A Diffusion Model for Event Skeleton Generation

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Event Skeleton Generation

Task definition: From a set of event instance graphs to generate an event schema graph.

From special to general, e.g.,

the Kabul ambulance bombing → Car bombing

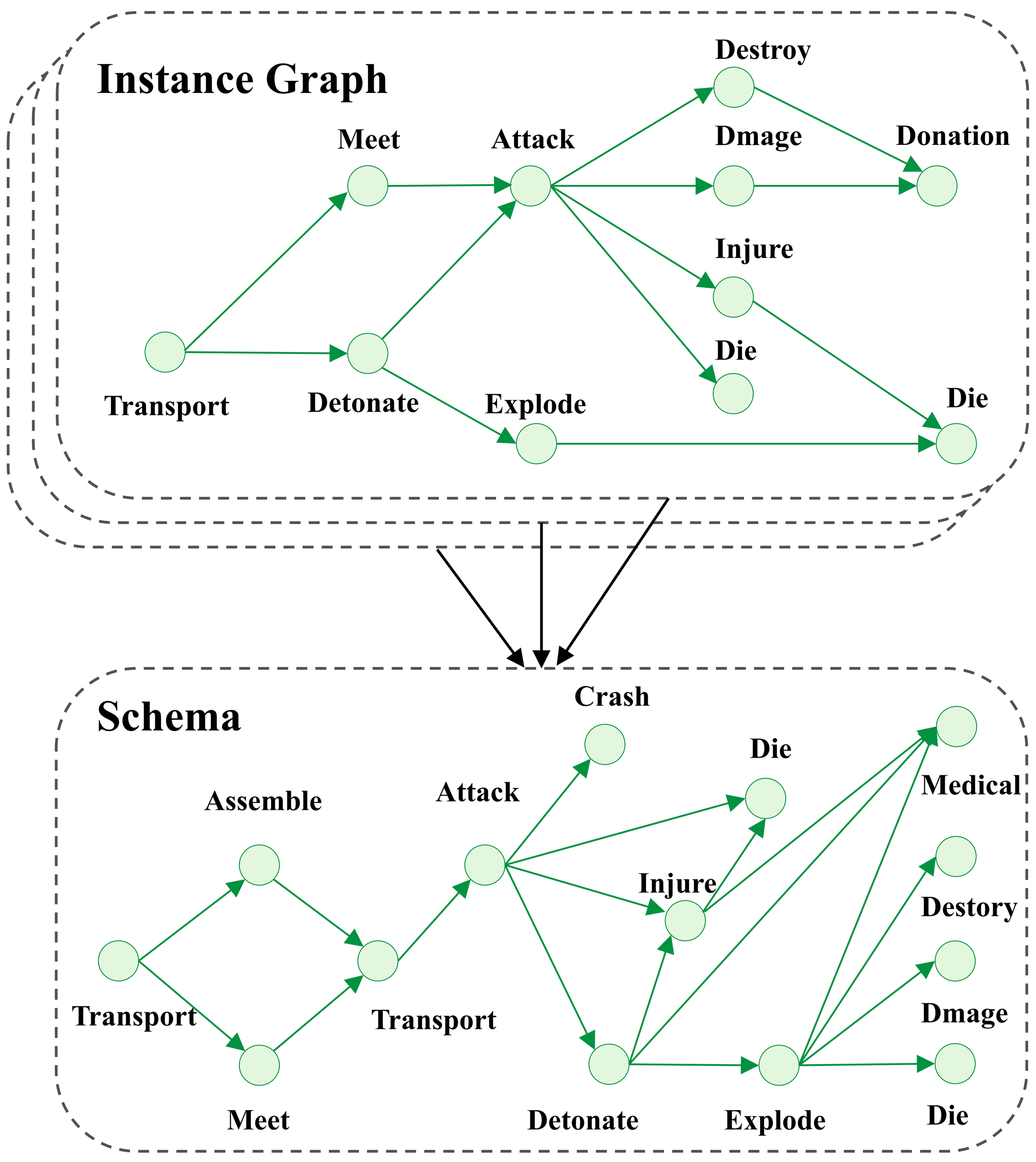
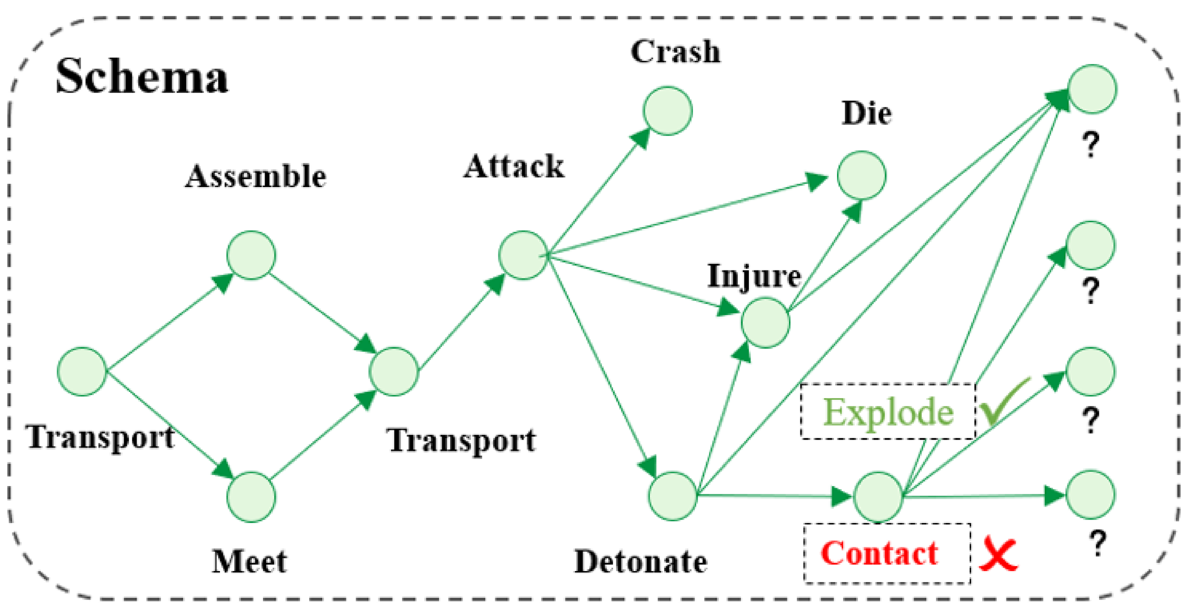


