

53      **A Few-shot Pipeline Performance with Different Numbers of Actions and Shots**

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55      Table 1. Prediction Performance with Different Number of Actions and Shots. (Action Number 1–3)

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58 <b>Actions</b>	59 <b>Shots</b>	60 <b>Window-level</b>				61 <b>Action-level</b>			
		62 <b>Acc</b>	63 <b>Prec</b>	64 <b>Rec</b>	65 <b>F1</b>	66 <b>Acc</b>	67 <b>Prec</b>	68 <b>Rec</b>	69 <b>F1</b>
70      1	71      1	72 $0.614 \pm 0.006$	73 $0.700 \pm 0.007$	74 $0.614 \pm 0.006$	75 $0.571 \pm 0.008$	76 $0.768 \pm 0.007$	77 $0.810 \pm 0.007$	78 $0.768 \pm 0.007$	79 $0.748 \pm 0.009$
	80      2	81 $0.628 \pm 0.005$	82 $0.710 \pm 0.006$	83 $0.628 \pm 0.005$	84 $0.620 \pm 0.006$	85 $0.800 \pm 0.006$	86 $0.835 \pm 0.006$	87 $0.800 \pm 0.006$	88 $0.810 \pm 0.006$
	89      3	90 $0.658 \pm 0.005$	91 $0.736 \pm 0.005$	92 $0.658 \pm 0.005$	93 $0.634 \pm 0.006$	94 $0.832 \pm 0.006$	95 $0.860 \pm 0.005$	96 $0.832 \pm 0.006$	97 $0.825 \pm 0.006$
	98      4	99 $0.664 \pm 0.005$	100 $0.743 \pm 0.005$	101 $0.664 \pm 0.005$	102 $0.641 \pm 0.006$	103 $0.839 \pm 0.005$	104 $0.866 \pm 0.005$	105 $0.839 \pm 0.005$	106 $0.833 \pm 0.006$
	107      5	108 $0.670 \pm 0.005$	109 $0.746 \pm 0.005$	110 $0.670 \pm 0.005$	111 $0.648 \pm 0.006$	112 $0.847 \pm 0.005$	113 $0.871 \pm 0.005$	114 $0.847 \pm 0.005$	115 $0.842 \pm 0.006$
	116      6	117 $0.676 \pm 0.005$	118 $0.749 \pm 0.005$	119 $0.676 \pm 0.005$	120 $0.657 \pm 0.006$	121 $0.856 \pm 0.005$	122 $0.879 \pm 0.005$	123 $0.856 \pm 0.005$	124 $0.852 \pm 0.006$
	125      7	126 $0.685 \pm 0.005$	127 $0.755 \pm 0.005$	128 $0.685 \pm 0.005$	129 $0.667 \pm 0.006$	130 $0.864 \pm 0.005$	131 $0.883 \pm 0.005$	132 $0.864 \pm 0.005$	133 $0.860 \pm 0.006$
	134      8	135 $0.691 \pm 0.005$	136 $0.758 \pm 0.005$	137 $0.691 \pm 0.005$	138 $0.674 \pm 0.006$	139 $0.869 \pm 0.005$	140 $0.887 \pm 0.005$	141 $0.869 \pm 0.005$	142 $0.865 \pm 0.006$
	143      9	144 $0.696 \pm 0.005$	145 $0.760 \pm 0.005$	146 $0.696 \pm 0.005$	147 $0.680 \pm 0.006$	148 $0.870 \pm 0.005$	149 $0.885 \pm 0.005$	150 $0.870 \pm 0.005$	151 $0.865 \pm 0.006$
