1 You are an experienced radiologist. Your task is to categorize the Lung Imaging Reporting and Data System (LungRADS) score for the lung nodule,
2 granulomata, opacity, or parenchyma with the provided radiology report and guideline.

3
4 If there are multiple nodules and have no totally calcified nodules or opacity, consider only the largest non-calcified nodule or opacity; otherwise, consider
5 the largest totally calcified nodule.
6 If the report states the previous size of the nodule or opacity as none, the nodule or opacity is considered new.
7 If the previous size of the nodule or opacity is smaller than the current size, the nodule or opacity is considered growing.
8 If the previous size of the nodule or opacity is the same as the current size, it is considered unchanged or stable.
9 Convert sizes in centimeters (cm) to millimeters (mm) if necessary (1 cm = 10 mm).
10 Please also print out the reasons clearly behind your categorization.
11 Your categorization should be either "1", "2", "3", "4A", "4B" or "4X", not "4" or "4S".

12 Report: {Insert report here}

13 Guideline:

14 **Category 1: based on one of the following findings:**
15 - No nodules are observed in the lung
16 - Nodules with specific calcifications: totally calcified, complete, central, popcorn or concentric ring calcifications or fat-containing nodules, regardless of the
17 nodule size
18 **Category 2: based on one of the following findings:**
19 - Juxtapleural nodules less than 10 mm at baseline or new, solid or smooth margins, and oval, lentiform, or triangular shape
20 - Solid nodules: less than 6 mm, or new nodule and less than 4 mm
21 - Part-solid or subsolid nodules less than 6 mm total mean diameter at baseline
22 - Non-solid nodules (Ground-Glass Nodules, GGN) less than 30 mm at baseline if the nodule is new or growing; or greater than or equal to 30 mm if the
23 nodule is unchanged or slowly growing
24 - Airway nodule that is subsegmental at baseline, new or unchanged
25 - Category 3 lesion or nodule that is unchanged or decreased in size or Category 4B lesion or nodule proven to be benign
26 **Category 3: based on one of the following findings:**
27 - Solid nodules greater than or equal to 6 mm and less than 8 mm at baseline, or new nodule greater than or equal to 4 mm and less than 6 mm
28 - Part-solid or subsolid nodules greater than or equal to 6 mm total diameter with a solid component less than 6 mm, or new nodule less than 6 mm total
29 diameter
30 - Non-solid nodules (GGN) greater than or equal to 30 mm at baseline CT or new
31 - Atypical pulmonary cyst: Growing cystic component of a thick-walled cyst
32 - Category 4A nodule or lesion that is satble, unchanged, or decreased in size
33 **Category 4A: based on one of the following findings:**
34 - Solid nodules greater than or equal to 8 mm and less than 15 mm at baseline, or growing nodule less than 8 mm, or new nodule greater than or equal to 6
35 mm and less than 8 mm.
