Abstract 1(September 9th, 2022)

A Family of Algorithms for Patient Similarity Based on Electronic Health Records

Speaker – Yank Liu

A new area of research called "patient similarity" has made it possible to analyze substantial amounts of patient-specific big data for healthcare. Its primary objective is to categorize or rank patients so that each cluster demonstrates a single, closely related patient trait. These traits include illnesses, drug use, dangers, dietary preferences, and moral concerns.

A significant source for data-based analysis of patient-centric, individualized perspective prognosis and decision-making has become available due to the quick adoption of Electronic Health Records (EHR) in hospitals and other government healthcare facilities. The speaker talked about the research based on drug-drug similarity that looks at patient-patient similarity.

The speaker's thesis contributes to the organization of an EHR as a vector of multidimensional components, each of which has a strict type in this context and can aggregate other parts. The actions of the type approach on each sub-component enable a semantic-based similarity evaluation of each component. The recommended EHR structure is adaptable and comprehensive.

The scoring functions that determine how similar two components are to one another are explicitly specified in terms of user and domain semantics. The degree of similarity between the records under study is determined using the weighted average of the component scores, with the weights based on user semantics. To ultimately show how functions behave, many examples are given. The results of the experiment are presented, and their advantages are assessed.

Abstract 2(September 9th, 2022)

Topology Discovery in Autonomic Networks

Speaker - Parsa Ghaderi

Network management entities need a fast-growing infrastructure, so to cope with that, they need intelligent ways to manage the network. IBM introduced the Autonomic system in the early 2000s. The speaker researched the autonomic network proposed by NMRG and ANIMA. The goal was to reduce human interference with network management, and also, the node in a network should know more about itself and its surroundings. This process is called topology discovery, collection, and processing neighboring information nodes across a network and distributing them.

The topology design model can be divided into two parts distributed topology and centralized topology model. Distributed topology is easily scalable, but multiple nodes need to be in sync with each other in a centralized approach; there is easy monitoring of nodes, but only one node is responsible for Autonomic nodes will serve as a network management entity that depends on the information they receive/send from/to their surroundings and their knowledge of themselves.

In network management, knowing the network's structure offers nodes a considerable advantage toward increasing autonomic. Knowing the topology can aid nodes with administration activities, including link failure recovery, routing, and imposing policy. Topology Discovery (TD) gathers information about each node's neighbors and disseminates the processed data among them. Topology Maintenance (TM) occurs after the topology map is generated during the TD procedure.

The TD and TM can be costly operations on the network since they entail collecting information from all nodes and dividing it between them. Aim to minimize bandwidth consumption by lowering the amount of exchanged messages for TD or TM purposes. Various techniques have been offered to increase the performance of TD and TM. TD techniques have been thoroughly studied, although not all the suggested solutions can be applied to autonomic networks.

In this thesis, I analyzed alternative approaches for TD and discuss their compatibility with the suggested autonomic network guidelines. The first solution states that a clustering method that allows the autonomic nodes to join clusters and limits the message passing to intra-cluster and inter-cluster communication between cluster heads. The second proposed approach states using the secure boot-strapping protocol (BRSKI) for autonomic nodes to generate the topology map of the autonomic network.

Abstract 3(November 14th, 2022)

Visual Dubbing Pipeline using Two-Pass Identity Transfer

Speaker – Dhyey Devendrakumar Patel

Dubbing is adding to or changing an existing video or movie's soundtrack. The translation must sound exactly like the actor's natural speech. As they rely on the speaker's mouth, dubbing is crucial for those with hearing loss. First, the proposed approach should apply to small datasets. Second, the mouth expression should be altered; all other facial expressions should remain unchanged. Third, the final processed video should have the same quality as the original.

Either audio-based dubbing or expression-based dubbing can be used for visual dubbing. These techniques use AI to construct a false actor's face that tries to match the lip sync. Still, they have various issues with the final product's quality, such as blurry video, a face whose skin tone doesn't match the actor in the original video, or temporal jitter. These issues arise as a result of comprehensive training. The three key components of the speaker's pipeline are identity transfer, pose alignment, and the video reassembly stage. The models are adjusted with the performers' faces at each stage. The video is parametrized in six steps: pose, identity, mouth expression, facial expression, and background. and resolution(high or low).

An identity transfer network with an additional style block that, with pre-training, may be able to decouple face components, particularly recognition and expression, as well as one that operates with brief video snippets like TV commercials. The pipeline also features newly developed stages for actor-specific super-resolution to preserve minute facial characteristics, temporal smoothing of the actor-reenacted face, and a second pass via the identity transfer network to verify actor identification. The actor's mouth area in the source video frame must be altered as little as possible to accomplish lip-sync localization.

The speaker developed a pipeline since it is challenging to use end-to-end trained networks to separate the numerous visual dubbing components. User research that was concentrated on the whole dubbing experience is used to support and confirm the findings. The problem with this method is the artifact of the double chin. To replace the entire face at once, a promising solution to this problem is to synthesize the actor's full face while only changing the actor's mouth expression. It was alternately warping the excess chin such that the warping stretch was distributed evenly throughout the image. To give users explicit control over the expression's level of intensity, researchers may eventually increase the network's expression control channels or incorporate expression loss.