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CEA analysis - project report

CONTEXT:

A farm growing cherry-tomatoes commercially is curious if using Controlled Environment Agriculture (CEA) to produce their crop is better than the methods they currently employ.

STAKEHOLDER QUESTION:

Will using CEA increase production and reduce the resources used compared to our current method? If so - by how much?

DATA ANALYSIS:

Data procured from the CEAOD Autonomous GreenHouse Challenge 2019. In this challenge 6 teams each using an identical greenhouse; produced one (six-month) harvest of cherry-tomatoes. 5 teams grow using their unique remote-controlled CEA methods. The 'Reference' team, composed of Dutch Commercial Farmers, produce their harvest manually using current methods. I will use production and resource data to compare the farming methods.

Production-data: production metrics
- Number of tomatoes class A
- Number of tomatoes class B
- Average number of trusses (using 10 stem == truss)
- Weight class A
- Weight class B

Resource-data: resources used for production
- Water
- Electricity
- CO2
- Heat

CONCLUSION:

The comparison of the teams studied show the numbers are fairly close. The resources consumed by 'Automatoes' are slightly greater than that of 'Reference' in every feature

except heat consumption - where the CEA method consumed more than half as much as 'Reference'. This may be due to opening the door to the greenhouse during the manual method.
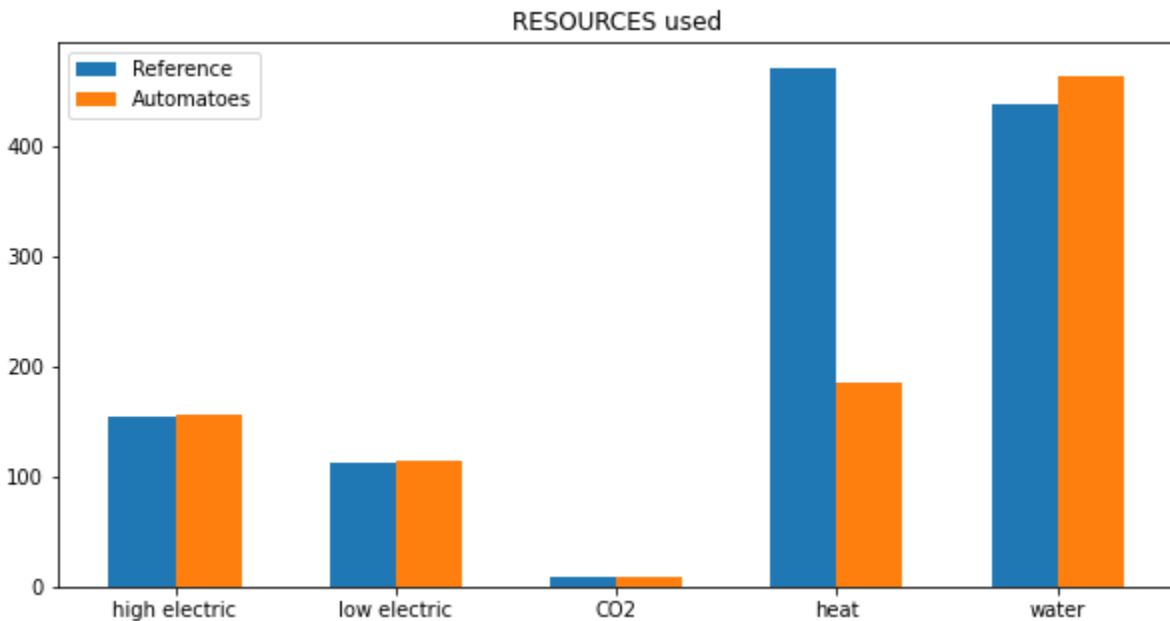
The production analysis shows that the 'Automatoes' had slightly greater production than the 'Reference' team. It is of interest that 'Reference' did not report any fruit of class B.
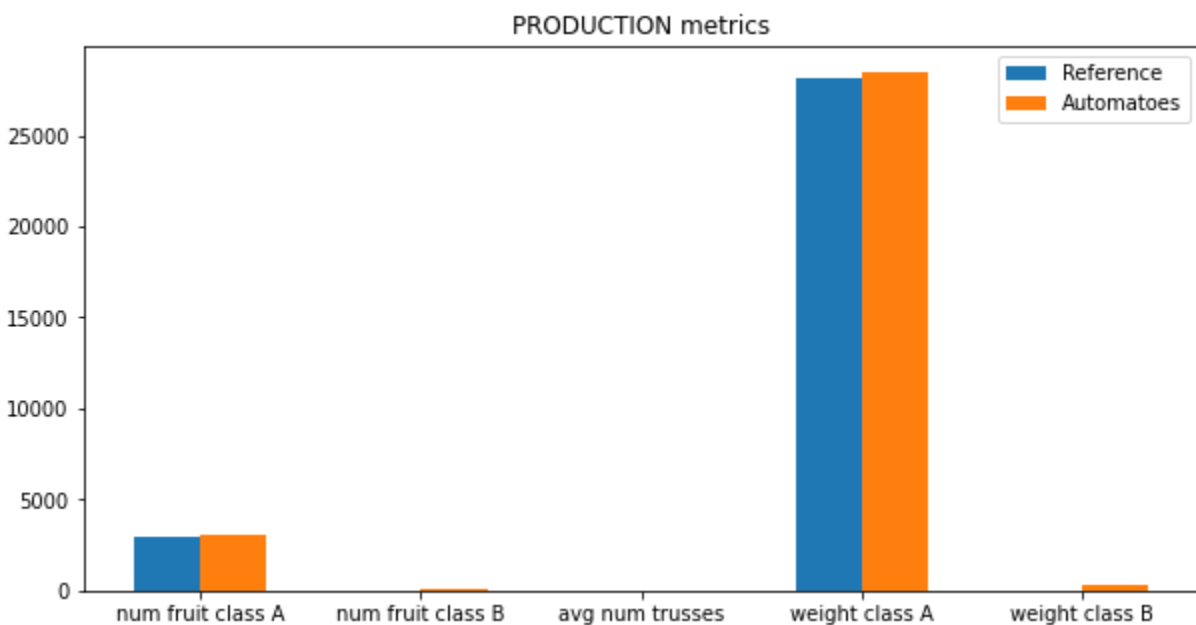
Comparing the 'Automatoes' against the 'Reference' team for overall efficiency (input - output) the 'Automatoes' are more efficient. They use more resources (except for heat) compared to 'Reference' but they produce more. Comparing 'Reference' to the other CEA teams will give a better assessment of CEA vs. current commercial methods.

NEXT STEPS:

- Collect more data!
- Create and engineer new features to improve analysis