	152      10	153 $0.702 \pm 0.005$	154 $0.763 \pm 0.005$	155 $0.702 \pm 0.005$	156 $0.688 \pm 0.006$	157 $0.877 \pm 0.005$	158 $0.890 \pm 0.005$	159 $0.877 \pm 0.005$	160 $0.873 \pm 0.006$
161      2	162      1	163 $0.578 \pm 0.003$	164 $0.622 \pm 0.004$	165 $0.578 \pm 0.003$	166 $0.521 \pm 0.004$	167 $0.701 \pm 0.004$	168 $0.717 \pm 0.004$	169 $0.701 \pm 0.004$	170 $0.667 \pm 0.004$
	171      2	172 $0.589 \pm 0.003$	173 $0.635 \pm 0.004$	174 $0.589 \pm 0.003$	175 $0.545 \pm 0.004$	176 $0.745 \pm 0.004$	177 $0.760 \pm 0.004$	178 $0.745 \pm 0.004$	179 $0.730 \pm 0.004$
	180      3	181 $0.639 \pm 0.003$	182 $0.684 \pm 0.003$	183 $0.639 \pm 0.003$	184 $0.608 \pm 0.003$	185 $0.783 \pm 0.003$	186 $0.797 \pm 0.003$	187 $0.783 \pm 0.003$	188 $0.770 \pm 0.003$
	189      4	190 $0.653 \pm 0.003$	191 $0.696 \pm 0.003$	192 $0.653 \pm 0.003$	193 $0.625 \pm 0.003$	194 $0.803 \pm 0.003$	195 $0.815 \pm 0.003$	196 $0.803 \pm 0.003$	197 $0.792 \pm 0.003$
	198      5	199 $0.667 \pm 0.003$	200 $0.707 \pm 0.003$	201 $0.667 \pm 0.003$	202 $0.643 \pm 0.003$	203 $0.817 \pm 0.003$	204 $0.827 \pm 0.003$	205 $0.817 \pm 0.003$	206 $0.808 \pm 0.003$
	207      6	208 $0.679 \pm 0.003$	209 $0.717 \pm 0.003$	210 $0.679 \pm 0.003$	211 $0.659 \pm 0.003$	212 $0.829 \pm 0.003$	213 $0.838 \pm 0.003$	214 $0.829 \pm 0.003$	215 $0.821 \pm 0.003$
	216      7	217 $0.690 \pm 0.003$	218 $0.725 \pm 0.003$	219 $0.690 \pm 0.003$	220 $0.672 \pm 0.003$	221 $0.838 \pm 0.003$	222 $0.847 \pm 0.003$	223 $0.838 \pm 0.003$	224 $0.832 \pm 0.003$
	225      8	226 $0.699 \pm 0.003$	227 $0.731 \pm 0.003$	228 $0.699 \pm 0.003$	229 $0.682 \pm 0.003$	230 $0.847 \pm 0.003$	231 $0.854 \pm 0.003$	232 $0.847 \pm 0.003$	233 $0.841 \pm 0.003$
	234      9	235 $0.704 \pm 0.003$	236 $0.735 \pm 0.003$	237 $0.704 \pm 0.003$	238 $0.689 \pm 0.003$	239 $0.850 \pm 0.003$	240 $0.858 \pm 0.003$	241 $0.850 \pm 0.003$	242 $0.845 \pm 0.003$
	243      10	244 $0.708 \pm 0.003$	245 $0.738 \pm 0.003$	246 $0.708 \pm 0.003$	247 $0.695 \pm 0.003$	248 $0.854 \pm 0.003$	249 $0.862 \pm 0.003$	250 $0.854 \pm 0.003$	251 $0.849 \pm 0.003$
252      3	253      1	254 $0.566 \pm 0.002$	255 $0.572 \pm 0.003$	256 $0.566 \pm 0.002$	257 $0.511 \pm 0.003$	258 $0.670 \pm 0.003$	259 $0.667 \pm 0.004$	260 $0.670 \pm 0.003$	261 $0.636 \pm 0.003$
