Graph Reinforcement Learning for Improving Smart Grid Services

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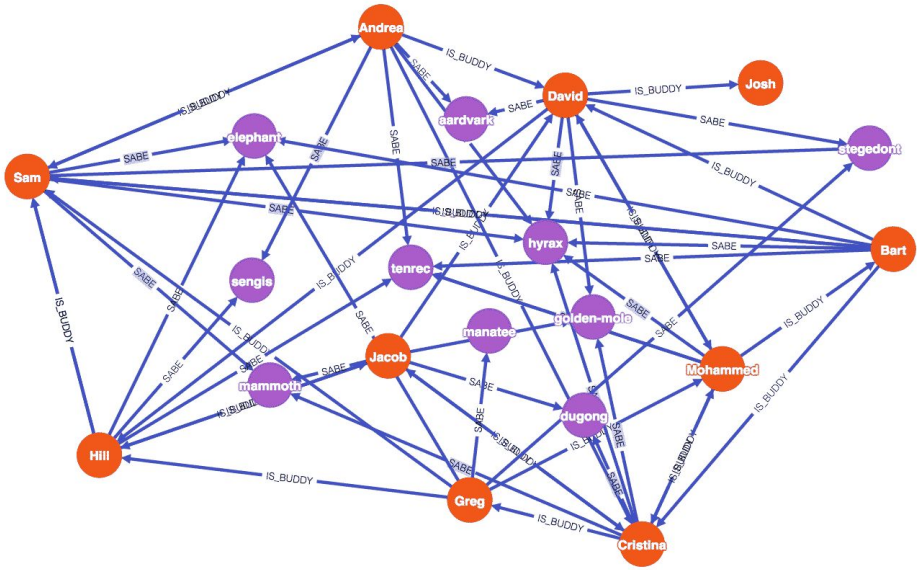
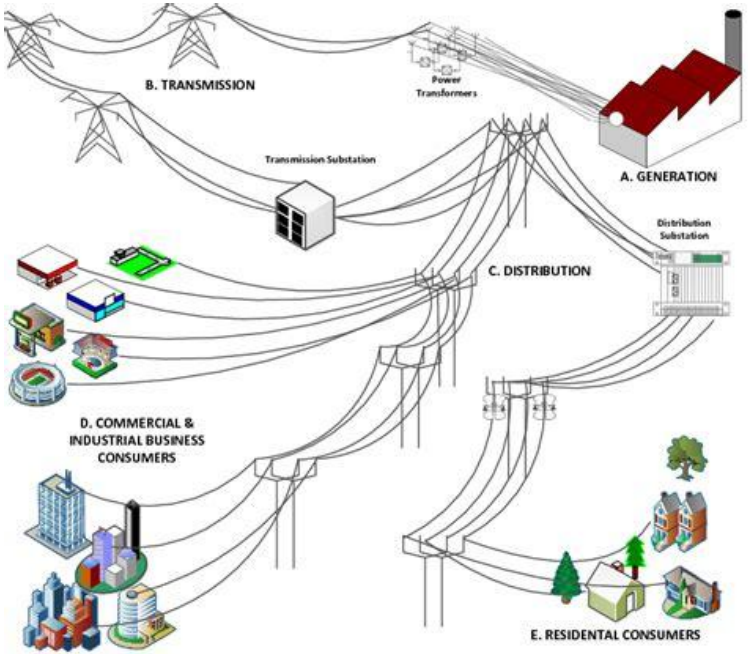
Outline

