Artificial Vision System for Meat Quality Gradation

B.Tech Major Project Report

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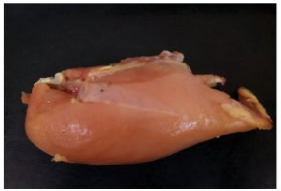
Problem statement :

- A rapid system for meat quality assessment is needed to guarantee the quality of meat.
- We plan to solve this problem by developing a mobile application to help users determine meat freshness in real-time.

(a) Fresh class

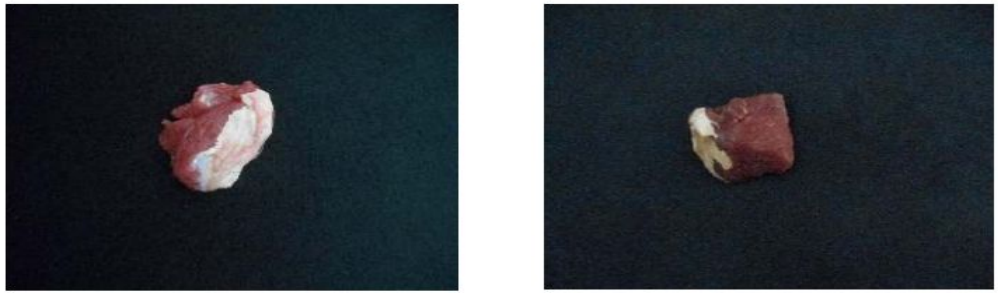


(b) Medium class

(c) Old class

Importance of work

- In today's world, food spoilage is a crucial problem as consuming spoiled food is harmful for consumers.
- Meat is a kind of perishable food that easily decays.
- As the number of meat consumers increases in the meat industry, the demand for meat supplies also rises. Determining meat freshness, therefore, is the primary consideration of the meat customers.

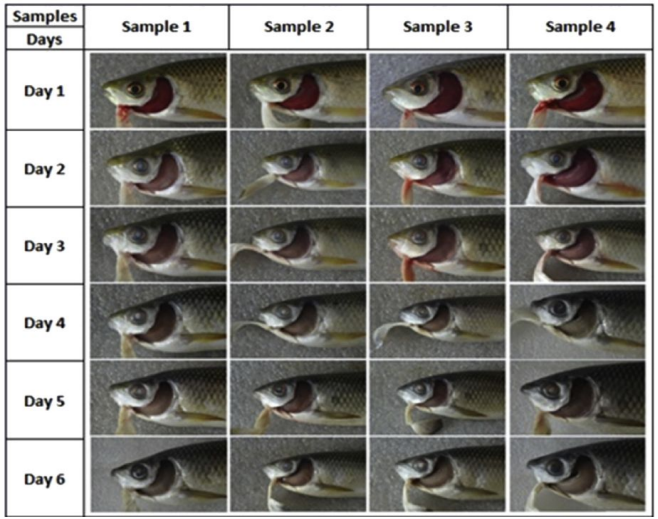


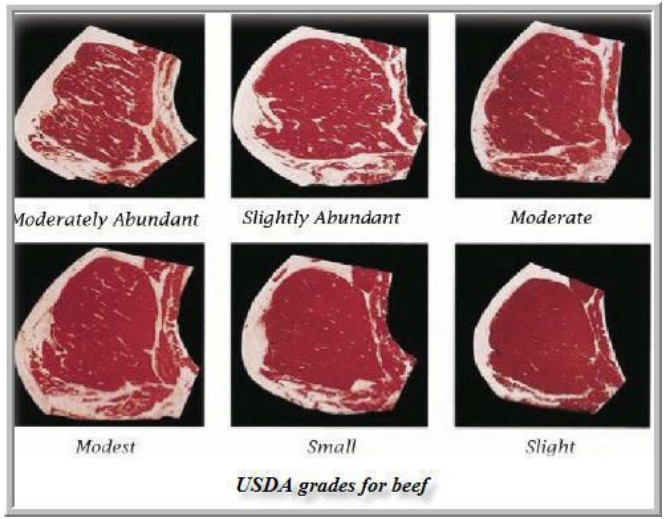
(a) (b)

Figure 2. (a) Fresh Meat, (b) Rotten Meat

Importance of work

- Due to covid, many people are ordering food items online. This has increased the necessity for real-time meat quality assessment through images.
- It will be helpful for customers who don't know how to check meat quality by seeing or touching it.