36 - Part-solid or subsolid nodules greater than or equal to 6 mm with a solid component greater than or equal to 6 mm and less than 8 mm, or with a new or
37 growing solid component less than 4 mm
38 - Segmental or more proximal airway nodule at baseline
39 - Thick-walled cyst OR multilocular cyst at baseline OR thin- or thick-walled cyst that becomes multilocular
40 **Category 4B: based on one of the following findings:**
41 - Solid nodules greater than or equal to 15 mm, or new or growing nodule greater than or equal to 8 mm
42 - Part-solid or subsolid nodules with a solid component greater than or equal to 8 mm, or with a new or growing solid component greater than or equal to 4
43 mm
44 - Atypical pulmonary cyst: Thick-walled cyst with growing wall thickness/nodularity or growing multilocular cyst or multilocular cyst with increased
45 loculation or new/increased opacity
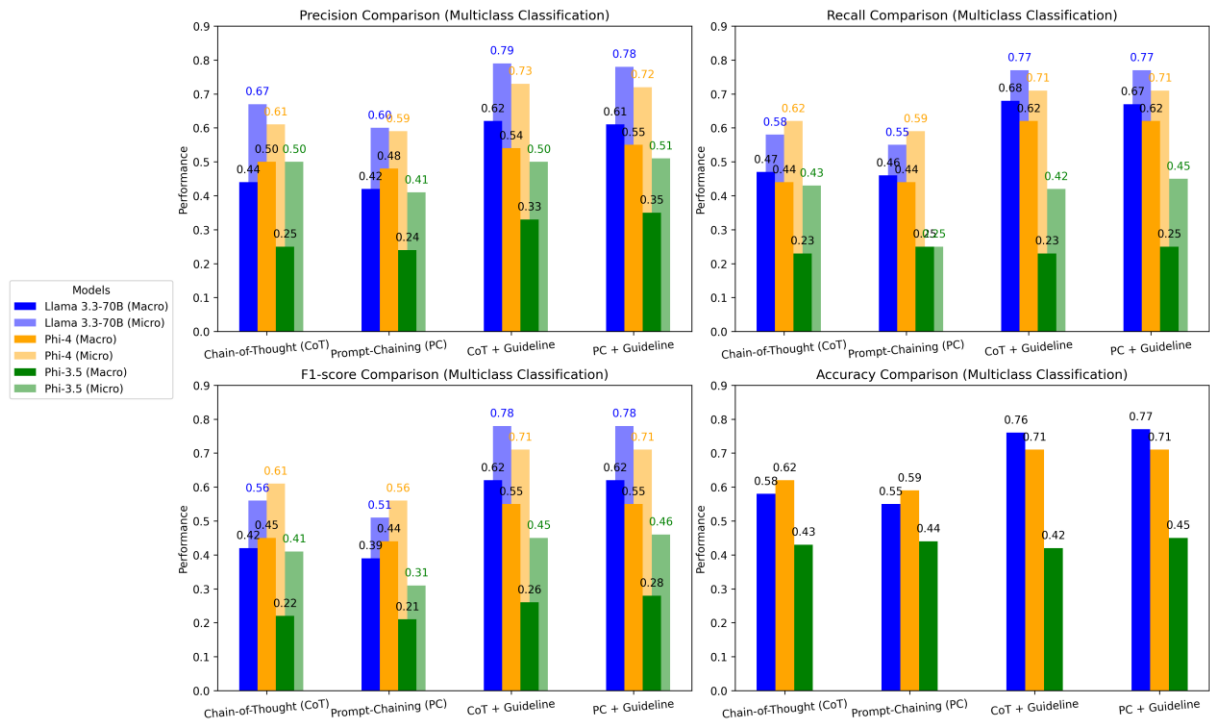46 - Solid or part solid nodule growing slowly over multiple screening exam
47 **Category 4X: one of the following findings:**
48 - Category 3, 4A or 4B nodules with additional features or imaging findings that increases the suspicion of malignancy, including spiculation, enlarged
49 regional lymph nodes, frank metastic disease, a GNN that doubles in size, cavitation, chest wall invasion, endobronchial occlusion, lobulation, air
50 bronchogram, retraction or displacement of fissure, overinflation, high and/or inhomogeneous attenuation, sharp or unsharp margins, presence of bullae,
51 Biopsy-proven adenocarcinoma in situ, vascular changes, including convergence, proliferation, or morphological alterations, Large AP window mass,
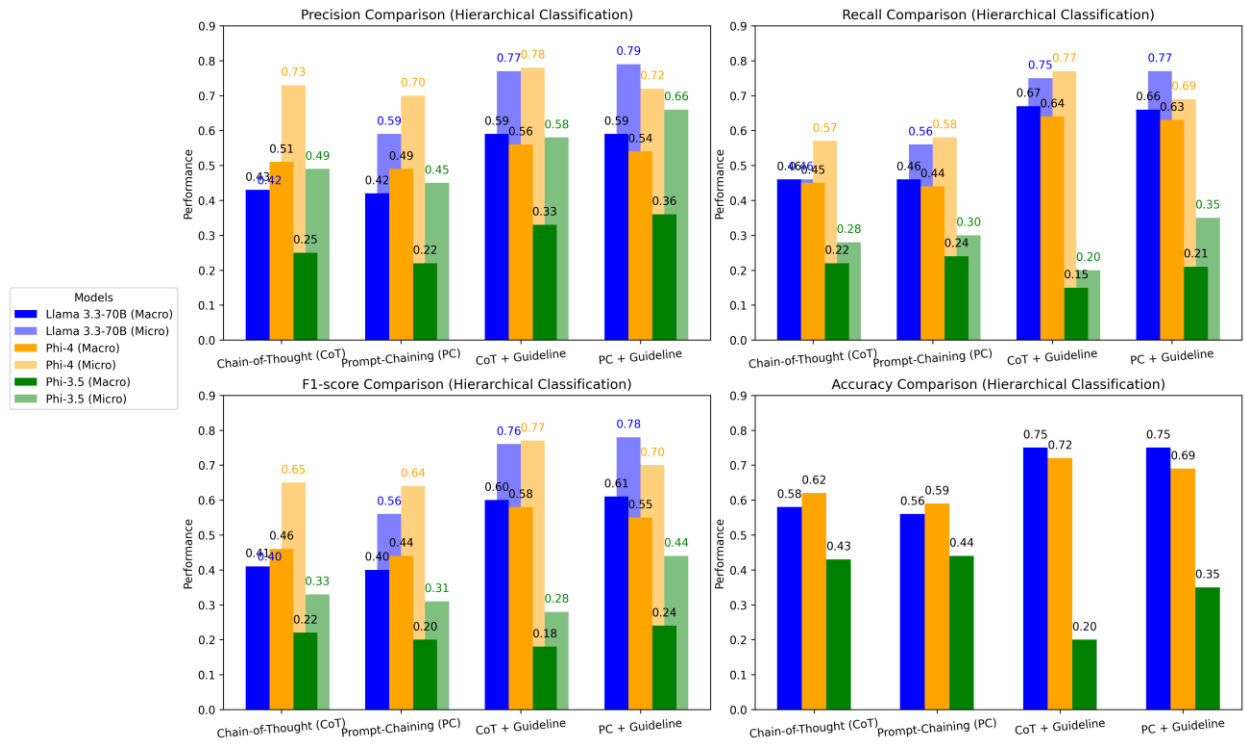52 consolidation and Traction bronchiectasis.
53
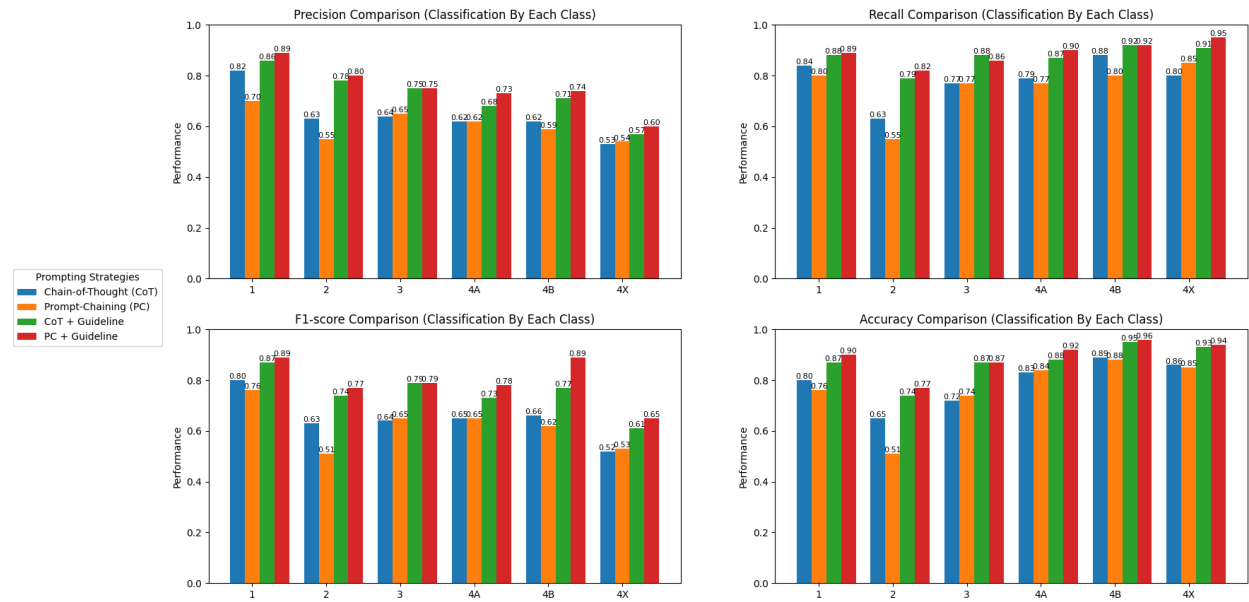54 Output the LungRADS category and reasons according to the report and guideline above.

