A Visual Analytics Framework for Emergency Room Clinical Encounters

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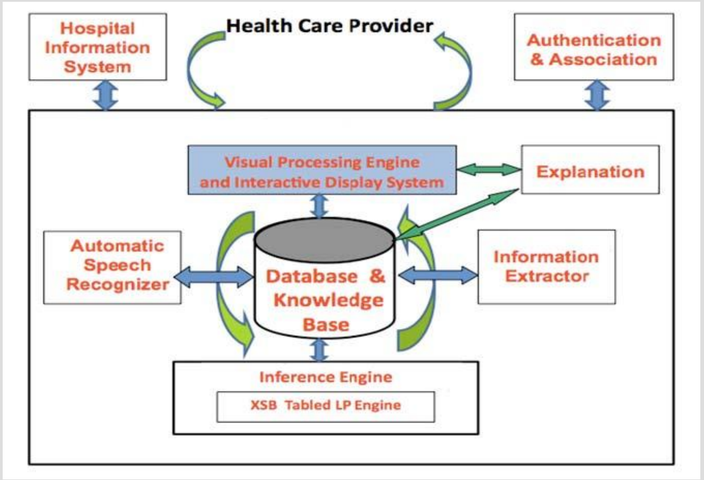
System Overview



The 5-W Scheme

WHO: the patient and the history

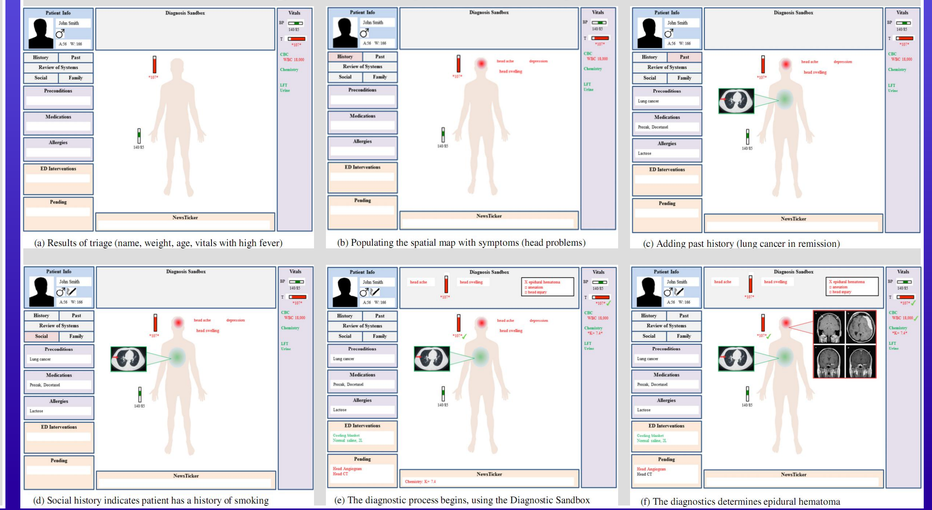
WHAT: the various information categories and items: Symptoms, Tests and Results, Diagnosis, Treatments and Medications, etc.

