Dialog Driven Wayfinding

MTech-Thesis

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Dialog Driven Wayfinding

Goal

Cross-lingual wayfinding service compatible and accessible to even low-end feature phones.

Challenge

- To build a dialog driven wayfinding tool specifically targeting maps and people of India.
- To resolve contexts of the user.
- To help deal with “Reorientation” of the lost.

Wayfinding Properties

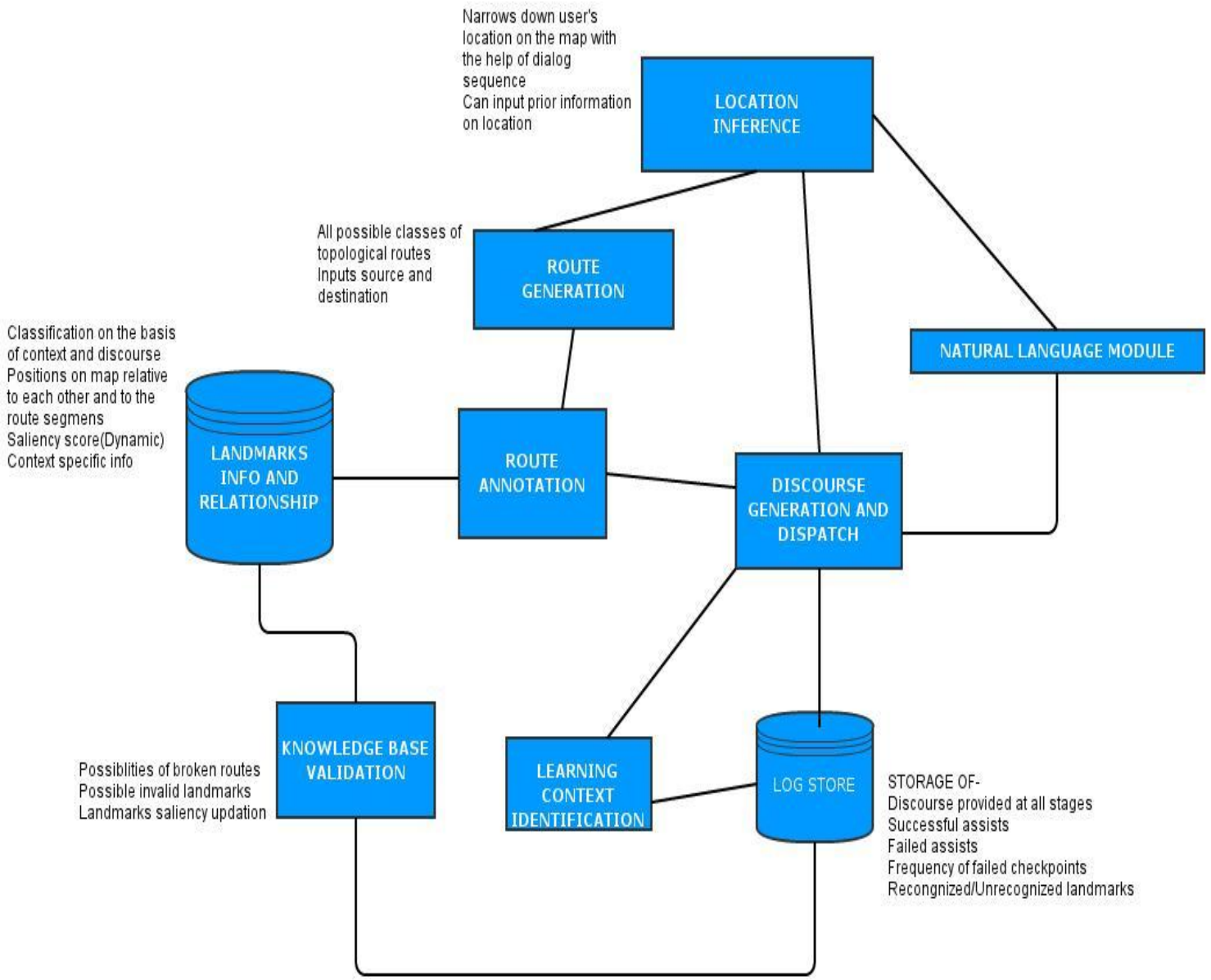
DOs

- Use of landmarks to
  - identify turns
  - confirm orientations
- Description of route passage

DON'Ts

- Use of distance metrics or cardinal directions
- Naive turn by turn instructions (“turn left”, “go straight”)

System Architecture



Route Generation

- For two given points, compute a sequence of edges on the shortest path
- Cost features
  - Distance (cost=edge length)
  - Number of turns (cost=number of end-connections)
- Edge features
  - Id, name, length, type, geometry
  - no. of end-connections
  - absolute angles {(startpoint, startpoint+1), (endpoint, endpoint-1)}

