OpenCV and smartphone-based foot-traffic mapping for assessment of COVID-19 infection risk through CS

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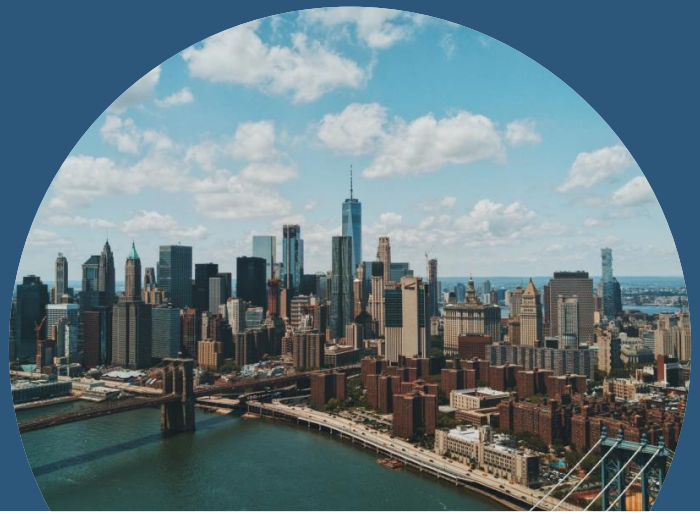

Citizen Science with Application to Nuclear, Seismic and Air Quality Monitoring: Applications

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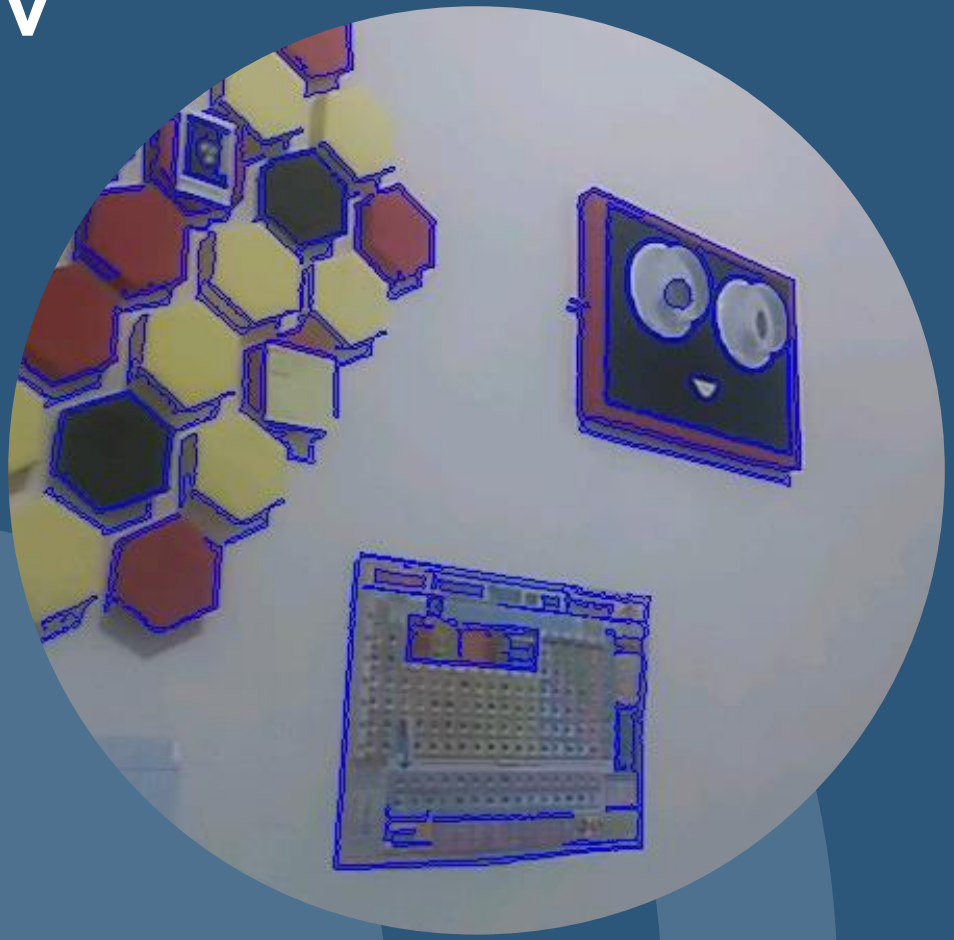
OpenCV

ORIGINAL PHOTO



Object edge detection thru OpenCV

EXAMPLE

- Detect pedestrians using CCTVs
- **Histograms of oriented gradients for human detection (HOG)**
- Programmed through OpenCV

