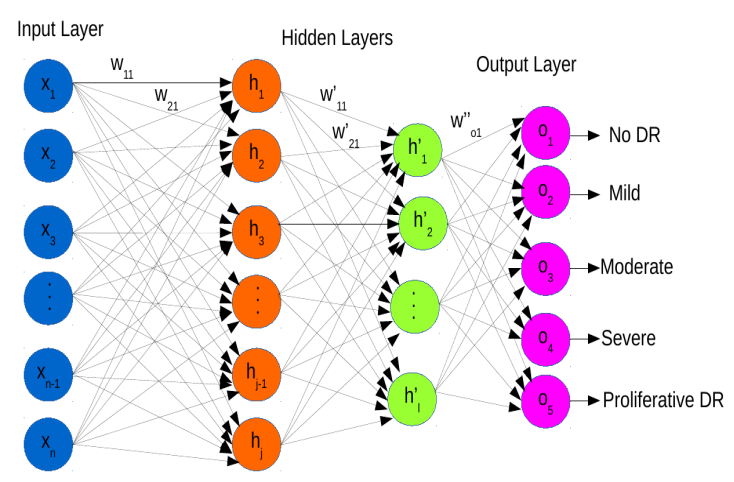
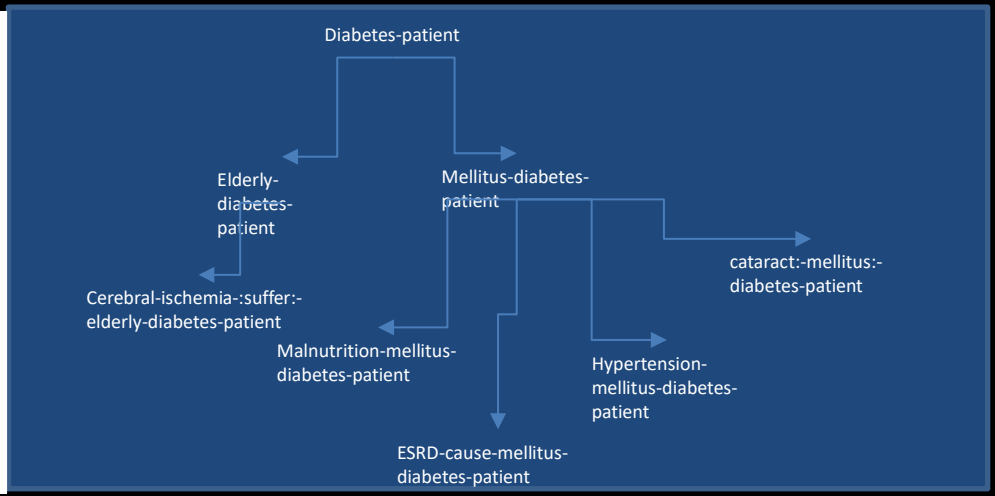
NeuroSymbolic Learning Ontologies: Track C





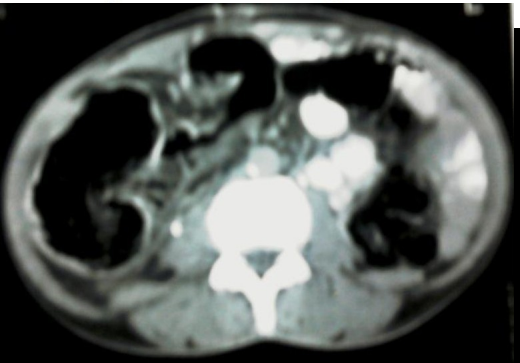
Ram D. Sriram, Douglas Miles, Cassiopeia Miles

2021-02-24

Case One A 55-year male was admitted in our hospital with a history of abdominal pain, distension, absolute constipation and vomiting for the last 6-8 days. He had past history of weakness, anorexia, low grade fever, and episodes of pain in the right lower abdominal quadrant and had taken anti tubercular treatment for a period of 6 months after suspicion of abdominal tuberculosis outside our hospital. Abdominal examination revealed the features of acute intestinal obstruction with dilated bowel loops and visible peristalsis.

The previous investigations of the patient namely colonoscopy, CT scan and barium meal studies were reviewed and were not suggestive of Crohn's disease. Even colonic biopsies did not pointed towards CD. Contrast Enhanced Compute Tomography was only suggestive of dilated large bowel loops Figure 1. However, in view of acute intestinal obstruction, exploratory laparotomy was performed after routine investigations and abdominal plain X-rays and intrapoeratively multiple strictures were found at terminal ileum, caecum, ascending colon and a completely obstructing stricture at hepatic flexure of the colon. Right hemicolectomy was performed followed by ileostomy and distal mucus fistula.

Histopathological examination of the resected specimen showed prominent and enlarged lymphatic follicles, proliferation of muscularis mucosa and formation of fissures extending from mucosa to serosa along with gross edema. Marked infiltrates of inflammatory cells involving all the layers and surrounding the fissures were present. Diagnosis of Crohn's disease was made. Postoperative period was uneventful.



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3336915/

Neurons Vs Symbols

- Neural Networks
  - Good at tacit or implicit knowledge
  - Explaining reasoning is hard
  - Requires considerable computational power
- Symbolic Networks or Knowledge Networks
  - Good at explicit knowledge
  - Can encode commonsense knowledge
  - Generating knowledge networks (KNs) is not easy

What Does this Mean For Ontologies

- Generation of ontologies by NN learning techniques
- Using ontologies to develop better NN models
- Symbiosis of NNs and Ontologies (KNs)

Schedule for Track C

- February 24th, 2021
  - Luis Lamb, Universidade Federal do Rio Grande do Sul Porto Alegre RS, Brazil Topic: Neural-Symbolic AI: From Turing to Deep Learning
  - Pascal Hitzler, Kansas State University, Topic: Neural-Symbolic Integration and Ontologies
- April 7th, 2021
  - Henry Kautz, National Science Foundation, Topic: Research Directions in NeuroSymbolic Computing
  - Amit Sheth, University of South Carolina, Topic: Semantics of Black Box: Using Knowledge-Infused Learning to Make AI Systems more Interpretable and Explainable
- May 5th, 2021
  - Pavan Kapanipathi, IBM, Topic: Getting AI to Reason: Using Neuro-Symbolic AI for Knowledge-based Question Answering
  - Spencer Breiner, NIST, Topic: OKNs and NNs meet through Predictive Encoding

Titles are tentative