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Cystoscopic imaging with machine learning algorithm for automated detection of bladder cancer

Stanford researchers at the Liao and Xing Labs have developed and tested a machine learning algorithm for augmented detection of bladder cancer. Machine learning has the potential to enhance medical decision making in cancer detection and image analysis.
This invention enables real time detection of bladder cancer and other tumors in a patient's bladder during the clinic cystoscopy procedure and transurethral resection in the operating room. The machine learning algorithm can be integrated into existing cystoscopy platforms. In comparison with other approved enhanced cystoscopy technologies such as blue light cystoscopy and narrow band imaging, our approach improves cancer detection and without the need for additional cystoscopy equipment or imaging agents.

Stage of Research:

- **Prototype tested** using data-set consisting of cystoscopy videos from 100 patients undergoing evaluation for bladder cancer
- Continued work to optimize algorithm speed to allow for lag-free real-time analysis

Applications

- **Augment cancer detection during cystoscopy**

Advantages

- **Uses machine learning**
- **Real time diagnostics** during standard cystoscopy procedure

- **Improves diagnosis of bladder cancer** – current practice misses up to 20% of bladder tumors
- **Less expensive** since it doesn't require additional equipment or medication like blue light cystoscopy
- **More accurate** than standard white light cystoscopy
- **Novel** - Currently there are no augmented imaging systems in cystoscopy
- **Can standardize cystoscopy quality and reporting**

Publications

- Chang TC, Shkolyar E, Jia X, Lee T, Mach K, Conti S, Xing L, Liao J, Real-time Augmented Bladder Tumor Detection with Deep Learning *American Urological Association 2020*
- Shkolyar E, Jia X, Chang TC, Trivedi D, Mach KE, Meng MQ, Xing L, Liao JC, "Augmented Bladder Tumor Detection Using Deep Learning" *European Urology* 2019 Sep 16;. doi: 10.1016/j.eururo.2019.08.032. [Epub ahead of print] PubMed PMID: 31537407. PubMed Central PMCID: PMC6889816.

Patents

- Published Application: WO2020206337
- Published Application: 20220160208

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