# Insight into Radiomics in Head and Neck Cancer

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Radiomics consists of high-throughput extraction of sub-visual, quantitative, higher-order features from clinical images for subsequent analysis through predefined algorithms to develop enhanced data models for clinical decision-making support

## Applications

Diagnosis and Staging

Characterization

Risk stratification and Prognosis

Prediction of toxicity of oncologic therapies

## Imaging modalities

- CT
- MRI
- PET
- CBCT

Head and Neck cancer

## Model building

**Machine learning classifier**

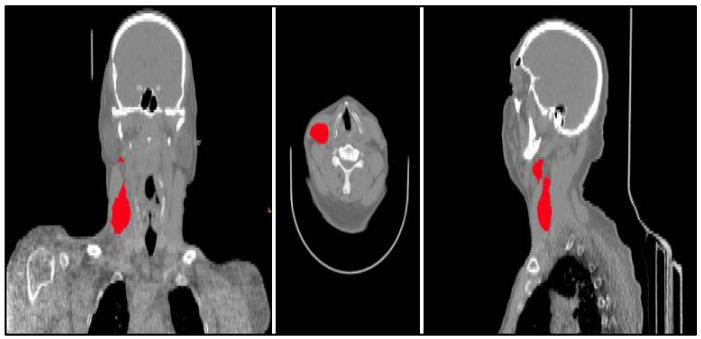
- Logistic Regression
- Naive Bayes
- Support Vector Machine
- Decision Tree
- Neural Networks

## Current limitations and challenges

Inadequate standardization of the whole radiomic process

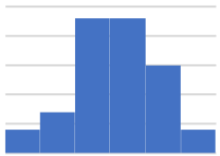
Absence of robust technical and clinical validation

## Image acquisition and Segmentation



## Feature extraction

### First order features



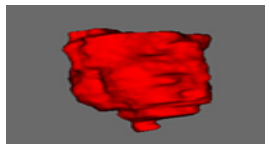
- Intensity
- Skewness
- Kurtosis
- Entropy

### Second order features

| | | | | |
|---|---|---|---|---|
| 1 | 0 | 3 | 0 | 0 |
| 1 | 2 | 3 | 0 | 2 |
| 0 | 0 | 0 | 0 | 2 |
| 2 | 0 | 0 | 0 | 1 |
| 2 | 0 | 3 | 3 | 3 |

- GLCM
- GLRLM
- GZMLS
- GLDZM
- NGTDM

### Shape based features



- Surface area
- Surface-to-volume ratio
- Sphericity

Reference :

Tortora, M.; Gemini, L.; Scaravilli, A.; Ugga, L.; Ponsiglione, A.; Stanzione, A.; D'Arco, F.; D'Anna, G.; Cuocolo, R. Radiomics Applications in Head and Neck Tumor Imaging: A Narrative Review. Cancers 2023, 15, 1174.