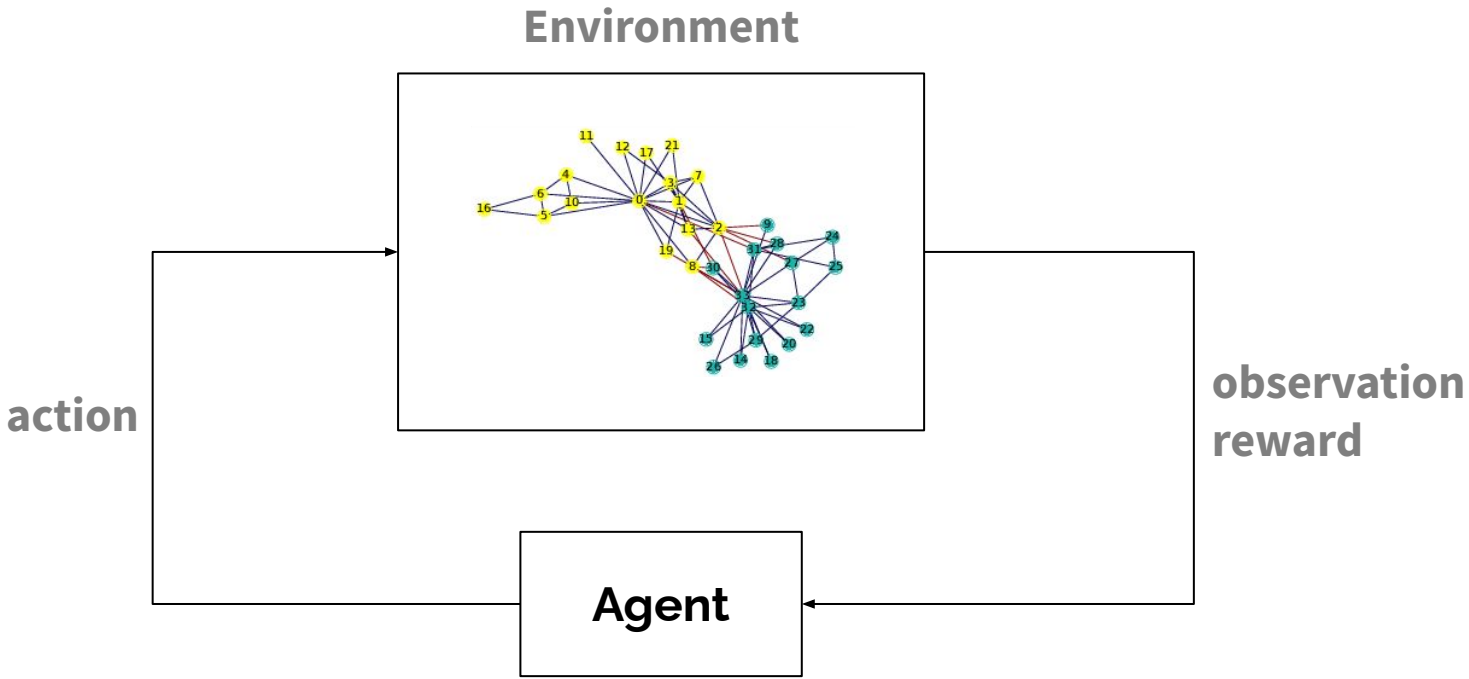
- Context
- Problem Formulation
- Objectives
- Literature Review
- Solution - Architecture
- Solution - Methodology
- Solution Validation
- Work Plan
- Impact & Contributions

Context


Andrea
David
Josh
aardvark
elephant
stegedont
Sam
Bart
hyrax
tenrec
sengis
golden-mole
manatee
Jacob
Mohammed
mammoth
dugong
Hill
Greg
Cristina
IS_BUDDY
SABE


B. TRANSMISSION
Power Transformers
Transmission Substation
A. GENERATION
Distribution Substation
C. DISTRIBUTION
D. COMMERCIAL & INDUSTRIAL BUSINESS CONSUMERS
E. RESIDENTAL CONSUMERS

