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An automated system for disease detection

Submitted on August 8, 2020

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<p>PROMPT</p> <p>Provide a brief description of your company, industry, or business.</p> <p>We are going to propose a project on creating an automated system that can detect the diseases, such as diabetes, Alzheimer, cancer, melanoma in the early phase of the disease development. Considering that these diseases are very dangerous to person life, I would like to develop a system that can identify the existence of the disease as fast as possible, which can speed up drug development and medical treatment, consequently leading to complete cure from the disease. Currently, the detection of the aforementioned diseases is done by medical doctors. However, considering busy schedule of the doctors and large amount of pay for the consultation with them, significantly large number of individuals cannot afford to benefit from early detection of these hazardous illnesses. Therefore, the system of early detection of the diseases can be automated using the power of Machine Learning, and more specifically Deep Learning. Recently, Convolutional Neural Networks (CNNs) based autoencoding models have advanced the field of image segmentation. Hence, we are going to benefit from the CNN based binary image segmentation models to create the proposed automated system for an early detection of disease.</p>	<p>RUBRIC</p> <p>Is the description of the business situation clear?</p> <p><input type="radio"/> 0 points No</p> <p><input checked="" type="radio"/> 1 point Yes</p>
<p>PROMPT</p> <p>Referring to the five stages of machine learning readiness, where does your company lie, and why? Remember to consider data, strategy, and expertise.</p> <p>Considering the machine learning readiness stages, we are currently in the developing phase. To be more specific, we are committed to invest in basic adoption of Machine Learning solutions to achieve our business targets. In this stage, we make investments in our projects by developing the first proof-of-concepts.</p>	<p>RUBRIC</p> <p>Identification of machine learning readiness</p> <p><input type="radio"/> 0 points The assigned stage of readiness doesn't make sense or there isn't any explanation for why the company is categorized at that stage.</p> <p><input checked="" type="radio"/> 1-point +1.5 pts because of a tie The explanation for the chosen stage makes sense but the explanation in terms of data, expertise, and strategy is not clear.</p> <p><input type="radio"/> 2 points The stage is appropriately chosen and the explanation justifies the choice in terms of data, expertise, and strategy.</p>
<p>PROMPT</p> <p>What business outcome are you supporting with your machine learning project? How is this outcome relevant and important for the company? How will you evaluate whether the desired outcome is being achieved?</p> <p>The business outcome of the project is to benefit from highly qualified, accurate and fast detection of the diseases. After training the Deep Learning model, it will be uploaded on the cloud, so that the patients can upload their images and obtain the result about the existence or absence the disease of their interest. After acquiring the results, the consumers will be asked to fill a short questionnaire on the experience of the using the system. The business success will be evaluated by the satisfaction of the consumers of the automated system. The evaluation will also use the power of Machine Learning. We are going to use online learning for this purpose, meaning that the learning process will never finish and the questionnaire data will increase as the consumers number grow.</p>	<p>RUBRIC</p> <p>Clear outcome</p> <p><input type="radio"/> 0 points No business outcome was provided or the description was too vague to provide concrete guidance.</p> <p><input checked="" type="radio"/> 1 point A business outcome that can be used to guide the project was clearly defined.</p> <p>Relevance of outcome</p> <p><input type="radio"/> 0 points It is not clear why the business outcome is relevant to the company, or the importance of the outcome isn't clearly stated</p> <p><input checked="" type="radio"/> 1-point +1.5 pts because of a tie The business outcome is clearly relevant to the company but the importance is inappropriate or not clearly explained. Or vice-versa</p> <p><input type="radio"/> 2 points The business outcome is relevant to the company and the importance of the outcome is clearly stated.</p> <p>Clear evaluation</p> <p><input type="radio"/> 0 points No evaluation measure was described, or the evaluation measure described does not make sense or isn't actually measurable.</p> <p><input checked="" type="radio"/> 1-point +1.5 pts because of a tie An evaluation measure has been proposed but it's not clear how it will actually be measured.</p> <p><input type="radio"/> 2 points The given evaluation measure is clear and measurable.</p>