Figure 1. An illustrated example demonstrates the utilization of multiple instance graphs extracted from news articles depicting complex events to generate an event schema skeleton graph for the complex event type *Car bombing*. The presented instance graph represents the complex event known as the *Kabul ambulance bombing*. A circle symbolizes an atomic event.

Pitfalls of Autoregressive Graph Generation Model

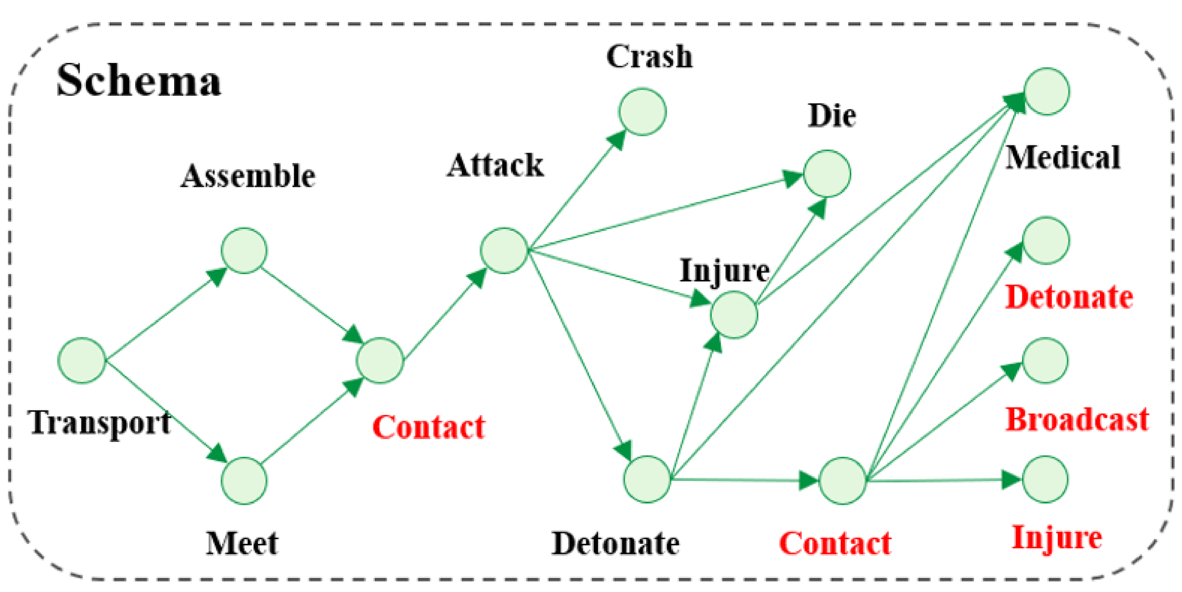
Autoregressive Graph Generation Model