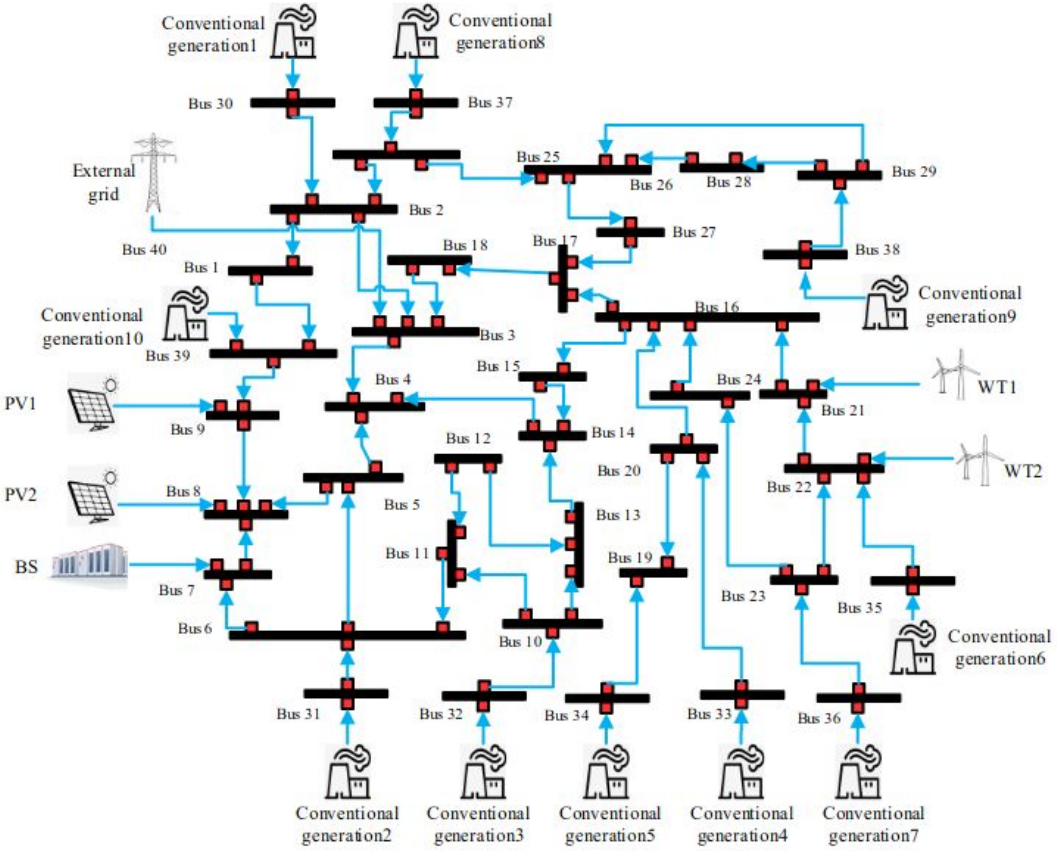
Problem Formulation - GRL



GRL Question

How can we effectively learn how to extract efficient graph representations to make better sequential decisions?