Route Annotation via Landmarks Info

- Annotating each route with sufficient information for discourse generation
  - Static time complexity

1. Edge relation

Edge	Academic Area Buildings	Hostel Buildings	Playgrounds	Parks	P.O.I

- varying neighborhood threshholds

Route Annotation via Landmarks Info

2. Landmark Saliency

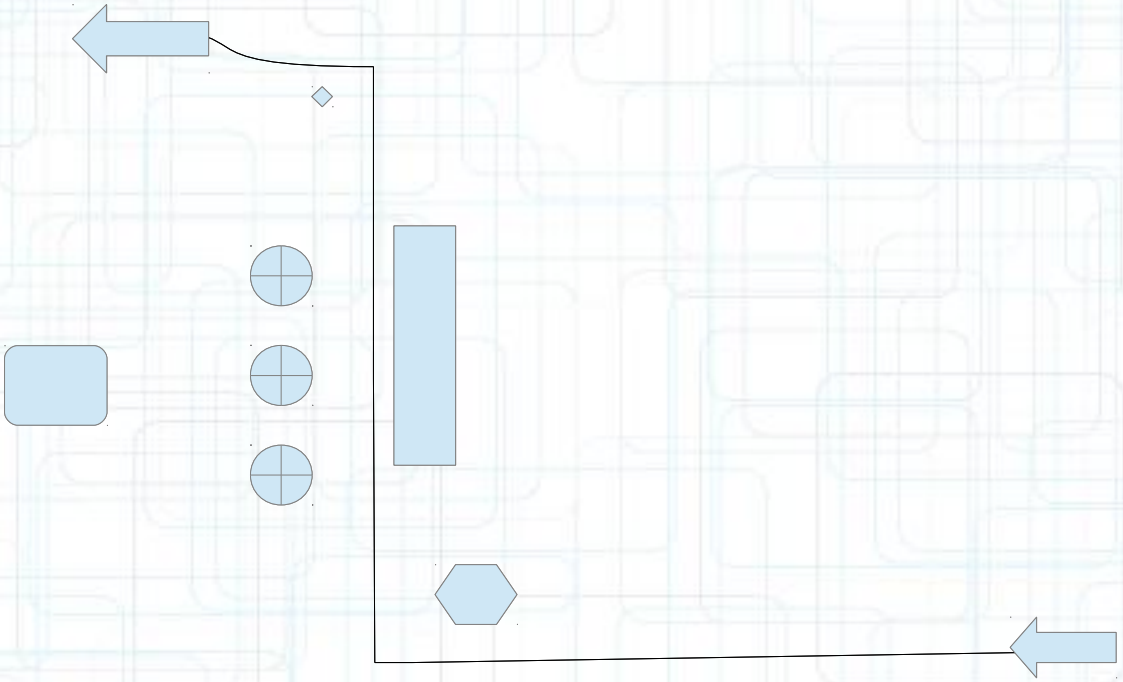
Landmark	Category	Name	Geometry	Visual	Semantic

Each category can take values based on the layering of the map
e.g. academic area, hostel Building

Visual feature attributes may not be always available

Semantic feature index may be contributed by popularity of the landmark
e.g. Retrieved from google's prominence index, web mining, crowd-sourcing or inherent in the map

