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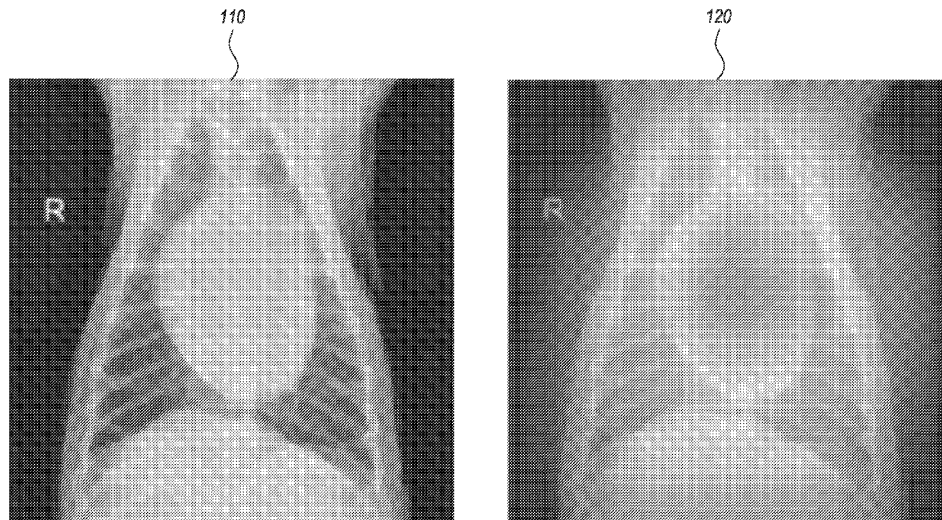


FIG. 1

(57) Abstract: In one embodiment, the disclosure provides a computer-implemented method comprising: receiving a first labeled training data set comprising a first plurality of images each associated with a set of labels; programmatically training a machine learning neural Teacher model on the first labeled training data set; programmatically applying a machine learning model trained for NLP to an unlabeled data set comprising digital electronic representations of natural language text summaries of a second plurality of images, thereby generating a second labeled training data set comprising the second plurality of images; using the machine learning neural Teacher model, programmatically generating soft pseudo labels; programmatically generating derived labels using the soft pseudo labels; training one or more programmed machine learning neural Student models using the derived labels; receiving a target image; and applying an ensemble of one or more of the Student models to output one or more classifications of the target image.

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