machine learning–based algorithms to big data science challenges.

Born from the Artificial Intelligence (AI) movement that began in the 1950s, machine learning is a data analysis technique that gives computers the ability to learn directly from data without being explicitly programmed.

Generally speaking, and don't worry I'll save the detailed description for our expert witnesses, machine learning is used when computers are "trained" on large data sets to recognize patterns in that data, and learn to make future decisions based on these observations.

Today, specialized algorithms termed "deep learning" are leading the field of machine learning-based approaches. These algorithms are able to train computers to perform certain tasks at levels that can exceed human ability. Machine learning also has the potential to improve computational science methods for many big data problems.

As the nation's largest federal sponsor of basic research in the physical sciences, with expertise in big data science, advanced algorithms, data analytics and high performance computing, the Department of Energy (DOE) is uniquely equipped to fund robust fundamental research in machine learning.

The Department also manages the 17 DOE national laboratories and 27 world-leading scientific user facilities, which are instrumental to connecting basic science and advanced computing.

Machine learning and other advanced computing processes have broad applications in the DOE mission space: from high energy physics to fusion energy sciences to nuclear weapons development.

Machine learning also has important applications in academia and industry. In industry, common examples of machine learning techniques are in automated driving, facial recognition and automated speech recognition.

At Rice University near my home district, researchers seek to utilize machine learning approaches to address challenges in geological sciences. In addition, the University's

Houston Solutions Lab supports research that will use machine learning to predict the behavior of flooding events and aid in evacuation planning. This would be incredibly beneficial for my district and all areas prone to hurricanes and flooding. In Texas, we are still recovering from Hurricane Harvey—the wettest storm on record!

The future of scientific discovery includes the incorporation of advanced data analysis techniques like machine learning.

With the next generation of supercomputers, including the exascale computing systems that DOE is expected to field by 2021, American researchers utilizing these technologies will be able to explore even bigger challenges.

With the immense potential for machine learning technologies to answer fundamental scientific questions, provide the foundation for high performance computing capabilities and drive future technological development, it's clear we should prioritize this research.

I want to thank our accomplished panel of witnesses for their testimony today and I look forward to hearing what role Congress should play in advancing this critical area of research.

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