Fair to predict next events when an error event has been generated

1. Lack of robustness
2. Unable to correct errors

Diffusion Graph Generation Model



1. More robustness
2. Ability to consistently correct errors in the schema

Method

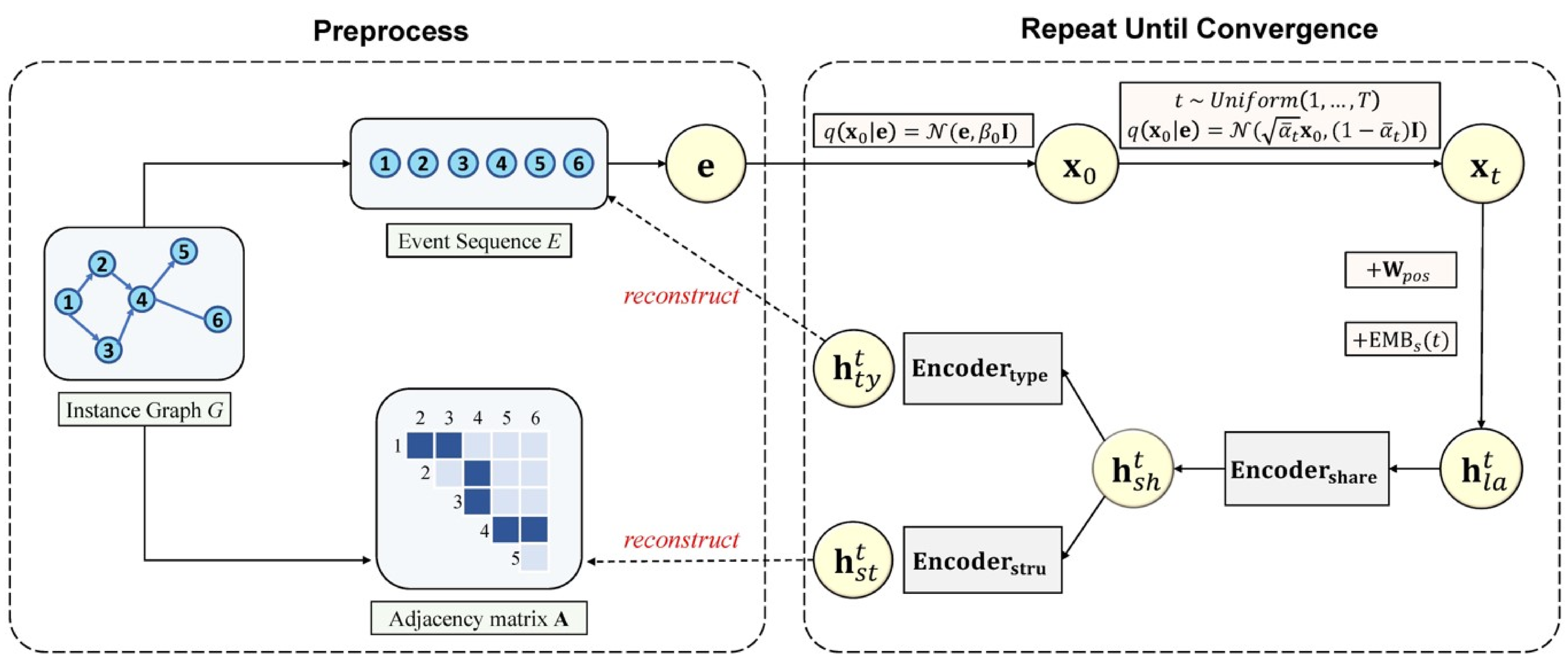
We propose **Diffusion Event Graph Model (DEGM)** to address the error accumulation problem. Our method includes

1. denoising training to improve robustness
2. iterative refinement on latent variables to correct errors

