

Results - Without Design Patterns

Model: gpt-4o-mini

Document: 15page rice document

Date: 19/03/2025 (RE-TEST)

Technique: Few-shot learning

Context 01- crop module AND RICE part01 – crop data

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"ClassAssertion": {\n  "Class": "Variety",\n  "Individuals": [\n    "PR131",\n    "PR130",\n    "PR129",\n    "PR128",\n    "HKR47",\n    "PR127",\n    "PR126",\n    "PR122",\n    "PR121",\n    "PR114",\n    "PR113"\n  ],\n}
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"Axiom": "PR113 averagePlantHeight 105",\n
"Domain": "Variety",\n
"Range": "integer"\n },\n {\n

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"Range": "integer"\n },\n {\n

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Context 02- P&D module AND RICE part02 – P&D data

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"ClassAssertion": [\n {\n

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"Class": "GrowingProblem",\n
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"Class": "Symptom",\n
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"Class": "PreventionMethod",\n
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"Range": "GrowingProblemEvent"\n },\n {\n

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"Axiom": "MechanicalControl hasApplicationMethod Spraying",\n
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DataPropertyAssertional": []\n}

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Results - Without Design Patterns

Model: gpt-4o-mini

Document: 15page rice document

Date: 19/03/2025 (RE-TEST)

Technique: Zero-shot learning

Context 1 (crop kB)- ontology

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ChatCompletionMessage(content='```\n\n  "ClassAssertion": [\n    {\n      "Class": "Crop",\n      "Individuals": ["Rice"]\n    },\n    {\n      "Class": "Variety",\n      "Individuals": [\n        "PR_131",\n        "PR_130",\n        "PR_129",\n        "PR_128",\n        "HKR_47",\n        "PR_127",\n        "PR_126",\n        "PR_122",\n        "PR_121",\n        "PR_114",\n        "PR_113",\n        "HKR_127"\n      ]\n    },\n    {\n      "Class": "SoilType",\n      "Individuals": ["Loamy_Soil"]\n    }\n  ],\n  "ObjectPropertyAssertion": [\n    {\n      "Axiom": "Rice hasVariety PR_131",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_130",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_129",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_128",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety HKR_47",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_127",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_126",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_122",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_121",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_114",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety PR_113",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "Rice hasVariety HKR_127",\n      "Domain": "Crop",\n      "Range": "Variety"\n    },\n    {\n      "Axiom": "PR_131 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_130 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_129 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_128 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_127 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_126 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_122 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_121 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_114 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "PR_113 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    },\n    {\n      "Axiom": "HKR_127 hasSoilTypeForVariety Loamy_Soil",\n      "Domain": "Variety",\n      "Range": "SoilType"\n    }\n  ]\n}\n\n```\n\n')

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Context 2 consider 01 page (Growing Problems) - ontology

ChatCompletionMessage(content='Based on the provided PDF content focusing on plant protection factors in agriculture, particularly related to crops, we can derive relevant elements for your ontology. Here\'s how the information fits into the classes and properties you\'ve outlined in relation to OWL:\n\n### Classes and Instances\n\n1. **Crop**: \n - Instances: Rice (specific variety, e.g., Basmati)\n\n2. **GrowingProblem**: \n - Instances: \n - Insect Pests (e.g., Rice Stem Borer, Leaf Folder, Planthoppers, Grasshoppers, Rice Hispa, Rice Root Weevil, Rice Ear-Cutting Caterpillar)\n - Diseases (e.g., Sheath Blight, False Smut, Brown Leaf Spot, Blast, Bunt/Kernel Smut, Sheath Rot, Stem Rot)\n\n3. **GrowingProblemEvent**: \n - Instances: Detected damage (e.g., 5% dead hearts in rice, 10% leaf damage, etc.)\n\n4. **ControlMethod**: \n - Instances: \n - Chemical Control Method: Using pesticides like Coragen, Fame, Takumi, Mortar, Ecotin.\n - Mechanical Control Method: Use of coir/jute ropes.\n\n5. **ControlMethodEvent**: \n - Instances: Spraying specific pesticides or implementing mechanical controls, such as applying neem-based bio-pesticides or other specified insecticides when thresholds are met.\n\n6. **CausalAgent**: \n - Instances: Specific pathogens or insects (e.g., Rhizoctonia solani for sheath blight, specific pests).\n\n7. **Symptom**: \n - Instances: Dead-hearts in rice, whitening of earheads, leaf damage, various lesions on leaves.\n\n8. **PreventionMethod**: \n - Instances: Strategies such as avoiding excessive nitrogen use, early transplanting, and proper irrigation.\n\n9. **ApplicationMethod**: \n - Instances: Methods such as spraying, mechanical removal, and maintaining irrigation levels.\n\n10. **Location**: \n - Instances: Specific fields or regions, e.g., Gurdaspur and Amritsar districts as specified for rice

