Studies	Research Objectives	Output Formats	Identify Entity	Identify Relation	Context of Relation	Methods
AttacKG [1]	Extract attack behavior graph & identify attack techniques	Attack Behavior Graphs	V	V		Entity Recognition, Graph Alignment
TTPDrill [2]	Learn attack pattern (TTPs)	STIX Objects	V		V	Ontology TF-IDF, Dependency Parser
LADDER [3]	Extract attack patterns	Knowledge Graph Triplet	V	V	△	BERT, TuckER
EXTRATOR [4]	Extract attack behaviors	Attack Behavior Graphs	V	V	△	ER, Semantic Role Labeling
Our Research	Extract attack activities	OP_{en} pair	V	V	V	Dependency Parser, BERT embedding