WHERE: locations (when appropriate) of the WHAT on the human body

WHEN: time and duration of the WHAT

WHY: cause and effect of the various WHAT constituents

Visualizing Who, What, and Where

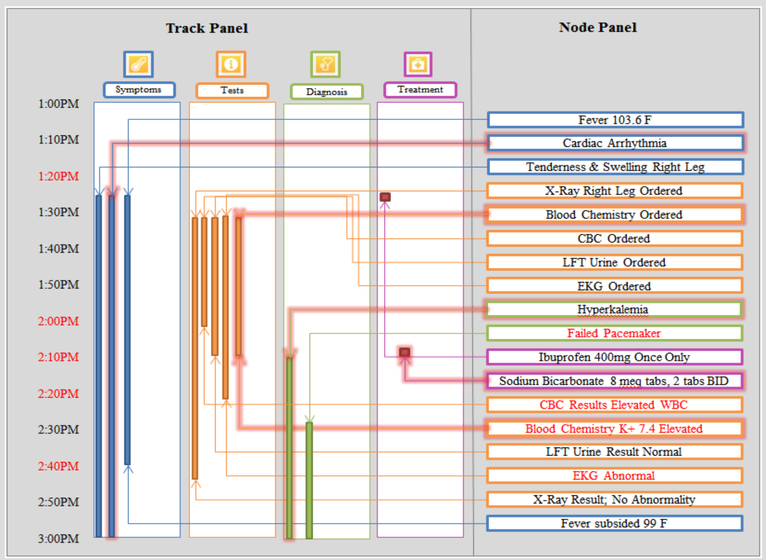


(a) Results of triage (name, weight, age, vitals with high fever)
(b) Populating the spatial map with symptoms (head problems)
(c) Adding past history (lung cancer in remission)
(d) Social history indicates patient has a history of smoking
(e) The diagnostic process begins, using the Diagnostic Sandbox
(f) The diagnostics determines epidural hematoma

Visualizing When

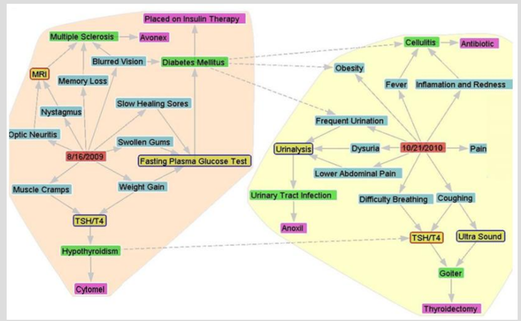
Each entry is classified into one of four tracks

- Symptoms: Blue;
- Tests: Orange
- Diagnosis: Green;
- Treatments: Purple

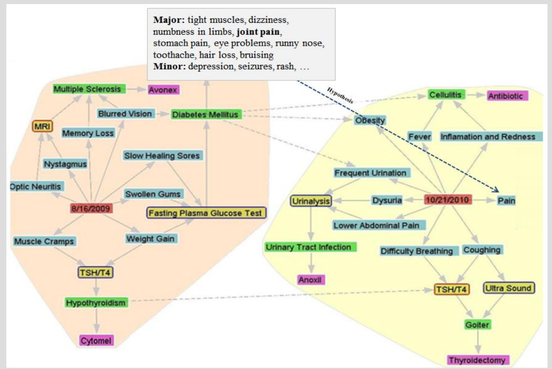


Visualizing Why

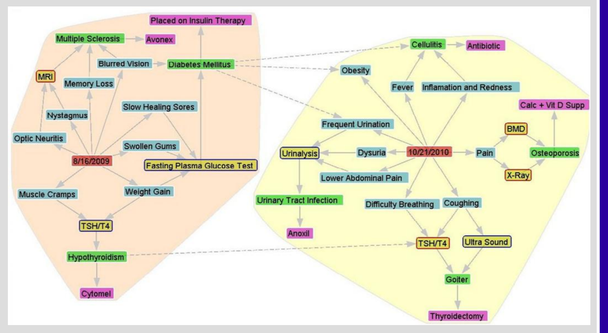
- There is a directed edge between two nodes n1 and n2 if n1 causes n2.
- Symptom->Test/Data->Diagnosis->Treatment/Medication
- All Symptoms of one visit have incoming edges from a node representing the visit.
- A modified version of the force-directed layout
- A convex hull is drawn for each incident, showing a clearer delineation between different visits.
- Explain the node when it's tapped.



Causal graph for two ER visits. Previous diagnosis explains current symptoms, as shown in dashed lines.



Show a list of side effects of a medication that might cause the symptom of current visit, and build hypothesis.



Disprove previous hypothesis by tests, and make new diagnosis based on new tests.

We thank *Prefuse* for providing the visualization toolkit.