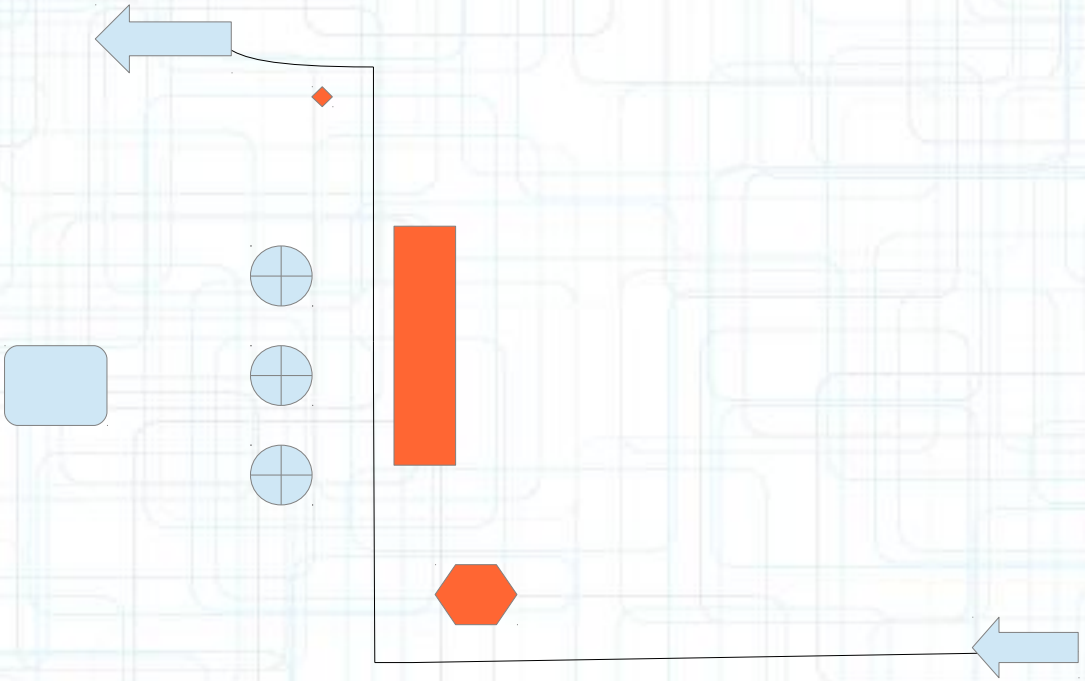
Route Annotation via Landmarks Info



Annotate the route with all possible
salient landmarks present in the region
Store the annotations in the form of
a triplet (edge, landmark, pairedRelation)

pairedRelations={Pass through, Pass with @left, Pass with @right,
Turn left @, Turn right@, ... }

Route Annotation via Landmarks Info



Compute the saliency scores for each landmark
Select the salient landmarks
Pass the corresponding triplets to the to the discourse module

Design Ahead

- **Discourse Generator**

Cross-lingual discourse generation platform is set
Given the triplet (edge, landmark,pairedRelation), generate a discourse