Supplementary Figure 1. Example prompt with the combination of radiology report and lung-RADS guideline
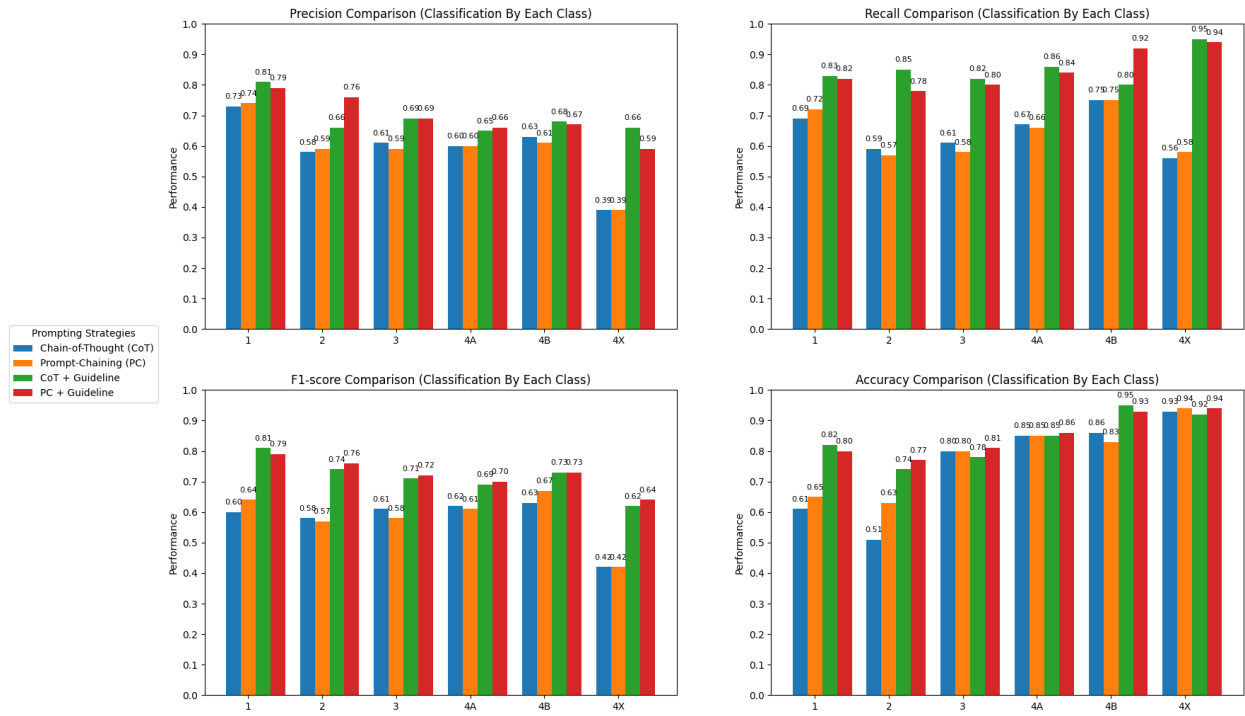
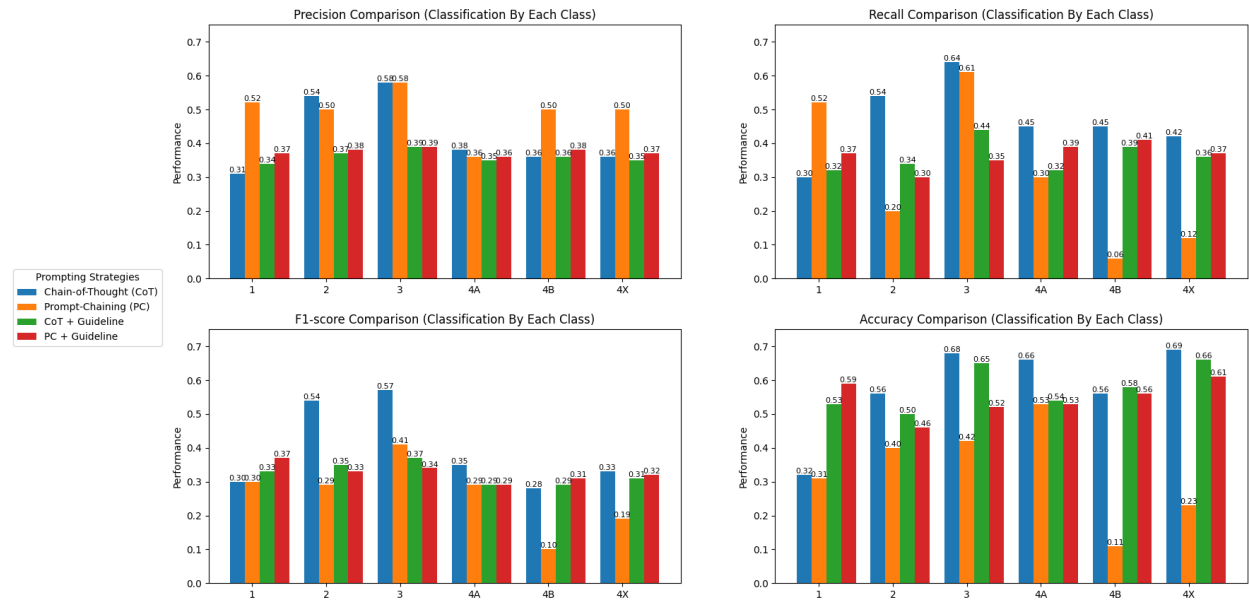**Supplementary Figure 2.** Model performance on multiclass classification