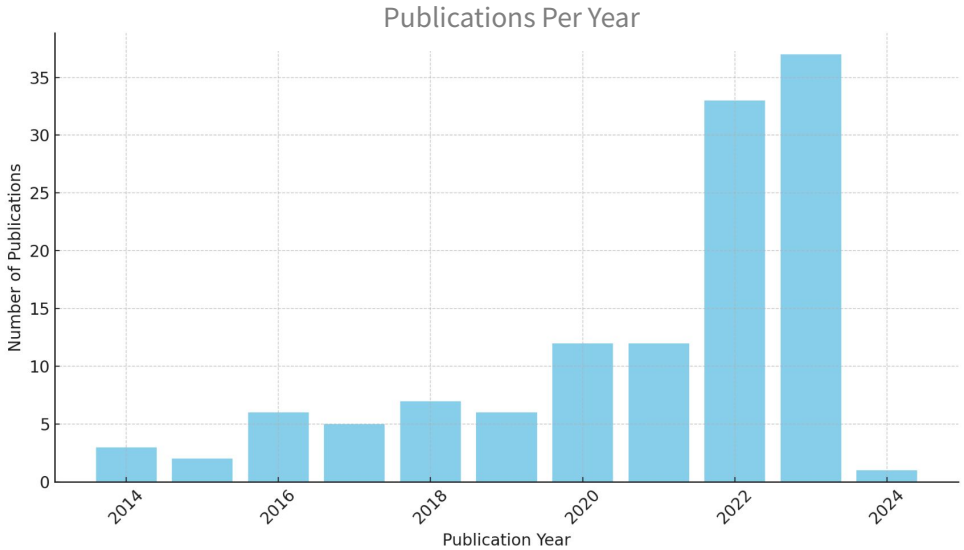
Problem Formulation - DED



Objectives

- Study and Analysis GRL approaches and strategies
- Implement different combinations of algorithms and approaches
- Solve Dynamic Economic Dispatch Problem with GRL
- Analyse and compare results
- Propose a model with concrete improvements on previous approaches
- (Opt.) Approach other problems in the context of Smart Grid Technologies

