Meeting #1

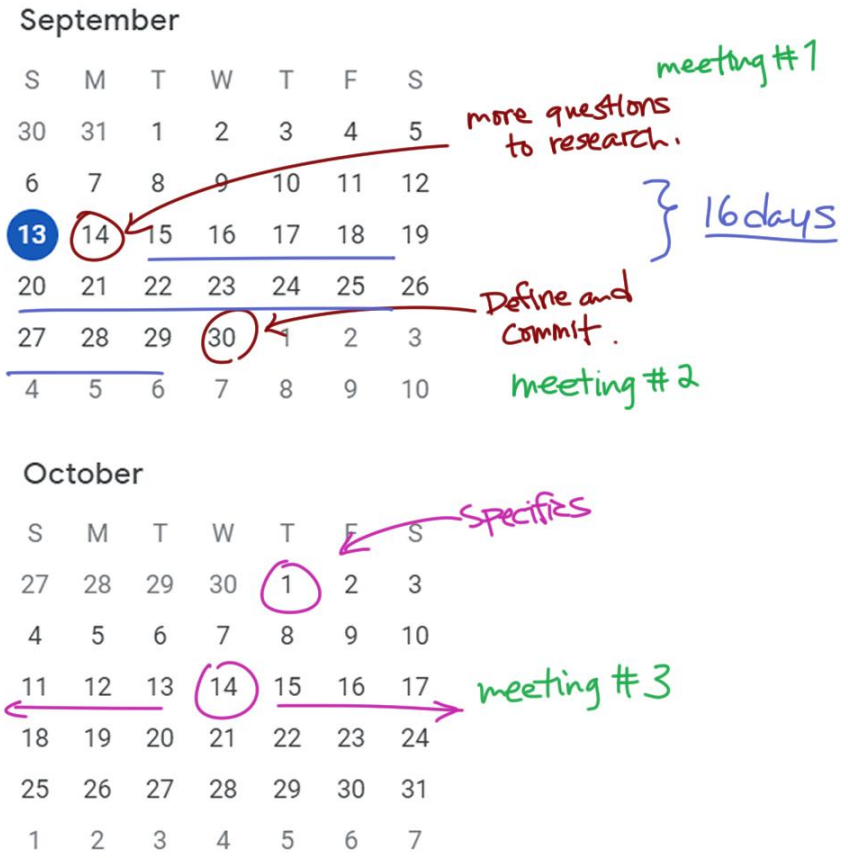
kense, for the thesis

Overview

- Projected timeline is six months.
- Currently: Reading the papers in the field.
- Next goal: Define and commit to a research problem.

Timeline- 2 Months

- Scouting
  - Papers
- Define and Commit
- Research
  - Papers
  - Software
- Production