	262      2	263 $0.587 \pm 0.002$	264 $0.605 \pm 0.003$	265 $0.587 \pm 0.002$	266 $0.555 \pm 0.003$	267 $0.723 \pm 0.003$	268 $0.730 \pm 0.003$	269 $0.723 \pm 0.003$	270 $0.710 \pm 0.003$
	271      3	272 $0.630 \pm 0.002$	273 $0.654 \pm 0.003$	274 $0.630 \pm 0.002$	275 $0.596 \pm 0.003$	276 $0.758 \pm 0.002$	277 $0.766 \pm 0.003$	278 $0.758 \pm 0.002$	279 $0.742 \pm 0.003$
	280      4	281 $0.647 \pm 0.002$	282 $0.671 \pm 0.003$	283 $0.647 \pm 0.002$	284 $0.617 \pm 0.003$	285 $0.777 \pm 0.002$	286 $0.785 \pm 0.003$	287 $0.777 \pm 0.002$	288 $0.764 \pm 0.003$
	289      5	290 $0.660 \pm 0.002$	291 $0.683 \pm 0.002$	292 $0.660 \pm 0.002$	293 $0.635 \pm 0.003$	294 $0.791 \pm 0.002$	295 $0.799 \pm 0.003$	296 $0.791 \pm 0.002$	297 $0.781 \pm 0.003$
	298      6	299 $0.673 \pm 0.002$	300 $0.694 \pm 0.002$	301 $0.673 \pm 0.002$	302 $0.650 \pm 0.003$	303 $0.804 \pm 0.002$	304 $0.812 \pm 0.002$	305 $0.804 \pm 0.002$	306 $0.795 \pm 0.003$
	307      7	308 $0.682 \pm 0.002$	309 $0.701 \pm 0.002$	310 $0.682 \pm 0.002$	311 $0.662 \pm 0.003$	312 $0.811 \pm 0.002$	313 $0.819 \pm 0.002$	314 $0.811 \pm 0.002$	315 $0.803 \pm 0.002$
	316      8	317 $0.690 \pm 0.002$	318 $0.709 \pm 0.002$	319 $0.690 \pm 0.002$	320 $0.672 \pm 0.003$	321 $0.817 \pm 0.002$	322 $0.826 \pm 0.002$	323 $0.817 \pm 0.002$	324 $0.811 \pm 0.002$
	325      9	326 $0.697 \pm 0.002$	327 $0.714 \pm 0.002$	328 $0.697 \pm 0.002$	329 $0.680 \pm 0.003$	330 $0.823 \pm 0.002$	331 $0.831 \pm 0.002$	332 $0.823 \pm 0.002$	333 $0.818 \pm 0.002$
	334      10	335 $0.701 \pm 0.002$	336 $0.718 \pm 0.002$	337 $0.701 \pm 0.002$	338 $0.686 \pm 0.003$	339 $0.826 \pm 0.002$	340 $0.835 \pm 0.002$	341 $0.826 \pm 0.002$	342 $0.822 \pm 0.002$

Table 2. Prediction Performance with Different Number of Actions and Shots. (Action Number 4–6)

Actions	Shots	Window-level				Action-level			
		Acc	Prec	Rec	F1	Acc	Prec	Rec	F1
4	1	0.557 <sub>±0.002</sub>	0.553 <sub>±0.003</sub>	0.557 <sub>±0.002</sub>	0.501 <sub>±0.003</sub>	0.659 <sub>±0.003</sub>	0.656 <sub>±0.003</sub>	0.659 <sub>±0.003</sub>	0.627 <sub>±0.003</sub>
	2	0.589 <sub>±0.002</sub>	0.608 <sub>±0.003</sub>	0.589 <sub>±0.002</sub>	0.555 <sub>±0.003</sub>	0.723 <sub>±0.003</sub>	0.730 <sub>±0.003</sub>	0.723 <sub>±0.003</sub>	0.710 <sub>±0.003</sub>