<p>PROMPT</p> <p>What machine learning project will you propose to support this business outcome? At a high level, what will your QuAM be doing? Make the case that this is a viable project (at least in theory) and relates to your overall business goals.</p> <p>An automated system will be detecting the illnesses, such as diabetes, Alzheimer, cancer, melanoma in the early phase of the disease development. Considering that, these diseases are very dangerous to person life, we would like to develop a system that can identify the existence of the disease as fast as possible, which can speed up drug development and medical treatment, consequently leading to complete cure from the disease. Also, by doing research on this field, we would like to assist people who have no access to high-quality medical services due to lack of financial resources. Since, the automated disease detection system will be accessible to everyone who has the internet connection and very basic computer skills. People should just upload the medical images on the system and obtain the information about the existence or absence of a particular disease.</p>	<p>RUBRIC</p> <p>Machine learning problem definition</p> <p><input type="radio"/> 0 points No viable machine learning project is described.</p> <p><input checked="" type="radio"/> 1-point +1.5 pts because of a tie There is a proposal for a machine learning project but it is not clear how it might be possible or there's not enough detail to understand the project.</p> <p><input type="radio"/> 2 points There is a clear description of the machine learning project, I understand what QuAM might be built.</p> <p>Appropriate to business outcomes</p> <p><input type="radio"/> 0 points The connection between the machine learning project and the business outcome is unclear (or explanation for one or the other is missing).</p> <p><input checked="" type="radio"/> 1-point +1.5 pts because of a tie I can see how the machine learning project might relate to the business outcome but the explanation is unclear or implausible.</p> <p><input type="radio"/> 2 points The connection between the machine learning project and business outcome is clearly and thoroughly described. I believe that this machine learning project will successfully support the business goals.</p> <p>Project viability</p> <p><input type="radio"/> 0 points There's no description of the project's viability or no supporting explanation for the stated viability.</p> <p><input checked="" type="radio"/> 1-point +1.5 pts because of a tie The project seems viable but the explanation is lacking details or there are some obvious pitfalls that haven't been addressed.</p> <p><input type="radio"/> 2 points I feel like I understand the riskiness of the project. The provided description is thoughtful and thorough.</p>
<p>PROMPT</p> <p>Given the state of readiness you have described and the scope of the project you're proposing, is this a risky project, broadly speaking? That is, is it appropriate to the stage your company is at or will it provide particular challenges?</p> <p>Regarding risks of the proposed system, the primary problem is to obtain data for initial training of the image segmentation model. Since we are going to create the model in the medical area, it will be hard to acquire the desirable amount of data. There are several reasons for this problem. First, as image segmentation models are the representative of supervised learning, the training data must be labelled. However, considering the busy schedule of doctors and tedious process of labelling, it may be difficult to cooperate with the doctors on labelling the medical images. This issue can be partially addressed by crowdsourcing, that is by hiring non-expert people to label the data. However, it can lead to the second problem, which is low-quality training data. Considering that the medical applications require very high degree of accuracy, this problem can be crucial risk to the business. Third, even if doctors may agree on labelling the data for image segmentation, the amount of the data might be small. Since DL methods require millions of training images to output accurate segmentation, this problem also may cause significant amount of risk to the business.</p>	<p>RUBRIC</p> <p>Riskiness level</p> <p><input type="radio"/> 0 points The risks have not been identified or the identified level seems wildly inappropriate.</p> <p><input type="radio"/> 1 point A plausible risk level was described but I'm not confident it is correct and/or the explanation is incomplete.</p> <p><input checked="" type="radio"/> 2 points I believe the student has correctly identified the inherent riskiness.</p> <p>Risk relative to ML readiness</p> <p><input type="radio"/> 0 points There was no explanation for the appropriateness of the project to the stage of ML readiness, or the explanation given was not plausible.</p> <p><input type="radio"/> 1 point There was an explanation of how the project fit into the described stage but it was incomplete or not entirely clear.</p> <p><input checked="" type="radio"/> 2 points The description clearly justifies whether this is high or low risk and relates to the ML readiness of the company in general.</p>

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