cultivation.\n\n11. ****TimeOfApplication****: \n - Instances: \n - July to October (for rice stem borers).\n - Specific times mentioned for applying specific pesticides or treatments.\n\n12. ****Quantity****: \n - Instances: \n - For instance, 60 ml of Coragen in 100 litres of water per acre, etc.\n\n13. ****Unit****: \n - Instances: ml, g, litres for measurement of pesticides and water.\n\n### Object Properties\n\n1. ****affect****: \n - For example, "Rice Stem Borer" → "Rice" indicating that the pest affects the crop.\n\n2. ****applyInControlMethod****: \n - For instance, linking a "ControlMethodEvent" (e.g., application of Coragen) to the "FarmingStage" during which it was applied.\n\n3. ****cause****: \n - For instance, linking "Rice Stem Borer" as a causal agent causing a "GrowingProblemEvent".\n\n4. ****hasApplicationMethodForCME****: \n - For example, linking a "ControlMethodEvent" to "spraying" as the application method.\n\n5. ****hasCausalAgent****: \n - Example linking a "GrowingProblemEvent" caused by "Rhizoctonia solani" to its "CausalAgent".\n\nSuch mappings from the document can be systematically recorded in an OWL ontology, potentially enhancing the understanding and management of agricultural challenges, leading to better control and prevention strategies for crops. This organized approach aids in decision-making processes regarding pest control and disease management, optimizing agricultural practices.', refusal=None, role='assistant', audio=None, function_call=None, tool_calls=None, annotations=[])

JSON – all pages of context

ChatCompletionMessage(content='Based on the provided ontology and the PDF content, here's the JSON representation of the Assertional Axioms:\n\n```\njson\n{\n "ClassAssertional": [\n {\n "Class": "Crop",\n "Individuals": ["Rice"]\n },\n {\n "Class": "GrowingProblem",\n "Individuals": ["InsectPest", "Disease"]\n },\n {\n "Class": "GrowingProblemEvent",\n "Individuals": ["DeadHeartsEvent", "LeafFolderDamageEvent", "PlanthopperDamageEvent"]\n },\n {\n "Class": "ControlMethod",\n "Individuals": ["MechanicalControl", "ChemicalControl"]\n },\n {\n "Class": "ControlMethodEvent",\n "Individuals": ["SprayCoragen", "SprayFame", "SprayEcotin"]\n },\n {\n "Class": "CausalAgent",\n "Individuals": ["RiceStemBorers", "LeafFolder", "Planthopper", "RiceHispa"]\n },\n {\n "Class": "Symptom",\n "Individuals": ["DeadHearts", "WhiteStreaks", "DryPatches"]\n },\n {\n "Class": "PreventionMethod",\n "Individuals": ["MaintainingSoilHealth", "ProperIrrigation"]\n },\n {\n "Class": "ApplicationMethod",\n "Individuals": ["Spraying", "MechanicalControl"]\n },\n {\n "Class": "Location",\n "Individuals": ["Field1", "Field2"]\n },\n {\n "Class": "TimeOfApplication",\n "Individuals": ["JulyToOctober", "PestInitiationStage"]\n },\n {\n "Class": "Quantity",\n "Individuals": ["60ml", "20ml", "50g", "170g"]\n },\n {\n "Class": "Unit",\n "Individuals": ["ml", "g", "litres"]\n }\n],\n "ObjectPropertyAssertional": [\n {\n "Axiom": "DeadHeartsEvent affect Rice",\n "Domain": "GrowingProblemEvent",\n "Range": "Crop"\n },\n {\n "Axiom": "SprayCoragen applyInControlMethod MechanicalControl",\n "Domain": "ControlMethodEvent",\n "Range": "FarmingStage"\n },\n {\n "Axiom": "RiceStemBorers cause DeadHeartsEvent",\n "Domain": "CausalAgent",\n "Range": "GrowingProblemEvent"\n },\n {\n "Axiom": "SprayCoragen hasApplicationMethodForCME Spraying",\n "Domain": "ControlMethodEvent",\n "Range": "ApplicationMethod"\n },\n {\n "Axiom": "DeadHeartsEvent hasCausalAgent RiceStemBorers",\n "Domain": "GrowingProblemEvent",\n


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"Range": "CausalAgent"\n  },\n  {\n    "Axiom": "DeadHeartsEvent hasControlMethod\nChemicalControl",\n    "Domain": "GrowingProblemEvent",\n    "Range": "ControlMethod"\n  },\n  {\n    "Axiom": "DeadHeartsEvent hasSymptom\nDeadHearts",\n    "Domain": "GrowingProblemEvent",\n    "Range":\n    "Symptom"\n  },\n  {\n    "Axiom": "SprayCoragen\nhasQuantityForControlMethodEvent 60ml",\n    "Domain": "ControlMethodEvent",\n    "Range": "Quantity"\n  },\n  {\n    "Axiom": "SprayCoragen\nhasTimeOfApplicationForCME JulyToOctober",\n    "Domain": "ControlMethodEvent",\n    "Range": "TimeOfApplication"\n  },\n  {\n    "Axiom": "SprayCoragen\nhasUnitsForControlMethodEvent Unit",\n    "Domain": "ControlMethodEvent",\n    "Range": "Unit"\n  },\n  ],\n  "DataPropertyAssertional": []\n}\n```\n\nThis JSON captures the classes, individuals, and relationships as described in the ontology structure and the content provided, organized properly into Assertional Axioms. Adjustments can be made as needed based on more specific details from the content if required., refusal=None, role='assistant', audio=None, function_call=None, tool_calls=None, annotations=[])
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