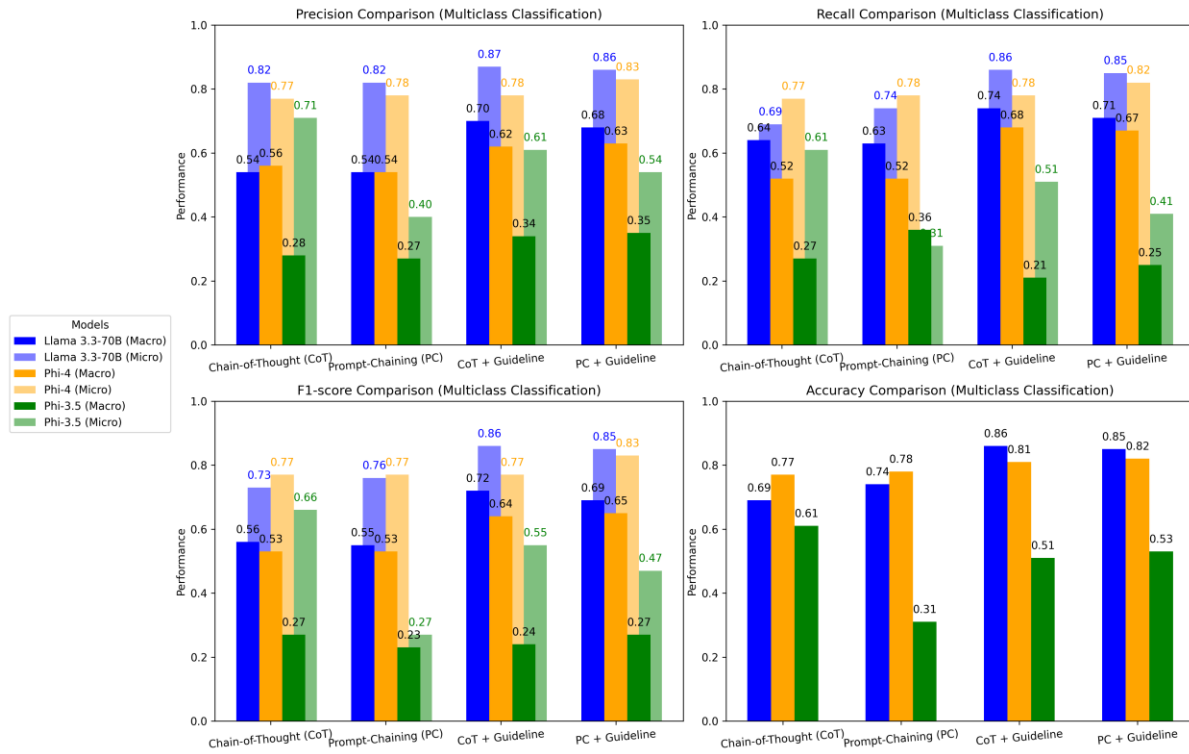**Supplementary Figure 3.** Model performance on hierarchical classification

Supplementary Figure 4. Performance of Llama 3.3-70B by Lung-RADS score