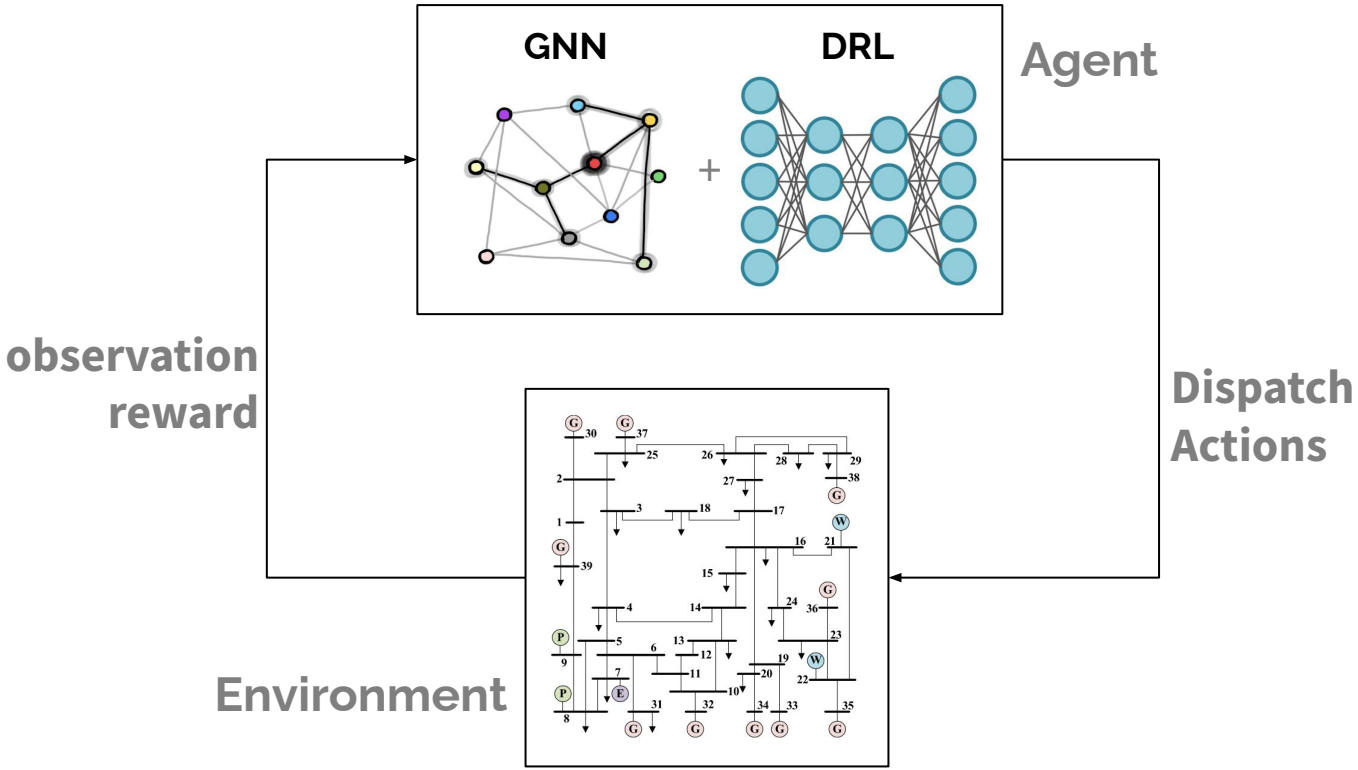
Literature Review



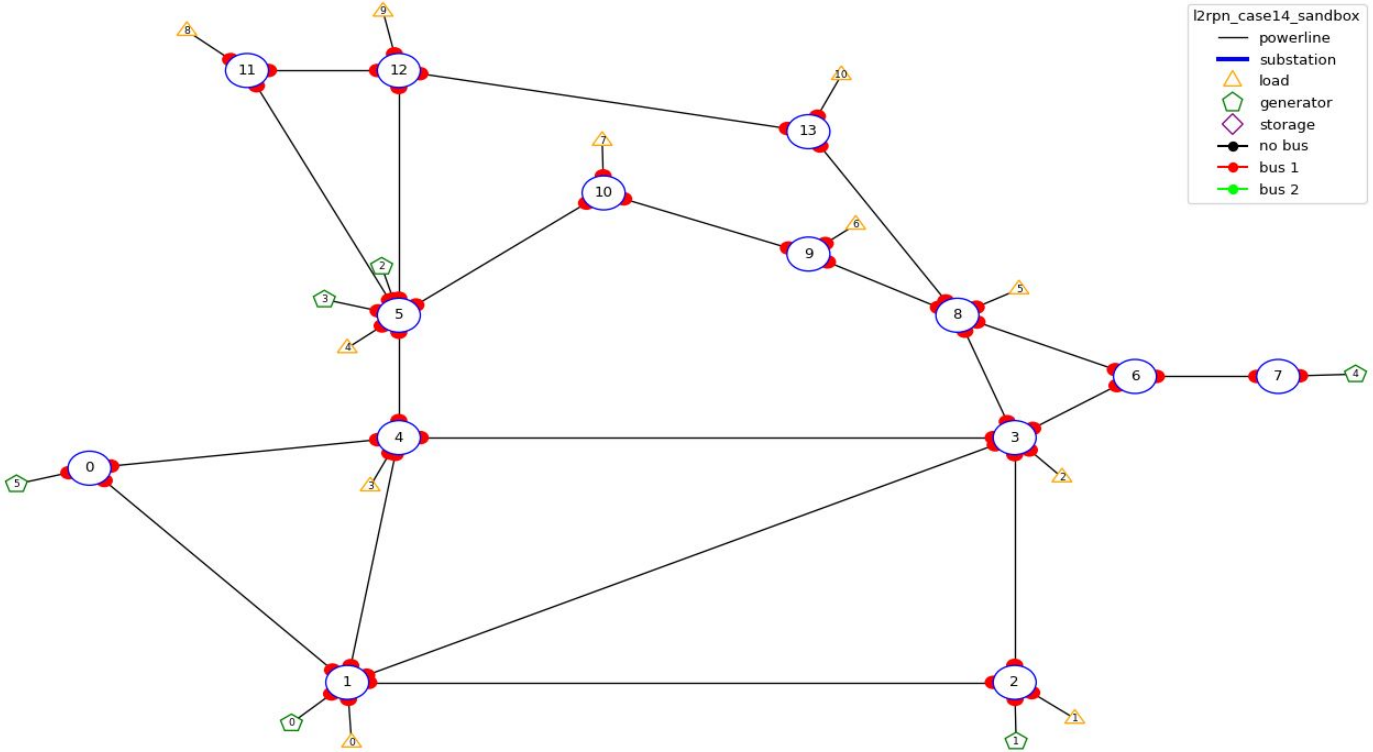
Literature Review - Key Takeways

- Sparse Literature
  - Some Academics consider a more general definition of GRL techniques
- Mostly articles proposing GRL Models within specific application domains
  - A small number of papers addressing GRL as its own standalone research area
- Reduced number of Open Source and well documented Projects
  - There is a need for well reported works around the topic

