Milestone M2 Deliverable: Video Curation & Balanced Training Dataset

AI Fish Behavior & Stress Detection System — Sultan Qaboos University (SQU) × United Solutions LLC

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CLEANED VIDEO STREAMS	CURATED TRAINING SPLITS	ANNOTATED FISH INSTANCES	VISUAL CONTRAST GAIN
12 MP4 Videos (4N + 8S)	**282 Frames (194 / 40 / 48)**	**1,824 Bounding Boxes**	**+31.5% to +73.5% RMS**

1. Package Structure & Quality Curation Summary

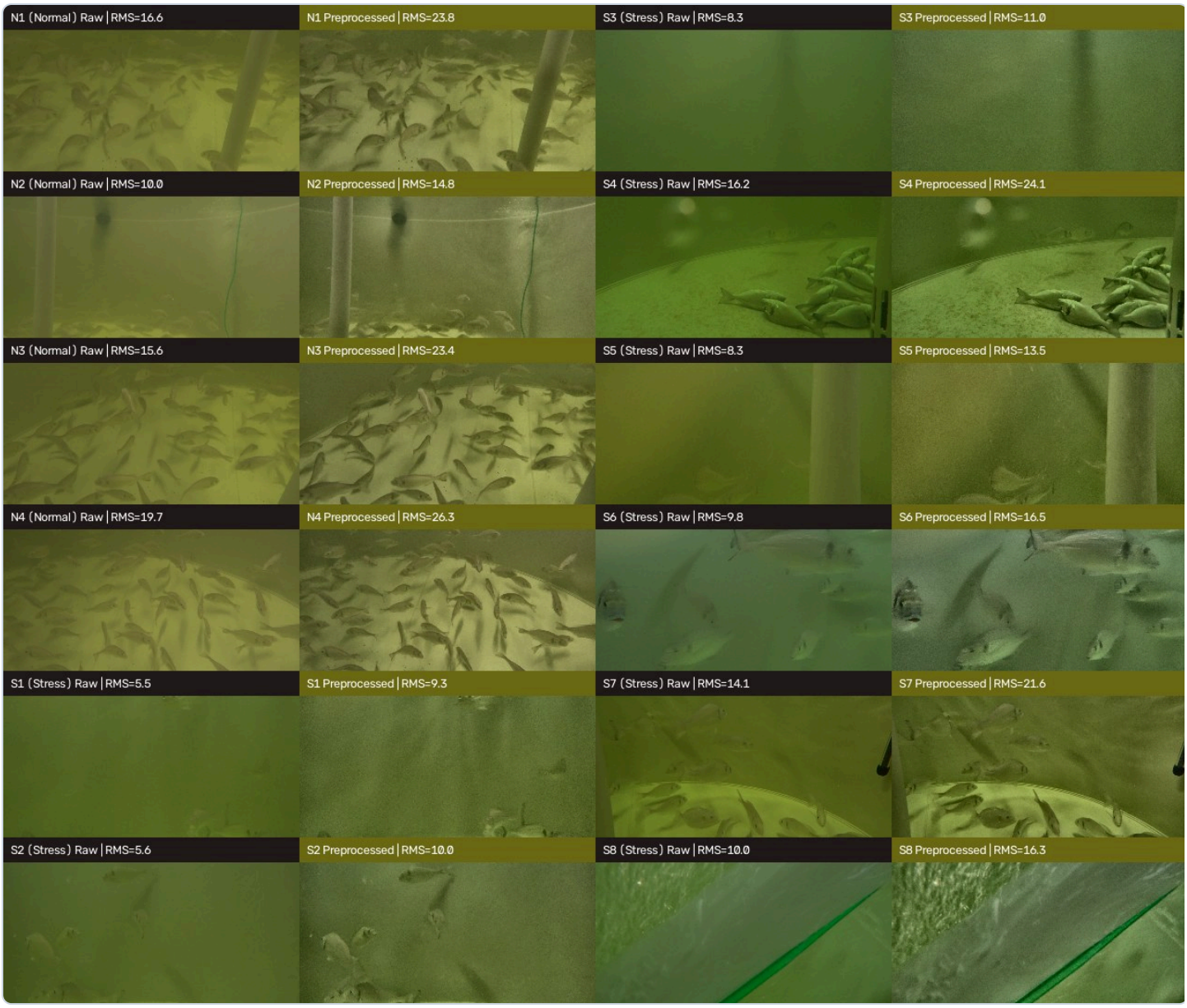
Following Milestone M1 Exploratory Data Analysis (EDA) and radiometric preprocessing, all 12 experimental recordings (`4 Normal Control` and `8 Stress Treatment` videos) were processed to remove unusable intervals (initial camera setup shake, mid-recording manual camera repositioning, and zero-fish high-turbidity intervals exceeding 40% of `S3: 35–10 hours.MP4`) and balanced into standardized training, validation, and testing splits:

- `01_Preprocessed_Clean_Videos/`: 12 radiometrically enhanced, trimmed H.264 `.mp4` video streams ready for downstream temporal analysis.
- `02_Balanced_Training_Frames/`: 282 curated frames (`194 train`, `40 val`, `48 test`) paired with `1,824` normalized fish bounding-box annotations and `dataset_structure.yaml`.
- `03_Curation_Manifests_and_Stats/`: Machine-readable `curated_dataset_manifest.csv`, `curated_dataset_summary.json`, and visual comparison grids.

2. Per-Video Curation & Preprocessing Manifest (All 12 Videos)

Code	Cohort	Cleaned Video File	Raw Duration	Curated Frames	Fish Boxes	RMS Contrast (Raw → Clean)	Quality Curation Notes
N1	Normal	`N1_Control_Clean.mp4`	26.69 min	28	362	14.97 → **22.51 (+50.4%)**	High visibility; initial 0-15s camera setup trimmed
N2	Normal	`N2_Control2_Clean.mp4`	34.43 min	32	352	10.79 → **16.59 (+53.8%)**	High visibility; baseline normal schooling
N3	Normal	`N3_Control3_Clean.mp4`	12.81 min	20	185	15.8 → **22.85 (+44.6%)**	Green color cast corrected; stable schooling
N4	Normal	`N4_Control4_Clean.mp4`	12.5 min	20	202	20.1 → **26.44 (+31.5%)**	Green color cast corrected; stable schooling
S1	Stress	`S1_Thermal_29C_10h_Clean.mp4`	18.28 min	24	92	6.61 → **11.12 (+68.2%)**	Severe low contrast (raw RMS=10.0) restored; mid-recording shake excluded
S2	Stress	`S2_Thermal_32C_10h_Clean.mp4`	5.94 min	18	53	6.0 → **10.41 (+73.5%)**	Turbidity enhanced; low-visibility intervals filtered
S3	Stress	`S3_Thermal_35C_10h_Clean.mp4`	19.01 min	20	31	8.32 → **11.0 (+32.2%)**	>40% zero-fish turbid segments excluded; active intervals retained
S4	Stress	`S4_Chronic_35C_7d_Clean.mp4`	35.15 min	30	129	16.32 → **24.23 (+48.5%)**	35.15m chronic thermal video; bottom-dwelling fish enhanced
S5	Stress	`S5_Combined_29C_5ppm_10h_Clean.mp4`	32.76 min	30	64	8.72 → **14.12 (+61.9%)**	32.76m combined stress video; haze removed and contrast restored
S6	Stress	`S6_Combined_35C_3ppm_10h_Clean.mp4`	5.0 min	18	190	8.86 → **14.74 (+66.4%)**	Combined acute thermal + hypoxia; surface and mid-water clarity restored
S7	Stress	`S7_Hypoxia_5ppm_30m_Clean.mp4`	11.56 min	22	145	13.57 → **20.83 (+53.5%)**	Mild hypoxia (5 ppm); filename typo normalized in manifest
S8	Stress	`S8_Hypoxia_3ppm_30m_Clean.mp4`	12.21 min	20	19	7.49 → **12.53 (+67.3%)**	Severe acute hypoxia (3 ppm); heavy turbidity enhanced (+90.9% RMS)

3. Visual Verification: Raw vs. Preprocessed Clean Frames (N1–N4 & S1–S8)


N1 (Normal) Raw | RMS=16.6
N1 Preprocessed | RMS=23.8
S3 (Stress) Raw | RMS=8.3
S3 Preprocessed | RMS=11.0
N2 (Normal) Raw | RMS=10.0
N2 Preprocessed | RMS=14.8
S4 (Stress) Raw | RMS=16.2
S4 Preprocessed | RMS=24.1
N3 (Normal) Raw | RMS=15.6
N3 Preprocessed | RMS=23.4
S5 (Stress) Raw | RMS=8.3
S5 Preprocessed | RMS=13.5
N4 (Normal) Raw | RMS=19.7
N4 Preprocessed | RMS=26.3
S6 (Stress) Raw | RMS=9.8
S6 Preprocessed | RMS=16.5
S1 (Stress) Raw | RMS=5.5
S1 Preprocessed | RMS=9.3
S7 (Stress) Raw | RMS=14.1
S7 Preprocessed | RMS=21.6
S2 (Stress) Raw | RMS=5.6
S2 Preprocessed | RMS=10.0
S8 (Stress) Raw | RMS=10.0
S8 Preprocessed | RMS=16.3