	3	0.619 <sub>±0.002</sub>	0.635 <sub>±0.003</sub>	0.619 <sub>±0.002</sub>	0.583 <sub>±0.003</sub>	0.739 <sub>±0.003</sub>	0.745 <sub>±0.003</sub>	0.739 <sub>±0.003</sub>	0.723 <sub>±0.003</sub>
	4	0.635 <sub>±0.002</sub>	0.651 <sub>±0.003</sub>	0.635 <sub>±0.002</sub>	0.604 <sub>±0.003</sub>	0.757 <sub>±0.003</sub>	0.766 <sub>±0.003</sub>	0.757 <sub>±0.003</sub>	0.745 <sub>±0.003</sub>
	5	0.647 <sub>±0.002</sub>	0.663 <sub>±0.003</sub>	0.647 <sub>±0.002</sub>	0.621 <sub>±0.003</sub>	0.770 <sub>±0.002</sub>	0.778 <sub>±0.003</sub>	0.770 <sub>±0.002</sub>	0.761 <sub>±0.003</sub>
	6	0.658 <sub>±0.002</sub>	0.673 <sub>±0.003</sub>	0.658 <sub>±0.002</sub>	0.635 <sub>±0.003</sub>	0.782 <sub>±0.002</sub>	0.791 <sub>±0.002</sub>	0.782 <sub>±0.002</sub>	0.775 <sub>±0.003</sub>
	7	0.667 <sub>±0.002</sub>	0.681 <sub>±0.003</sub>	0.667 <sub>±0.002</sub>	0.646 <sub>±0.003</sub>	0.790 <sub>±0.002</sub>	0.799 <sub>±0.002</sub>	0.790 <sub>±0.002</sub>	0.783 <sub>±0.002</sub>
	8	0.676 <sub>±0.002</sub>	0.689 <sub>±0.003</sub>	0.676 <sub>±0.002</sub>	0.657 <sub>±0.003</sub>	0.796 <sub>±0.002</sub>	0.805 <sub>±0.002</sub>	0.796 <sub>±0.002</sub>	0.791 <sub>±0.002</sub>
	9	0.684 <sub>±0.002</sub>	0.697 <sub>±0.003</sub>	0.684 <sub>±0.002</sub>	0.667 <sub>±0.003</sub>	0.803 <sub>±0.002</sub>	0.814 <sub>±0.002</sub>	0.803 <sub>±0.002</sub>	0.800 <sub>±0.002</sub>
	10	0.689 <sub>±0.002</sub>	0.701 <sub>±0.003</sub>	0.689 <sub>±0.002</sub>	0.673 <sub>±0.003</sub>	0.807 <sub>±0.002</sub>	0.817 <sub>±0.002</sub>	0.807 <sub>±0.002</sub>	0.803 <sub>±0.002</sub>
5	1	0.542 <sub>±0.003</sub>	0.524 <sub>±0.004</sub>	0.542 <sub>±0.003</sub>	0.481 <sub>±0.004</sub>	0.636 <sub>±0.004</sub>	0.618 <sub>±0.005</sub>	0.636 <sub>±0.004</sub>	0.600 <sub>±0.005</sub>
	2	0.584 <sub>±0.003</sub>	0.581 <sub>±0.004</sub>	0.584 <sub>±0.003</sub>	0.538 <sub>±0.004</sub>	0.691 <sub>±0.004</sub>	0.689 <sub>±0.004</sub>	0.691 <sub>±0.004</sub>	0.668 <sub>±0.004</sub>
	3	0.610 <sub>±0.003</sub>	0.612 <sub>±0.004</sub>	0.610 <sub>±0.003</sub>	0.573 <sub>±0.004</sub>	0.722 <sub>±0.004</sub>	0.724 <sub>±0.004</sub>	0.722 <sub>±0.004</sub>	0.705 <sub>±0.004</sub>
	4	0.629 <sub>±0.004</sub>	0.635 <sub>±0.004</sub>	0.629 <sub>±0.004</sub>	0.597 <sub>±0.004</sub>	0.741 <sub>±0.004</sub>	0.746 <sub>±0.004</sub>	0.741 <sub>±0.004</sub>	0.728 <sub>±0.004</sub>
