“Los Angeles Fires”
1/7/25

➔DP Research OVERVIEW

Question	Topics	Sources
1) What are the associated problems related to your topic?	Fires,smoke, respiratory issues,destruction of homes and ecosystems	https://pmc.ncbi.nlm.nih.gov/articles/PMC3492003/
2) What are the current solutions?	Firefighters, evacuation, reporting unattended fires	https://www.nps.gov/subjects/fire/wildland-firefighting-tactics.htm
3) Are they effective? Why or why not?	Firefighters and evacuation are not working, thousands of houses still burned.	https://www.nps.gov/subjects/fire/wildland-firefighting-tactics.htm
4) How might the current solution be implemented in San Diego?	Drones can detect fires in advance with the infrared camera.	https://spectrum.ieee.org/drones-sensors-wildfire-detection
5) How can we make the solution better or more universal	We can make the solution more universal by using a magnetic plate to charge drone automatically	https://www.researchgate.net/publication/312562462_Automatic_wireless_drone_charging_station_creating_essential_environment_for_continuous_drone_operation

Building medium sized solar panels and a battery connected to the pads, can turn the whole operation green, and net negative,

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6) How to make the implementation use green energy/ net zero emissions.	because the co2 cost of making the drones is less not spotting and stopping the early fires with the drones.	https://constantenergy.net/blog/going-green-with-solar-energy/
7) How to make the system more affordable.	Fire organizations can use cheap commercial drones and outfit them with an infrared camera. Such a similar practice is already done in Ukrainian UAVs.	https://www.pbs.org/newshour/world/how-ukraine-soldiers-use-inexpensive-commercial-drones-on-the-battlefield
8) How can the images from the drones be analyzed?	We can use a dataset of burning items seen from an infrared camera of similar pixels. Then we train a model with the dataset using a machine learning library like RCMLRS, made by Hadrian Lazic https://github.com/had2020/RCMLRS. The drones can connect over ratio and report potential fires to a server where an image is analyzed by our model. The image will be split into tensors, used as matrices in math, split each pixel into likelihoods and determine with our model if class 1 on fire is true. If it is true then people can be told to check the image and GPS position taken by the drone.	https://www.analyticsvidhya.com/blog/2022/11/how-to-make-a-image-classification-model-using-deep-learning/ https://developers.google.com/machine-learning/practica/image-classification https://github.com/had2020/RCMLRS

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9) How can only people get notified only when there's really a fire?	Deep learning models, while mostly smart, can make mistakes. This is why we assign a probability. When an image is scanned it is turned into a class variable which is a float, a number with a decimal point number or non integer number. This can range from any number between 0, lowest not possible, and 1 highest possible. If the range of an image is higher than a tested number like 0.5,50% probability a member of the organization with the mobile app, with notifications on, can check the image, and send it to a firefighter with a GPS position.	https://jonathan-hui.medium.com/probability-in-machine-learning-deep-learning-a2acdd793f18 https://arxiv.org/abs/1801.04260
10) How can the government make regulations for these drones?	The laws for such drones already exist, and can be done safely. The drone company DJI in China used to have geofencing and a check for planes. Drones can be flown within strict walls in the software by Geofencing, an effective tech already used in drones. The technology is already in our backyard. For instance my Grampa, a photographer, had a Drone made by DJI, which could fly to preploted points or an already flown fly path all by itself.	https://umilesgroup.com/en/geofencing-in-drones-how-does-it-work-and-what-is-it-for/ https://d3.harvard.edu/platform-digit/submission/flight-of-the-future-exploring-djis-ai-driven-drone-evolution/

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11) How much is the average lifespan for a Drone?	With normal usage a good drone would last 5 years. This drone, despite being good, can be prone to motor and battery degradation, not to mention crashing due to some kid's kite, or similar. So a rough life span would be 1 year at best, assuming it's running only during the day for small shifts. So for a normal sized operation of 12 drones to cover a smaller sized city like San Diego, would cost 12000 dollars plus the cost of the pads and solar panels, not cheap, assuming drones are roughly $1000, drones could be much less, but for a year of timespan, we should assume more. So the main problem for our project would be finding a way to either get cheap working drones constantly, or repair them.	https://www.droneblog.com/drone-life-expectancy/
12) What other solutions are similar?	There are some other similar solutions,for example, fire spotting satellites, using bigger drones/ like autonomous solar planes to spot fire in the same fashion, cameras watching places where fires are around, with livesteams, where people can report a fire to a local fire tower to zoom in to.	https://www.technologyreview.com/2024/09/19/1104174/how-ai-can-help-spot-wildfires/ https://wfca.com/wildfire-articles/fire-prediction-technology/