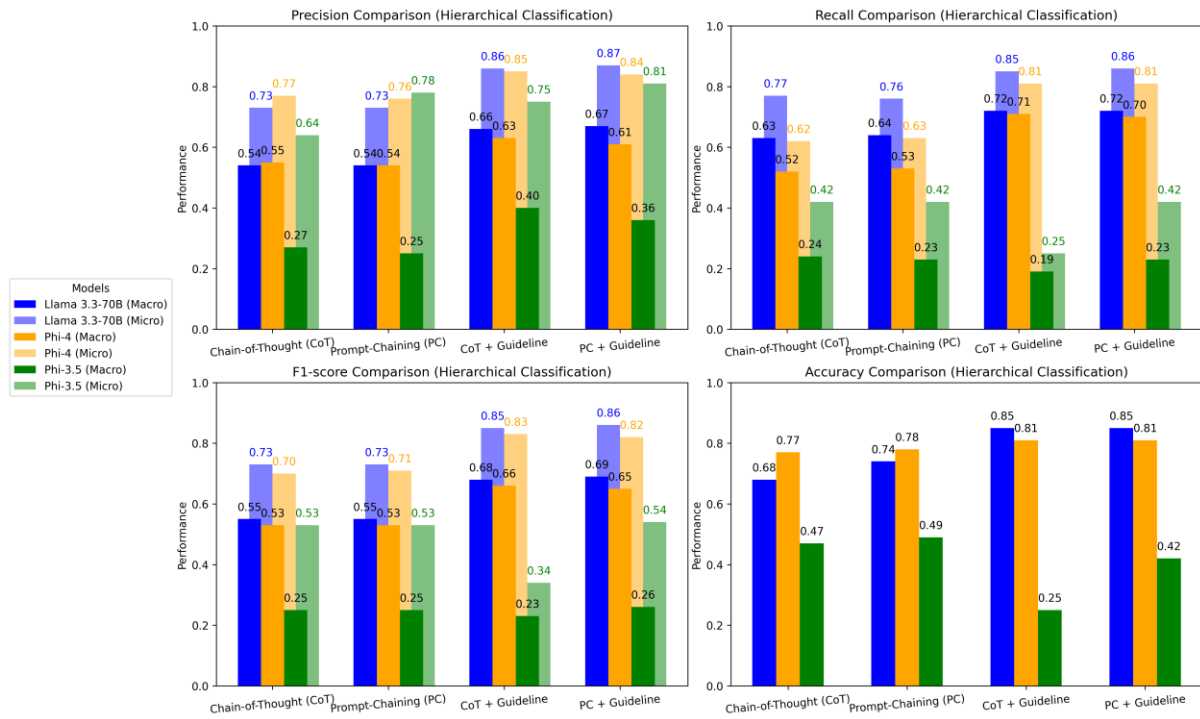
Supplementary Figure 5. Performance of Phi-4 by Lung-RADS score

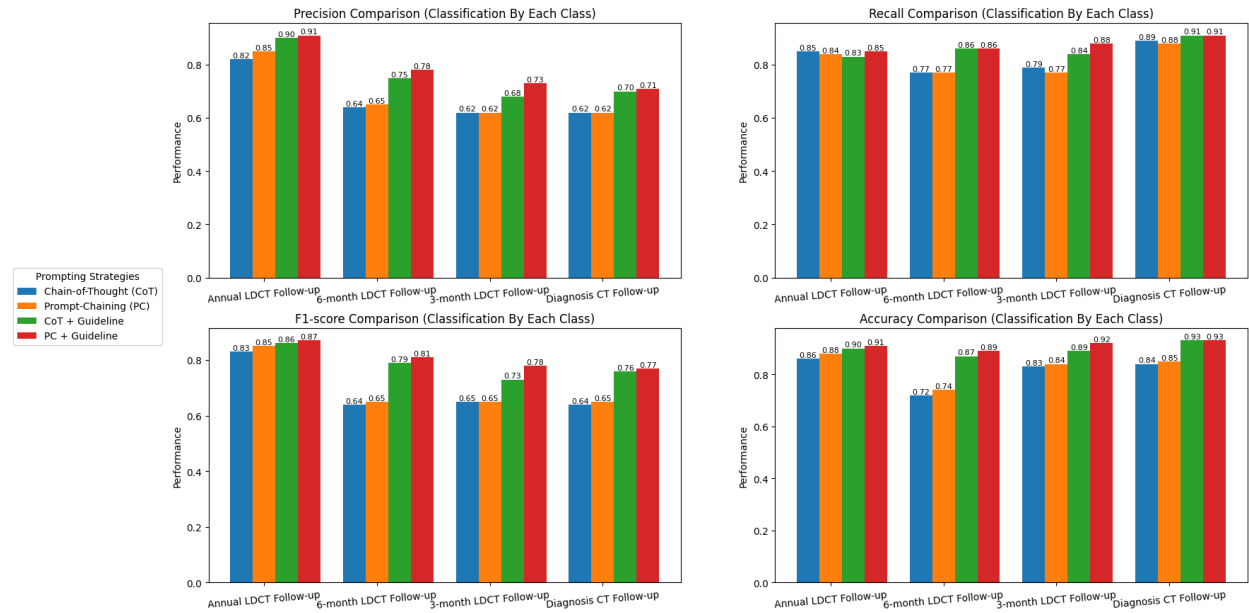**Supplementary Figure 6.** Performance of Phi-3.5 by Lung-RADS score