Photo credit: Madhawa Vidanapathirana / Medium.com

SMARTPHONE

Smartphones that have camera and GPS can record:

- Photos, along with;
- Time
- Date
- Location

Photo credit: zlatko_plamenov / Freepik

CORONAVIRUS

- Fast-spreading
- Mask, eye protection, and physical distancing reduces risk
- Higher density of population lessens physical distancing, **increasing risks**

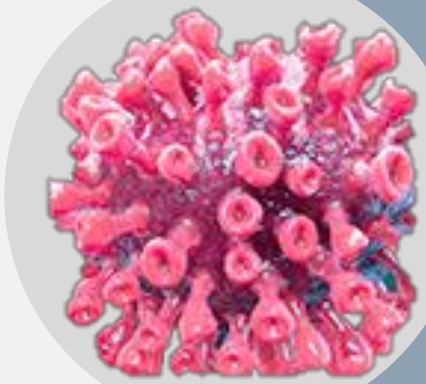
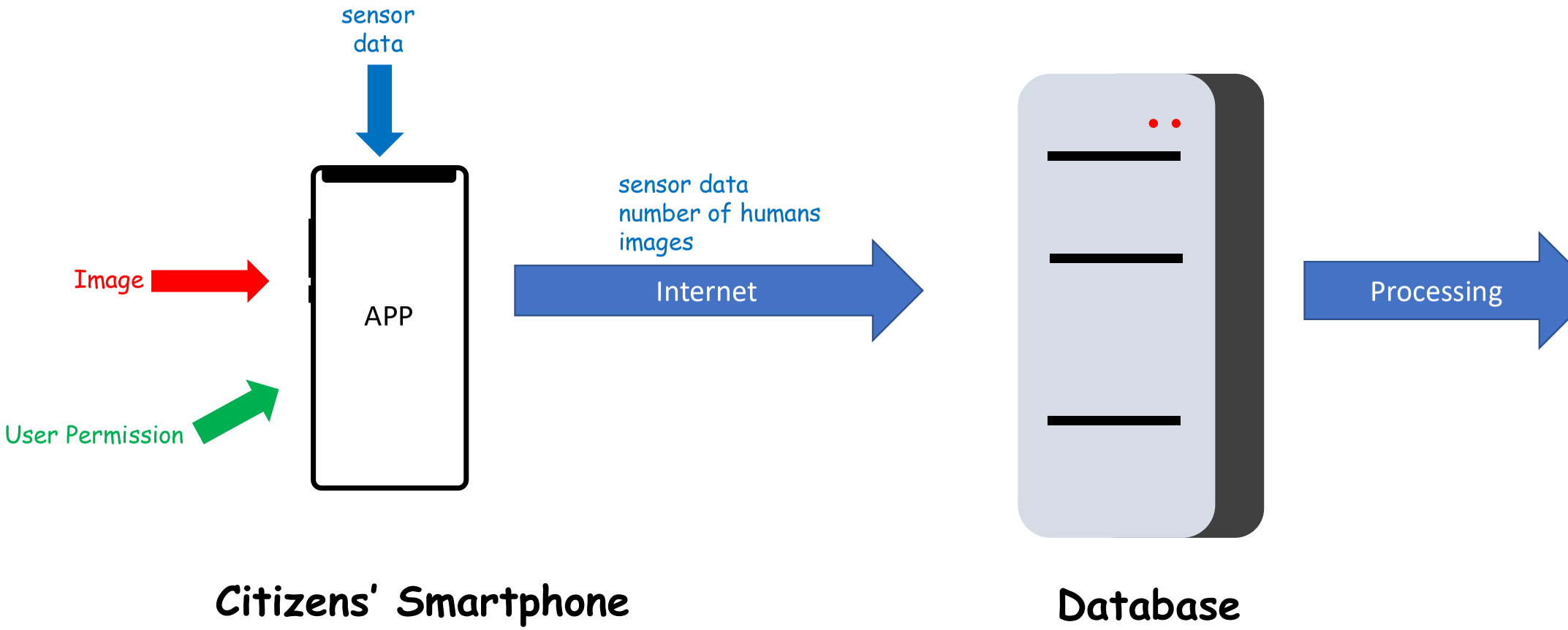


