Tackling Climate Change with Machine Learning

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& Climate Change AI

Climate change

Increasingly severe effects

- Storms, droughts, fires, flooding, extreme heat, etc.

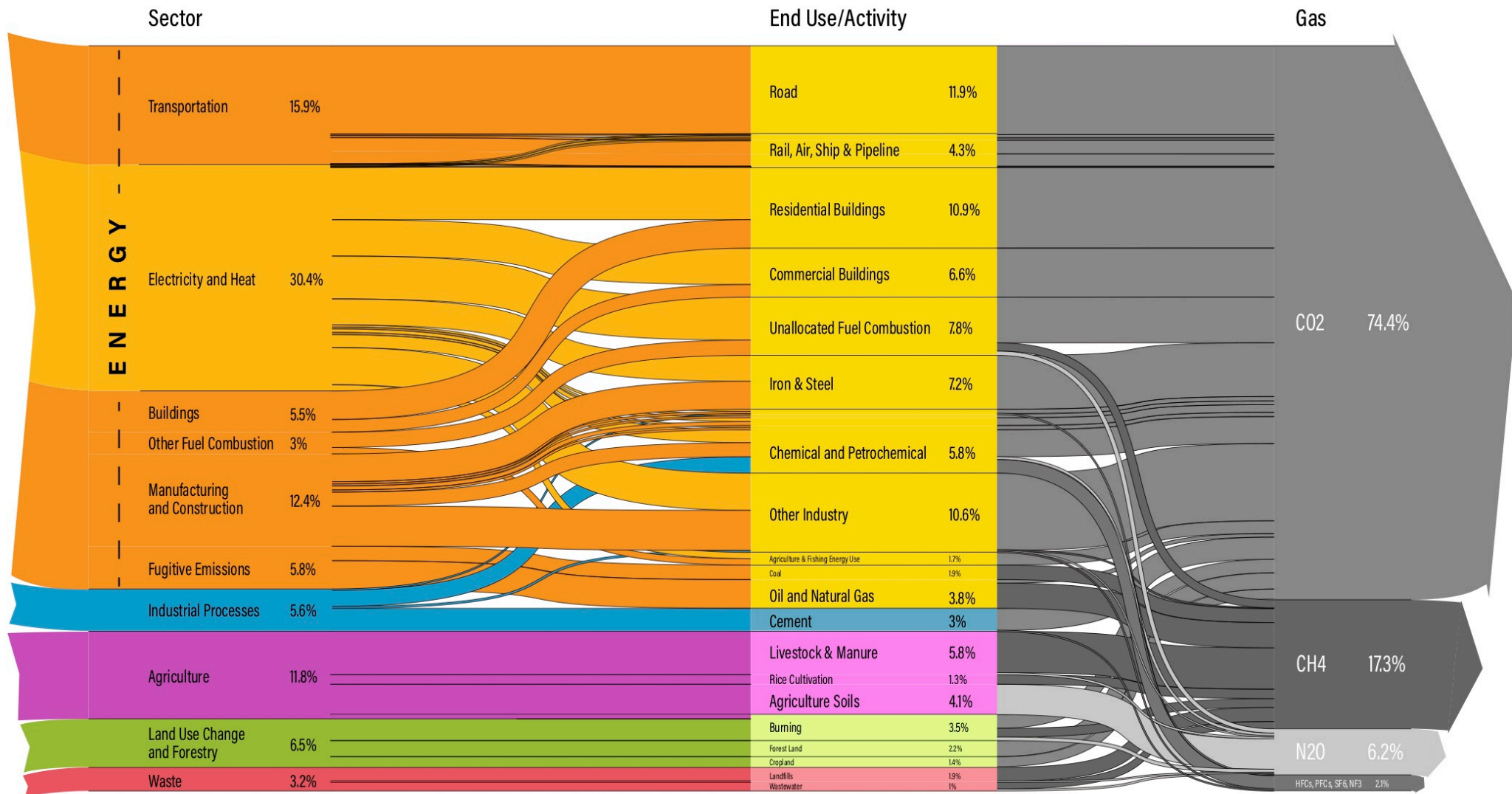- Uneven impacts

Feedbacks (e.g. albedo, permafrost)

