Abstract Submitted
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Patient-specific analysis of esophageal transport using barium swallow fluoroscopy[1] SOURAV HALDER, Theoretical and Applied Mechanics, Northwestern University, SHASHANK ACHARYA, Mechanical Engineering, Northwestern University, WENJUN KOU, JOHN ERIK PANDOLFINO, PETER J. KAHRILAS, Feinberg School of Medicine, Northwestern University, NEELESH ASHOK PATANKAR, Mechanical Engineering, Northwestern University; Theoretical and Applied Mechanics, Northwestern University — Barium swallow is an X-ray test for diagnosis of esophageal disorders such as achalasia, diverticula, dysphasia, gastroesophageal reflux disease (GERD) etc. This test gives a qualitative idea of how efficiently a bolus is transported through the esophagus. We have developed a technique by which we can analyze a barium swallow fluoroscopy and calculate the velocity and pressure distribution inside the esophagus. In this technique, we use a Convolutional Neural Network to perform segmentation of image sequences generated from a fluoroscopy, and use these segmented images as input to a reduced-order model to calculate the velocity and pressure in the fluid inside the esophagus. We have also used this method along with High Resolution Manometry (HRM) to identify and estimate biomarkers such as wall-relaxation that occurs ahead of the peristalsis wave in the esophagus wall. This reduced-order model can run very fast, and hence can be used in clinical applications to add more quantitative information to the barium swallow test, thus resulting in better diagnosis of esophageal disorders.

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