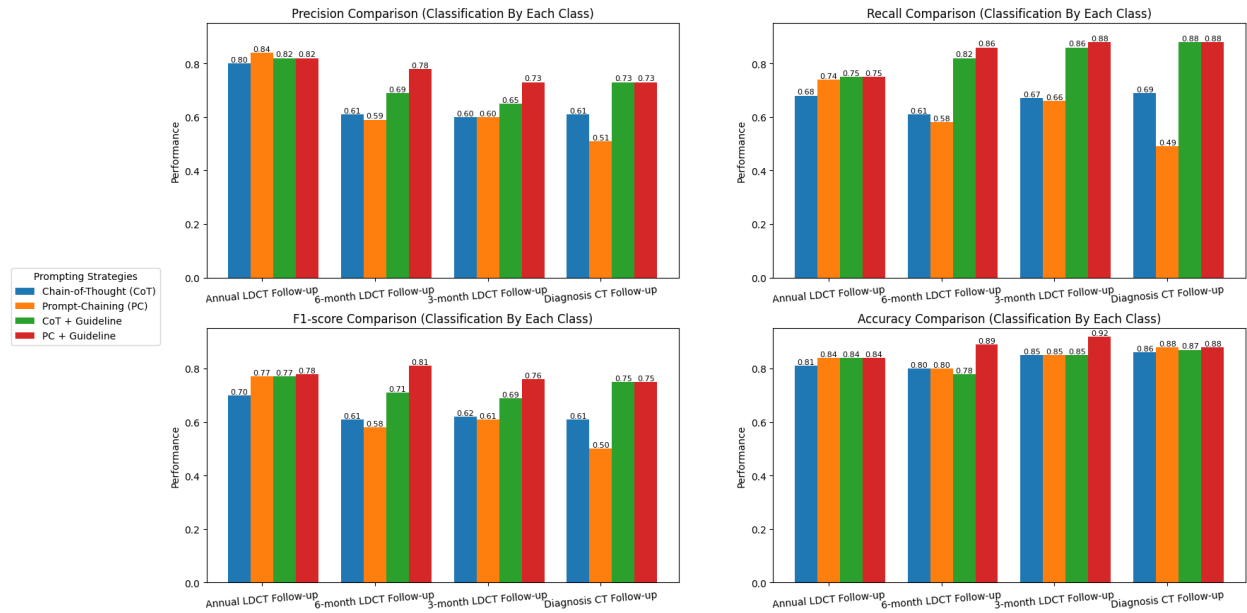**Supplementary Figure 7.** Model performance on multiclass classification

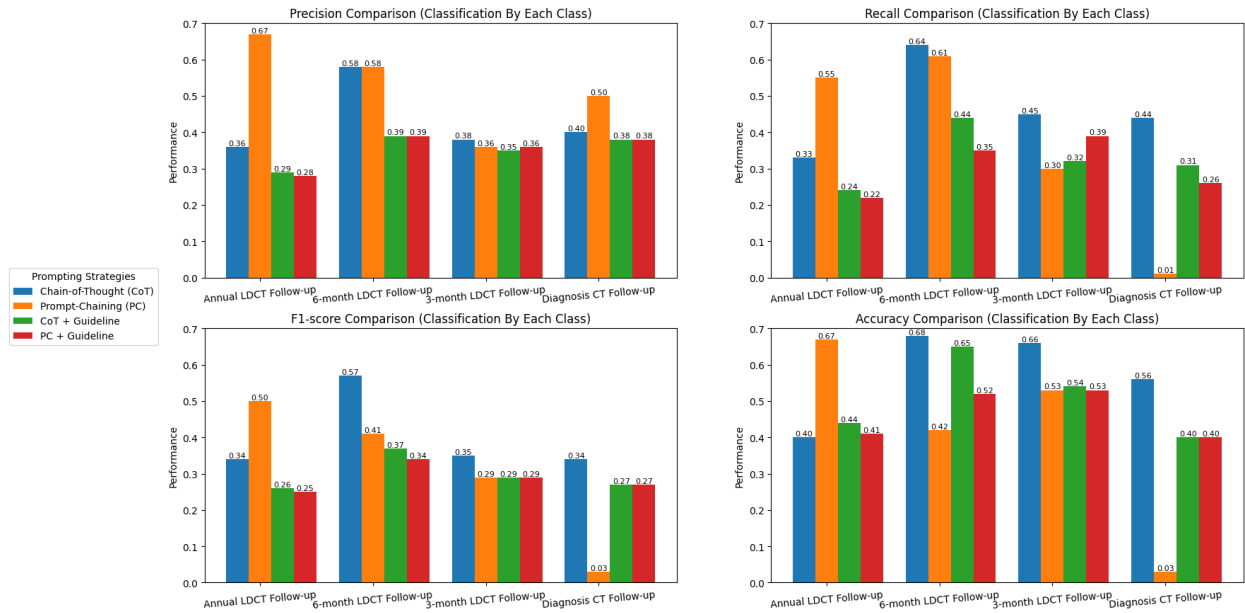**Supplementary Figure 8.** Model performance on hierarchical classification

Supplementary Figure 9. Performance of Llama 3.3-70B by lung cancer screening management

Supplementary Figure 10. Performance of Phi-4 by lung cancer screening management

Supplementary Figure 11. Performance of Phi-3.5 by lung cancer screening management