PRESENTER
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Motivation

- Modelling extreme events to **evaluate** and **mitigate** their **risk** has applications in Financial Crashes and managing unexpectedly high demands in Online Services
- Wide range of **generated extreme examples** can be used by **domain experts** to **understand** the nature of **extreme events**
- Can be used to perform **Stress Testing**

Challenges

- **Lack of training examples**: One does not simply train a GAN on just the extreme samples in the dataset, because of the rarity of "extreme" samples in any moderately sized dataset
- **Conditional Generation**: Need to generate extreme samples at any given, user-specified extremeness level
- **Scalability**: Need to be fast, even for highly extreme samples. Otherwise, we could just employ unconditional generation with rejection sampling

Methods

DISTRIBUTION SHIFTING

While dataset not extreme enough:
   Train an unconditional GAN on your dataset
   Use this GAN to augment your dataset with fake data
   Discard low extremeness samples from the dataset

EXTREME VALUE THEORY (EVT) BASED CONDITIONAL GENERATION

Use the dataset created in the previous step to train a conditional GAN
Use EVT to model the distribution of extremeness values
Use the above distribution to translate desired user extremeness levels to the conditioning input for the GAN

Paper Contents

In the paper, we
- Provide proper motivation to our problem statement
- Define tools that help us formally describe our setup, and assumptions, and make our analysis concrete
- Explain the baseline approach, and compare thoroughly with our approach.
- Describe implementational tricks for our approach
- Discuss limitations of our approach and scope for future work
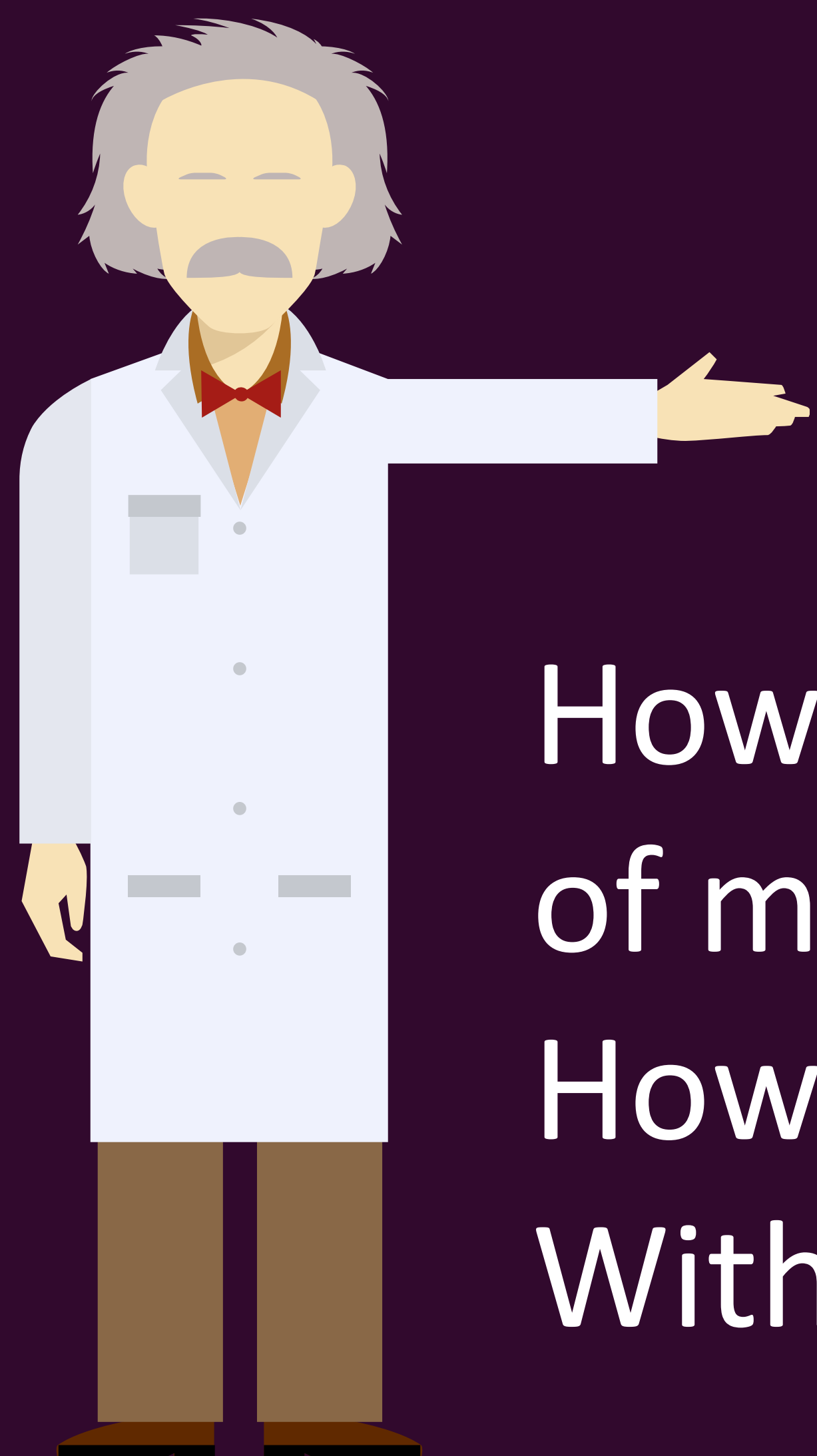
ExGAN: Adversarial Generation of Extreme Samples