	5	0.643 <sub>±0.004</sub>	0.649 <sub>±0.004</sub>	0.643 <sub>±0.004</sub>	0.614 <sub>±0.004</sub>	0.755 <sub>±0.004</sub>	0.762 <sub>±0.004</sub>	0.755 <sub>±0.004</sub>	0.745 <sub>±0.004</sub>
	6	0.654 <sub>±0.004</sub>	0.661 <sub>±0.004</sub>	0.654 <sub>±0.004</sub>	0.629 <sub>±0.004</sub>	0.767 <sub>±0.004</sub>	0.774 <sub>±0.004</sub>	0.767 <sub>±0.004</sub>	0.759 <sub>±0.004</sub>
	7	0.663 <sub>±0.004</sub>	0.670 <sub>±0.004</sub>	0.663 <sub>±0.004</sub>	0.640 <sub>±0.004</sub>	0.774 <sub>±0.004</sub>	0.782 <sub>±0.004</sub>	0.774 <sub>±0.004</sub>	0.768 <sub>±0.004</sub>
	8	0.672 <sub>±0.004</sub>	0.679 <sub>±0.004</sub>	0.672 <sub>±0.004</sub>	0.651 <sub>±0.004</sub>	0.785 <sub>±0.004</sub>	0.793 <sub>±0.004</sub>	0.785 <sub>±0.004</sub>	0.779 <sub>±0.004</sub>
	9	0.678 <sub>±0.004</sub>	0.685 <sub>±0.004</sub>	0.678 <sub>±0.004</sub>	0.659 <sub>±0.004</sub>	0.789 <sub>±0.004</sub>	0.798 <sub>±0.004</sub>	0.789 <sub>±0.004</sub>	0.784 <sub>±0.004</sub>
	10	0.684 <sub>±0.004</sub>	0.690 <sub>±0.004</sub>	0.684 <sub>±0.004</sub>	0.666 <sub>±0.004</sub>	0.795 <sub>±0.004</sub>	0.803 <sub>±0.004</sub>	0.795 <sub>±0.004</sub>	0.790 <sub>±0.004</sub>
6	1	0.533 <sub>±0.009</sub>	0.510 <sub>±0.010</sub>	0.533 <sub>±0.009</sub>	0.479 <sub>±0.010</sub>	0.617 <sub>±0.010</sub>	0.613 <sub>±0.011</sub>	0.617 <sub>±0.010</sub>	0.589 <sub>±0.011</sub>
	2	0.579 <sub>±0.008</sub>	0.565 <sub>±0.010</sub>	0.579 <sub>±0.008</sub>	0.533 <sub>±0.010</sub>	0.672 <sub>±0.009</sub>	0.668 <sub>±0.011</sub>	0.672 <sub>±0.009</sub>	0.650 <sub>±0.010</sub>
	3	0.599 <sub>±0.009</sub>	0.592 <sub>±0.010</sub>	0.599 <sub>±0.009</sub>	0.561 <sub>±0.010</sub>	0.703 <sub>±0.010</sub>	0.706 <sub>±0.011</sub>	0.703 <sub>±0.010</sub>	0.686 <sub>±0.011</sub>
	4	0.617 <sub>±0.009</sub>	0.612 <sub>±0.011</sub>	0.617 <sub>±0.009</sub>	0.583 <sub>±0.011</sub>	0.720 <sub>±0.010</sub>	0.724 <sub>±0.011</sub>	0.720 <sub>±0.010</sub>	0.707 <sub>±0.011</sub>
	5	0.630 <sub>±0.009</sub>	0.628 <sub>±0.011</sub>	0.630 <sub>±0.009</sub>	0.601 <sub>±0.010</sub>	0.734 <sub>±0.009</sub>	0.739 <sub>±0.011</sub>	0.734 <sub>±0.009</sub>	0.723 <sub>±0.010</sub>
	6	0.643 <sub>±0.009</sub>	0.641 <sub>±0.010</sub>	0.643 <sub>±0.009</sub>	0.617 <sub>±0.010</sub>	0.745 <sub>±0.009</sub>	0.751 <sub>±0.010</sub>	0.745 <sub>±0.009</sub>	0.737 <sub>±0.010</sub>