Photo credit: The Lancet

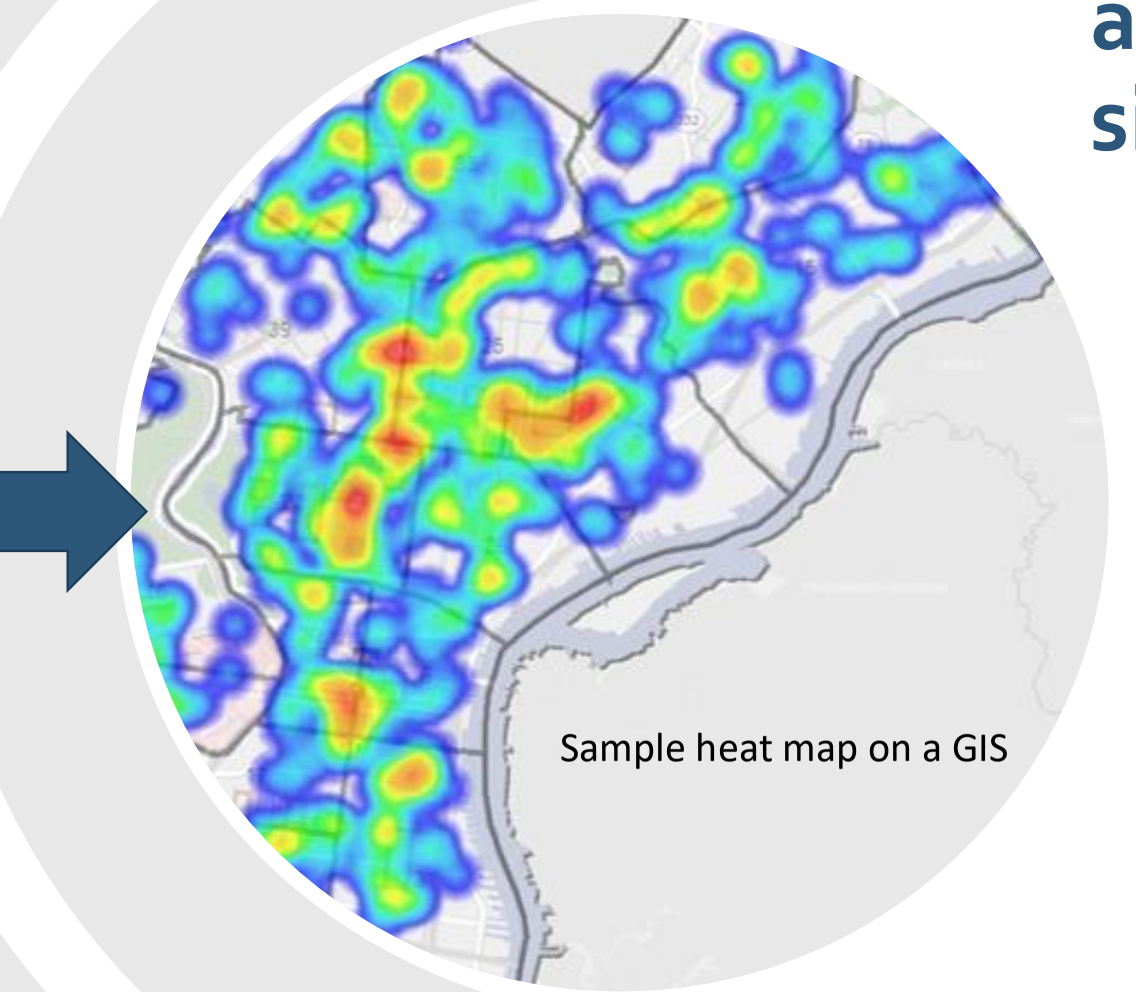
What is Proposed:

- Use photo submissions from people
- Determine the foot-traffic, or density of people
- Create a heat map to visualize infection risk

How Does it Work? Phone App



after accumulating significant amount of data…



Heat map is generated

Photo credit: Juliana Reyes / Technical.ly

This maps out the:

- infection risk based on foot-traffic
- but NOT the number of infections

Pros.

- share publicly sourced, and publicly available data
- plan precautions, routes prior to going to a place
- researchers gathering data without needing CCTV access

Cons.

- prone to some degree of error as calculations are fully automated
- phone app involves quite heavy processing due to OpenCV
- not a real-time representation of foot-traffic

REFERENCES

- N. Dalal and B. Triggs, "Histograms of oriented gradients for human detection," *2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05)*, San Diego, CA, USA, 2005, pp. 886-893 vol. 1, doi: 10.1109/CVPR.2005.177.
- D. Chu, E, Akl, S. Duda, K. Solo, S. Yaacoub and H. Schünemann, “Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis,” *The Lancet,* 2020, pp. 1973-1985 vol. 395, doi.org/10.1016/S0140-6736(20)31142-9

Thank you for listening!

You may ask now questions, comment, & give suggestions.

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