How to generate extreme samples (right) using a dataset consisting of mostly normal samples (left)?
How to provide control over the extremeness of generated samples?
Without making assumptions about how extremeness is defined?
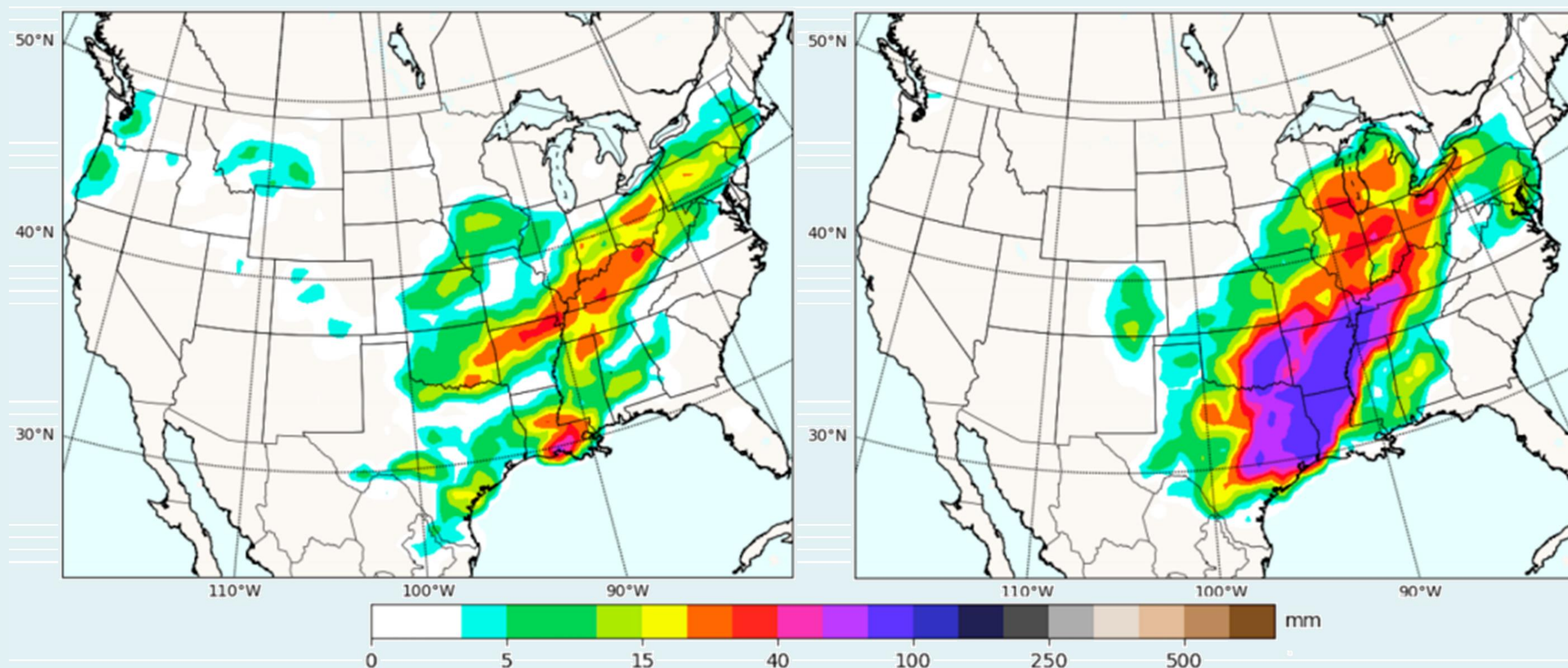
For a spatial rainfall dataset, let the total rainfall be a representative of the extremeness. Then, using this dataset how do you generate mild floods? severe floods? Noah's Flood? Are the generated samples *realistic?* What does it mean to be realistic for something that you have not seen?

2009.08454
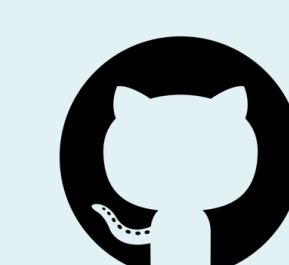
Stream-AD/ExGAN

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