- **Context Identification**

On the basis of incremental dialog response,
resolve the context of the user

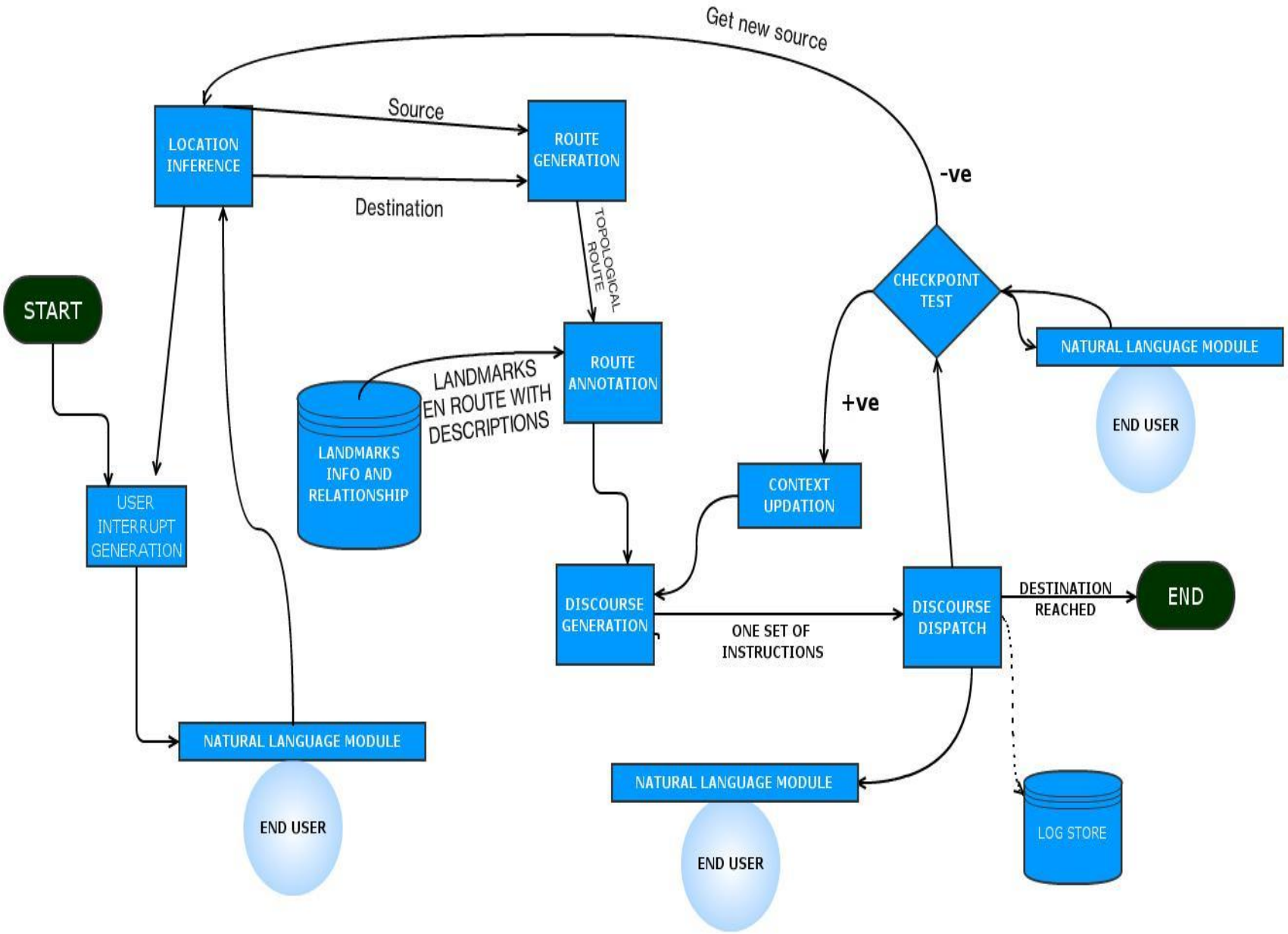
- **Log Store**

Setting up the data requirements for performance enhancements (like dialog,response, context)
Incorporating the log store

- **Reorientation Algorithm**

Given the last waypoint checked, retain the location of disoriented user.

DIALOG DRIVEN WAYFINDFINDING
- FLOWCHART

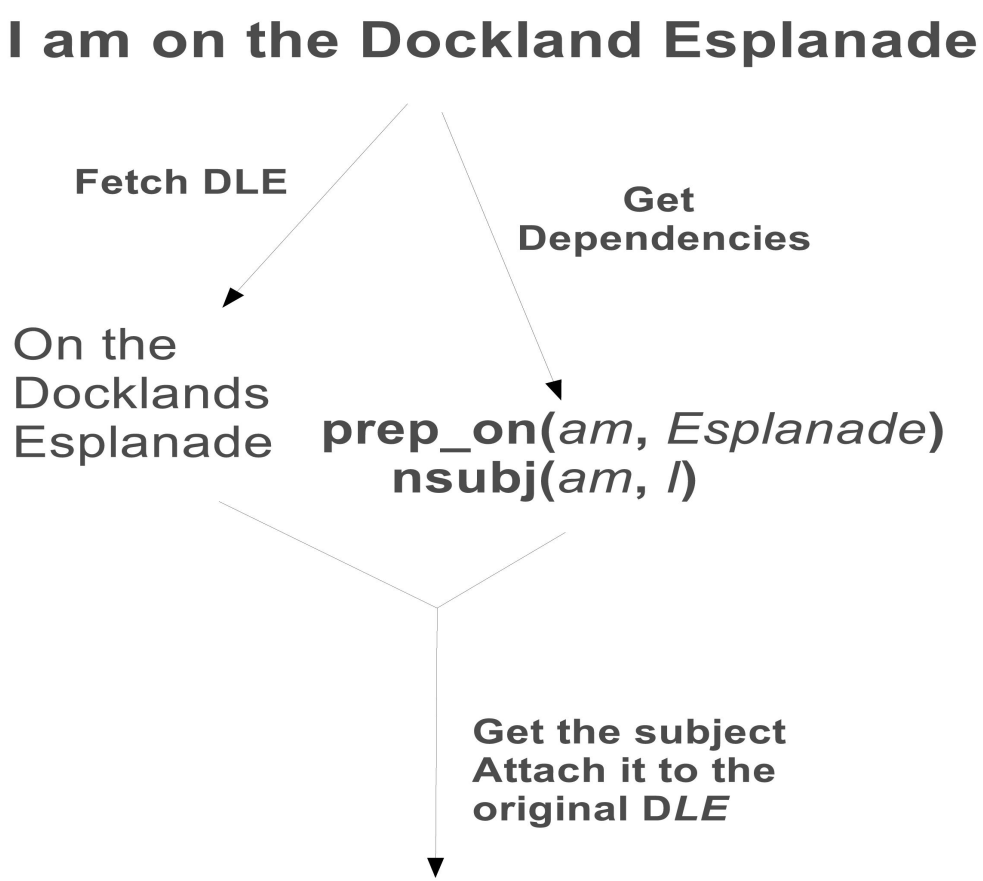


Location Inference

- Automated extraction of triplets from natural language text to represent spatial relationships e.g. *house in alley*
- To use meta-information in the text to produce informative triplets which are convenient enough for computational interpretations
- Exploits a parser which identifies prepositional clauses(DLE) for a place name.

Corpuses
1] 1858 place descriptions from a mobile game
2] A set of 4 descriptions of University of Melbourne

Location Inference



<I on Docklands Esplanade>