Application of AI & CI for Diagnosis of Breast Cancer

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Abstract

To replicate humans, AI systems require large training datasets to imitate perception of humans. We must supply examples of both malignant and benign mammograms to train a system how to identify abnormalities. After many iterations and trial and error, it will eventually learn to get things right.

To find out if AI and CI are making complementary decisions in breast cancer diagnosis. If we are able to catch more cancer at screening to reduce the amount of false positives by 100%. To show the benign or malignancy able to be caught by the AI algorithm but which the recruited CI crowd of human miss to enhance diagnosis.

In 2018, breast cancer claimed lives of 74,072 in Africa and 168,690 estimated cases [2]. In 2012, Moroccan women breast cancer recorded death is 2,878 [1].

<table>
<thead>
<tr>
<th>Year</th>
<th>Breast Cancer Statistics (in Africa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>74,072</td>
</tr>
<tr>
<td>2012</td>
<td>2,878</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Africa</td>
<td>43.6</td>
</tr>
<tr>
<td>West Africa</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Collective Intelligence CI Approach: Crowd of humans rate the imaging with non-zero knowledge by responding to the survey for classification of these imaging with their analytics and reasoning skills to detect if the imaging are benign or malignant for early detection of breast cancer.

Proposed Approach

Collective Intelligence CI Approach:
Crowd of humans rate the imaging with non-zero knowledge by responding to the survey for classification of these imaging with their analytics and reasoning skills to detect if the imaging are benign or malignant for early detection of breast cancer.

Artificial Intelligence AI Approach:
We implement DenseNet201 architecture, CNN deep learning algorithm for classification of the mammogram imaging into benign or malignant for early detection of breast cancer.

AI: We use accuracy score, classification report, confusion matrix, ROC and AUC.
CI: We use manual un-automated method for respondents score & statistical measure in excel which requires further study as our next step of research to rerun the CI approach.

Objective

Our objective is to empower radiologists with these tools and hope they become ubiquitous, and doctors would not interpret a mammogram without the use of AI and CI as assistance tools.

Artificial Intelligence DL-CNN Model

Collective Intelligence CC Model

AI Simulation Results / CI Experiment Simulation in Progress

References


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