Need net-zero greenhouse gas emissions by 2050 (UN Intergovernmental Panel on Climate Change)

- But emissions still increasing each year

World Greenhouse Gas Emissions in 2016

Total: 49.4 GtCO$_2$e

Sector		End Use/Activity		Gas	
Transportation	15.9%	Road	11.9%		
		Rail, Air, Ship & Pipeline	4.3%		
Electricity and Heat	30.4%	Residential Buildings	10.9%		
		Commercial Buildings	6.6%	CO2	74.4%
		Unallocated Fuel Combustion	7.8%		
		Iron & Steel	7.2%		
Buildings	5.5%				
Other Fuel Combustion	3%	Chemical and Petrochemical	5.8%		
Manufacturing and Construction	12.4%	Other Industry	10.6%		
Fugitive Emissions	5.8%	Agriculture & Fishing Energy Use	1.7%		
		Coal	1.9%		
Industrial Processes	5.6%	Oil and Natural Gas	3.8%		
		Cement	3%		
Agriculture	11.8%	Livestock & Manure	5.8%		
		Rice Cultivation	1.3%	CH4	17.3%
		Agriculture Soils	4.1%		
Land Use Change and Forestry	6.5%	Burning	3.5%		
		Forest Land	2.2%		
		Cropland	1.4%	N20	6.2%
Waste	3.2%	Landfills	1.9%		
		Wastewater	1%	HFCs, PFCs, SF6, NF3	2.1%

ENERGY

What it means to tackle climate change

Climate change is not an on/off switch

Mitigation: Reducing greenhouse gas emissions

Adaptation: Resilience to consequences of climate change

Climate Change AI

Volunteer initiative, intersection of machine learning & climate change

• Identify impactful problems / techniques

• Build a global network of experts

• Provide resources for knowledge-sharing

• Facilitate partnerships with relevant stakeholders

Read more at **www.climatechange.ai**

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Theme 1. Remote sensing

Automatically labelling satellite or aerial images

Examples

- Tracking GHG emissions, e.g. methane

- Gathering infrastructure data, e.g. buildings

- Pinpointing deforestation

- Evaluating coastal flood risk

Theme 2. Accelerated experimentation

Recommendations for which experiments to try

Examples

- Better batteries

- Lower-emissions construction materials

- Efficient ways to make fertilizer

- "Sorbents" (chemical sponges) for carbon capture

Theme 3. Improving efficiency

Optimization/control of a complex system

Examples

- Consolidating freight
- Controlling heating/cooling systems efficiently
- Reducing food waste

Theme 4. Forecasting

Predictions from time-series data

Examples

- "Nowcasting" for solar and wind power
- Foreseeing agricultural yield / famines
- Predicting prices in carbon markets

AI is not a silver bullet!

- Not applicable everywhere

- Where applicable, only one part of the strategy
    - E.g. insulation more important than smart buildings!

- Impactful applications are often unsexy

- Problems need to be driven by end users

- Also, like other tech, AI can be applied in negative ways

Challenges for governance

- Gap between research and deployment
  - In-house capacity, e.g. local governments
  - Obstacles to adoption of new technologies

- Incentive structures

- Data sharing and ownership

Read more at www.climatechange.ai

Climate Change AI — About ⌄ — The Paper ⌄ — Newsletter ⌄ — Events ⌄ — Get Involved ⌄ — Forum

Climate change is one of the greatest problems society has ever faced, with increasingly severe consequences for humanity as natural disasters multiply, sea levels rise, and ecosystems falter. While no silver bullet, machine learning can be an invaluable tool in fighting climate change via a wide array of applications and techniques. Climate Change AI aims to facilitate work at the nexus of climate change and machine learning.

LEARN

- Search our list of impactful applications
- Read our paper
- Explore readings and data
- Watch recordings and read abstracts from our previous events

ENGAGE

- Join our discussion forum
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- Launch events or projects (ideas here)
- Attend our workshop at ICLR 2020

Readings, suggestions, datasets, recorded talks, events, and more

Thank you!