Denoising Training

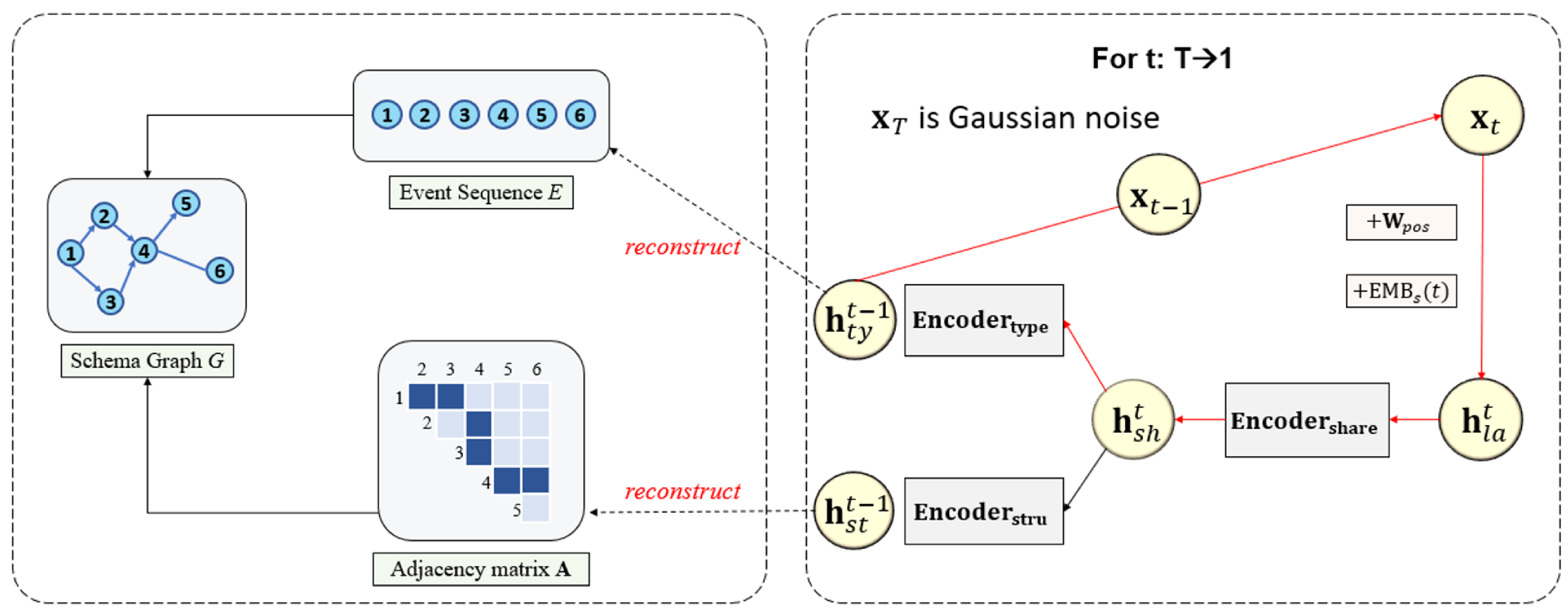
Our optimization objectives are

1. Event Sequence Reconstruction
2. Graph Structure Reconstruction



Schema Generation

Error correction is guaranteed via **iterative refinement** on the latent representation $\mathbf{x}_t$.



Experiments

Our generated schema gains 5% to 27% (F1 values) improvement compared with the best baseline DoubleGAE.

Datasets	Methods	Event type match (F1)	Event seq match (F1) $l=2$	Event seq match (F1) $l=3$
General-IED	TEGM	0.638	0.181	0.065
	FBS	0.617	0.149	0.064
	DoubleGAE	0.697	0.273	0.128
	Ours avg	$0.726_{\pm 0.018}$	$0.361_{\pm 0.020}$	$0.137_{\pm 0.009}$
	Ours	$0.754_{\pm 0.008}$	$0.413_{\pm 0.010}$	$0.153_{\pm 0.016}$
Car-IED	TEGM	0.588	0.162	0.044
	FBS	0.542	0.126	0.038
	DoubleGAE	0.674	0.259	0.081
	Ours avg	$0.754_{\pm 0.008}$	$0.413_{\pm 0.010}$	$0.153_{\pm 0.016}$
	Ours	$0.795_{\pm 0.002}$	$0.483_{\pm 0.030}$	$0.357_{\pm 0.063}$
Suicide-IED	TEGM	0.609	0.174	0.048
	FBS	0.642	0.164	0.036
	DoubleGAE	0.709	0.290	0.095
	Ours avg	$0.744_{\pm 0.009}$	$0.464_{\pm 0.015}$	$0.195_{\pm 0.052}$
	Ours	$0.775_{\pm 0.005}$	$0.534_{\pm 0.011}$	$0.330_{\pm 0.033}$