Proposed Solution - Architecture



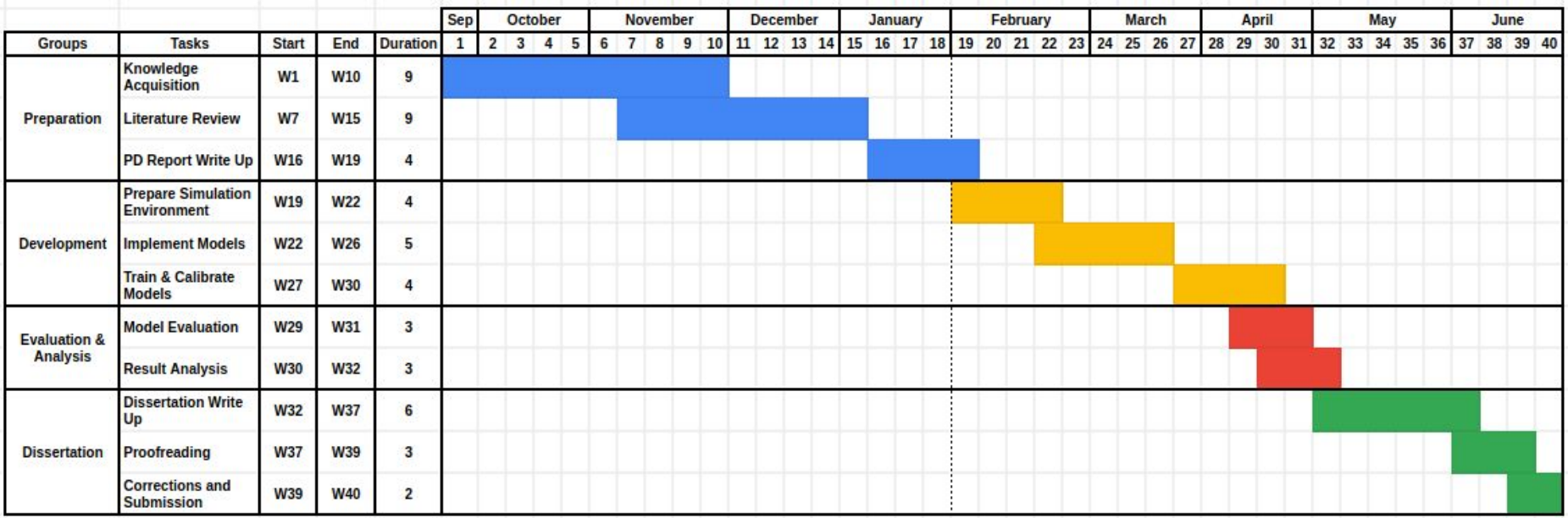
Proposed Solution - Methodology



Solution Validation

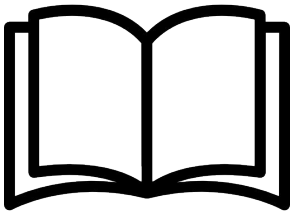
- Training Convergence
- Computational Efficiency
- Daily Operating Costs
- Scalability and Robustness
- Compare with pure DRL approach and other approaches

Work Plan



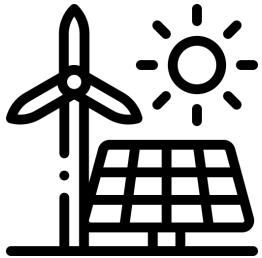
Groups	Tasks	Start	End	Duration
Preparation	Knowledge Acquisition	W1	W10	9
	Literature Review	W7	W15	9
	PD Report Write Up	W16	W19	4
Development	Prepare Simulation Environment	W19	W22	4
	Implement Models	W22	W26	5
	Train & Calibrate Models	W27	W30	4
Evaluation & Analysis	Model Evaluation	W29	W31	3
	Result Analysis	W30	W32	3
Dissertation	Dissertation Write Up	W32	W37	6
	Proofreading	W37	W39	3
	Corrections and Submission	W39	W40	2

Impact & Expected Contributions



A systematic study of GRL approaches

Concrete improvements in GRL techniques



A solution for Dynamic Economic Dispatch with GRL algorithms

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