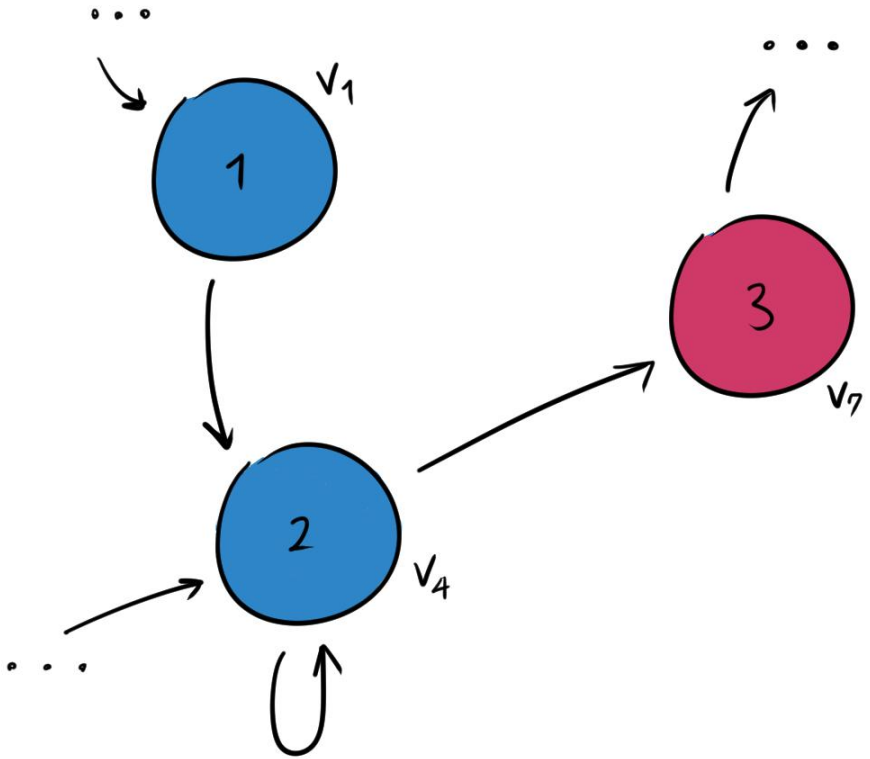


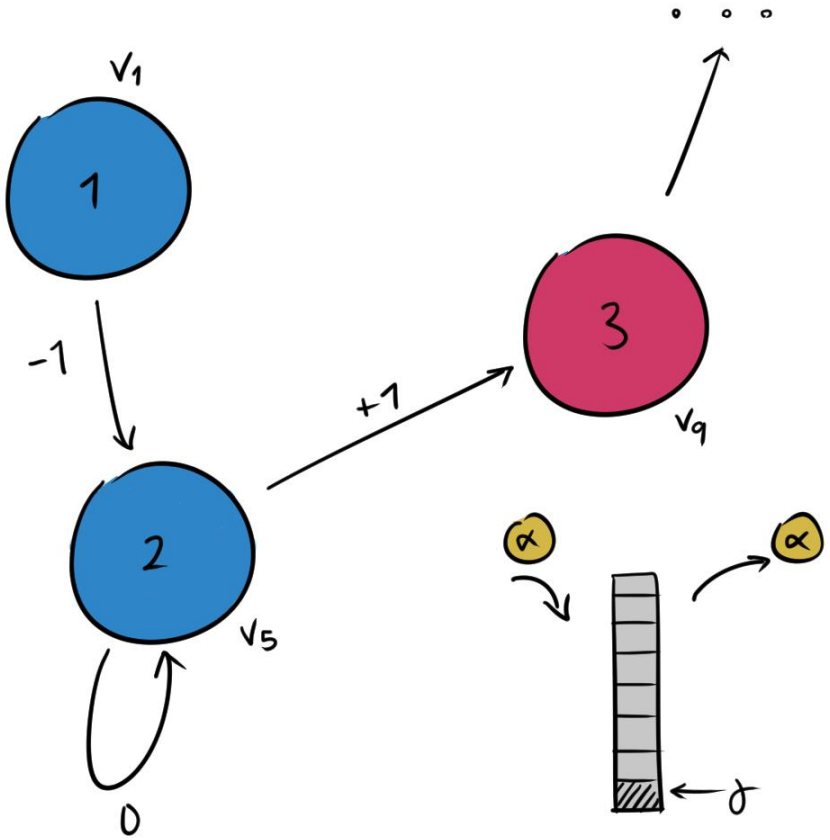
Previously...

- Graph equivalence using rewrite rules and neural model
- Basic notion of Language Exchange

Graph Games

- Graph representation
- Parity Games
- Energy Games (and Pushdown Automata)
- Decidability: liveness, reachability/termination, etc.