Summary table for each method

Classifier	Author	Type of sample	Number of sample	Color space	Accuracy (%)
K Nearest Neighbors	Trientin, Hidayat, and Darana [1]	BEEF	Uninformed	RGB,HSB	75
	Taheri-Garavand, Fatahi, Banan, and Makino [2]	CARP	1344	RGB, L*a*b*	90.48
	S Agustin, R Dijaya [3]	BEEF	60	RGB, HSI, Grayscale, Binary	91.0667
	Christell Faith D. Lumogdang, Marianne G. Wata, Christell Faith D. Lumogdang, Stephone Jone S. Loyola, Randy E. Angelia, Hanna Leah P. Angelia [4]	PORK	75	RGB, Binary Gradient	93.33
	Kenan Lugatiman, Crisanto Fabiana, Jairo Echavia, Jetron J. Adtoon [5]	TUNA	90	RGB, Binary Gradient	86.67

Summary table for each method

Linear Regression	Sun, Young, Liu, Chen, and Newman [6]	PORK	Uninformed	RGB, HSI, L*a*b*	83
Logistic regression	Nachiketa Hebbar [7]	MEAT FRUIT FISH VEGETABLE	40	Uninformed	100
Support Vector Machine(SVM)	Xiao Guan, Jing Liu, Qingrong Huang, And Jingjun Li [8]	PORK BEEF MUTTON SHRIMP	112(28*4)	Uninformed	92.8
	Arsalane, Barbri, Tabyaoui, Klilou, Rhofir, and Halimi [9]	BEEF	Uninformed	HSI	100
	Taheri-Garavand, Fatahi, Banan, and Makino [10]	CARP	1344	RGB, HSI, L*a*b*	91.52

Summary table for each method

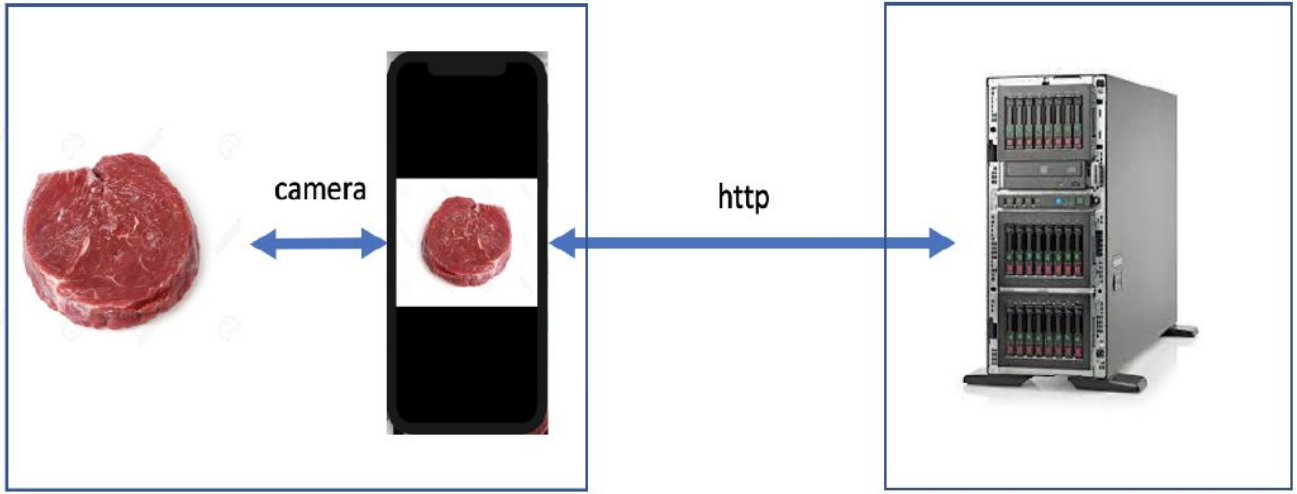
K Means	Malay Kishore Dutta , Ashish Issac , Navroj Minhas, Biplab Sarkar [11]	FISH	24	RGB, XYZ, Lab color space	95.833
	Jae Moon Lee,In Hwan Jung, Kitae Hwang [12]	BEEF	300	Uninformed	75

Conclusion

- Accurate meat freshness assessment is crucial for the problem of food quality.
- Meat freshness cannot be assessed accurately by any single conventional index because every index reflects only partial characteristics of a meat sample.
- Sometimes the results obtained from different indices are inconsistent.
- Therefore, a freshness assessment with greater accuracy should depend on more-comprehensive indices.
- To conclude, artificial vision and machine learning is a reliable technique, and it has shown its efficiency in many applications related to meat assessment.
- Still current methods in use has some limitations.
- In fact, it permits us to detect external features, but not internal characteristics.
- Neural network implementation requires high computational power.
- We will deploy the model as a mobile application. Hence, we will be using the Machine learning model or statistical model to solve this problem.

Future Work

- Preparation of dataset
- Run existing model on our dataset
- We will use a statistical method or machine learning model to develop the application on an ideal platform.



References of existing works

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2. Taheri-Garavand, Amin, et al. "Real-time nondestructive monitoring of Common Carp Fish freshness using robust vision-based intelligent modeling approaches." Computers and Electronics in Agriculture 159 (2019): 16-27.
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9. Arsalane, Assia, et al. "An embedded system based on DSP platform and PCA-SVM algorithms for rapid beef meat freshness prediction and identification." Computers and Electronics in Agriculture 152 (2018): 385-392.
10. Taheri-Garavand, Amin, et al. "Real-time nondestructive monitoring of Common Carp Fish freshness using robust vision-based intelligent modeling approaches." Computers and Electronics in Agriculture 159 (2019): 16-27.
11. Dutta, Malay Kishore, et al. "Image processing based method to assess fish quality and freshness." Journal of Food Engineering 177 (2016): 50-58.
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