	7	0.650 <sub>±0.009</sub>	0.649 <sub>±0.010</sub>	0.650 <sub>±0.009</sub>	0.625 <sub>±0.010</sub>	0.756 <sub>±0.009</sub>	0.764 <sub>±0.010</sub>	0.756 <sub>±0.009</sub>	0.749 <sub>±0.009</sub>
	8	0.659 <sub>±0.009</sub>	0.659 <sub>±0.010</sub>	0.659 <sub>±0.009</sub>	0.636 <sub>±0.010</sub>	0.766 <sub>±0.009</sub>	0.773 <sub>±0.010</sub>	0.766 <sub>±0.009</sub>	0.760 <sub>±0.009</sub>
	9	0.666 <sub>±0.009</sub>	0.666 <sub>±0.010</sub>	0.666 <sub>±0.009</sub>	0.645 <sub>±0.010</sub>	0.772 <sub>±0.009</sub>	0.783 <sub>±0.009</sub>	0.772 <sub>±0.009</sub>	0.767 <sub>±0.010</sub>
	10	0.673 <sub>±0.009</sub>	0.673 <sub>±0.010</sub>	0.673 <sub>±0.009</sub>	0.653 <sub>±0.010</sub>	0.776 <sub>±0.009</sub>	0.785 <sub>±0.010</sub>	0.776 <sub>±0.009</sub>	0.771 <sub>±0.010</sub>

## B Comparative Evaluation and Ablation of Pipeline Stages (10shots)

157 Table 3. Action-Level Results of Comparison Study and Ablation Study. The same training (10 shots, one new target behavior) and  
 158 testing data were used to ensure consistency.

160 <b>Methods</b>	161 <b>Acc</b>	162 <b>Prec</b>	163 <b>Rec</b>	164 <b>F1</b>
165 <b>SVM</b>	0.809±0.006	0.864±0.004	0.809±0.006	0.778±0.008
166 <b>Random Forest</b>	0.779±0.006	0.832±0.006	0.779±0.006	0.738±0.008
167 <b>COVID-away</b>	0.740±0.005	0.812±0.004	0.740±0.005	0.698±0.006
168 <b>Itchector</b>	0.745±0.006	0.808±0.006	0.745±0.006	0.696±0.008
169 <b>HandGesCus</b>	0.820±0.005	0.847±0.005	0.820±0.005	0.811±0.005
170 <b>SVM</b> (data augmentation & synthesis)	0.714±0.005	0.783±0.007	0.714±0.005	0.653±0.008
171 <b>Random Forest</b> (data augmentation & synthesis)	0.786±0.006	0.830±0.006	0.786±0.006	0.751±0.008
172 <b>Itchector</b> (data augmentation & synthesis)	0.754±0.007	0.785±0.009	0.754±0.007	0.702±0.009
173 <b>WatchGuardian</b> w/o all	0.800±0.005	0.839±0.005	0.800±0.005	0.785±0.006
174 <b>WatchGuardian</b> with Stage 1 (pre-trained SSL model)	0.839±0.004	0.864±0.004	0.839±0.004	0.830±0.005
175 <b>WatchGuardian</b> with Stage 1 & 2 (finetuning)	0.841±0.004	0.872±0.004	0.841±0.004	0.829±0.005
176 <b>WatchGuardian</b> with Stage 1, 2, & 3 (data augmentation & synthesis)	<b>0.877±0.005</b>	<b>0.890±0.005</b>	<b>0.877±0.005</b>	<b>0.873±0.006</b>