1
2
3
v_1
v_4
v_7

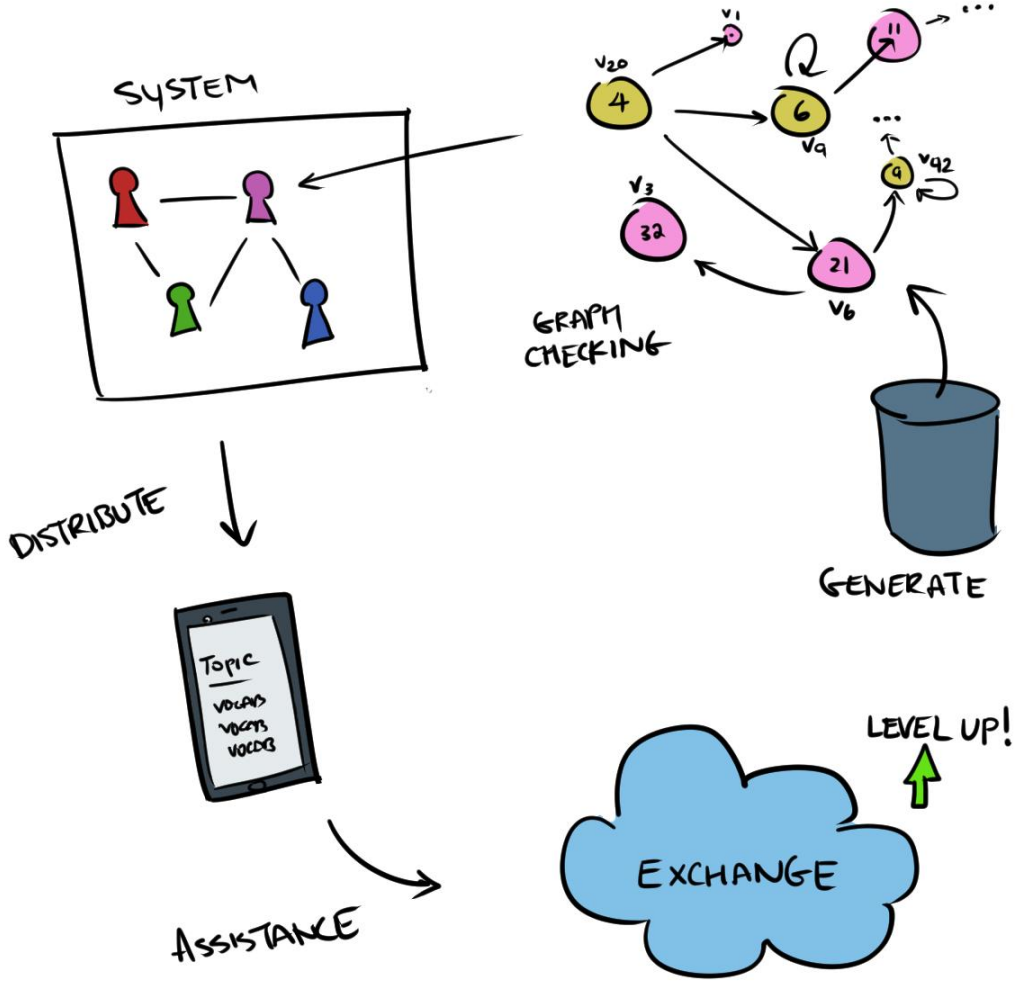

v1
1
-1
2
v5
0
+1
3
v9
α
α
γ

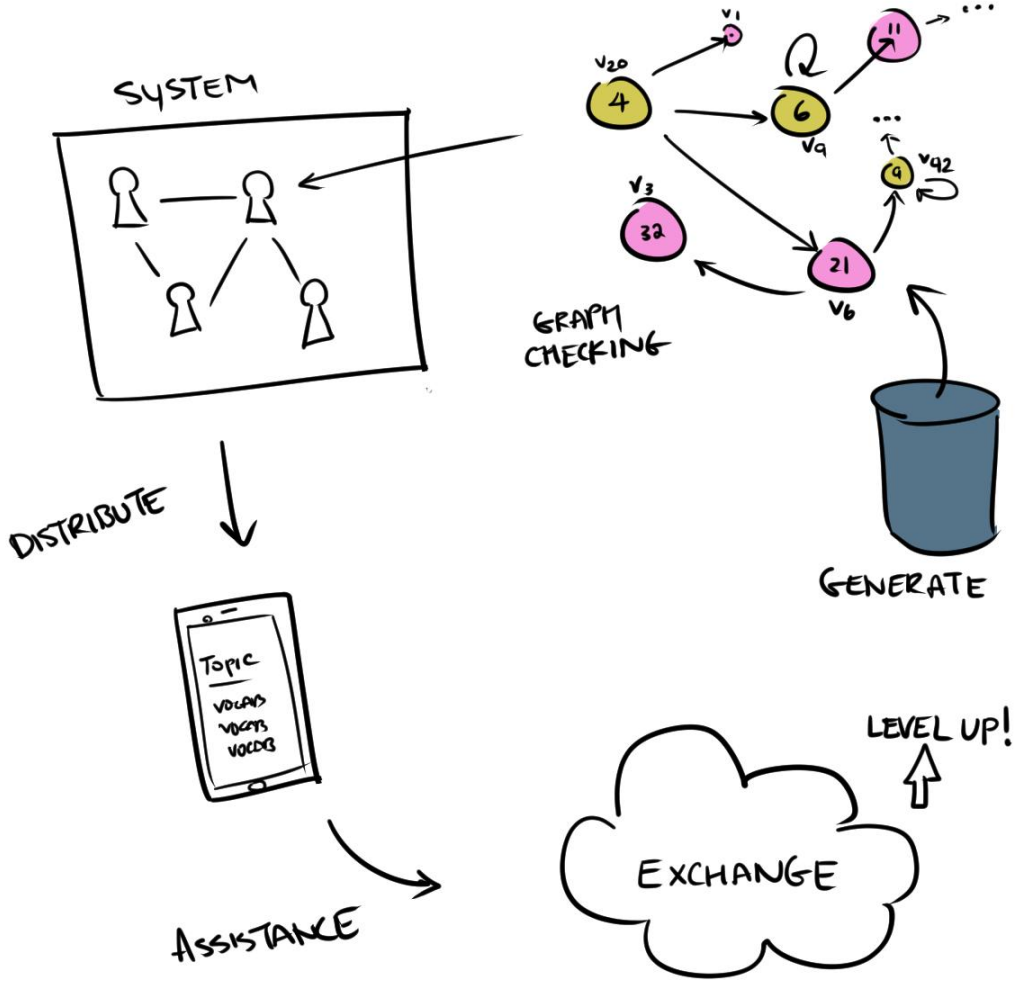
From Theory to Idea

- What would I personally want?
- What needs to be done to get that?
- Which of those things can actually be done?

Imagining the Product

- Input name, vocab-list, target/source language.
- System matches based on graphs it can generate.
- Treat the LE system as multiple graph-games.
- Improves players interaction through increasing confidence, reducing uncomfortability, and guaranteeing reachability.


SYSTEM
DISTRIBUTE
Topic
ASSISTANCE
EXCHANGE
LEVEL UP!
GRAPH CHECKING
GENERATE


SYSTEM
DISTRIBUTE
Topic
ASSISTANCE
EXCHANGE
LEVEL UP!
GENERATE
GRAPH CHECKING
v1
v20
4
6
v9
11
...
9
v42
v3
32
21
v6

Getting Started

- Describing LE as a system of vertices and edges
- Consider properties of a conversation

Describing Language Exchange

$LE = (V, U, T)$

Where V is a set of nodes, representing arbitrary states in a conversation, partitioned into V_0 and V_1 (Where $V_0, V_1 \in V$), set of nodes owned by respective players indicating their “turn” to advance the game. Note that V_0 and V_1 do not have to be fair.

Describing Language Exchange

$LE = (V, U, T)$

Where U is a set of actions, representing speech in a conversation.

Where T is a set of transitions (edges), representing the speech moving the conversation to the next state. $T \subseteq V \times U \times V$

Formally defined as transitioning state s to s' through an action u, as (s, u, s'), where $u \in U$ and $s, s' \in V$

Describing Speech

$LE = (V, U, T, \boldsymbol{W}, \boldsymbol{C})$

From the set U, we can categorize any $u_i \in U$ as a set of words with some intention. Formally represented as a tuple $u_i = (w, c)$ where w is a set of words from the language, $w_i \in W$, and c is an item from the set of intentions, $c_i \in C$.

The set of intentions C, we can borrow from familiar descriptions of Speech Acts (i.e: check.reception, give.recall, accept.coordination, etc)

Thinking about LE as a system

- Gives us a system of graphs.
- Graphs can be checked for properties.
- Graphs can be rewritten to produce equivalent graphs. (Maybe a place to get a research question going)

Next Goal: Define and Commit

Questions to research:

- Different representations of graph games
- Applications of graph representations

Commit to an area:

- Model property checking? Model Generation?
- Something else?