```
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0194 -
val_loss: 0.0227

Epoch 597/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0228

Epoch 598/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0230

Epoch 599/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0200 -
val_loss: 0.0229

Epoch 600/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0229

Epoch 601/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0229

Epoch 602/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0229

Epoch 603/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0229

Epoch 604/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0232

Epoch 605/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0229

Epoch 606/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 - val_loss: 0.0230

Epoch 607/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0232

Epoch 608/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 - val_loss: 0.0230

Epoch 609/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0194 - val_loss: 0.0226

Epoch 610/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 - val_loss: 0.0229

Epoch 611/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 - val_loss: 0.0228

Epoch 612/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0230

Epoch 613/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0205 - val_loss: 0.0229

Epoch 614/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 - val_loss: 0.0228

Epoch 615/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0194 - val_loss: 0.0229

Epoch 616/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0194 - val_loss: 0.0226

Epoch 617/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0193 - val_loss: 0.0228

Epoch 618/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0196 - val_loss: 0.0228

Epoch 619/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0201 - val_loss: 0.0227

Epoch 620/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0189 - val_loss: 0.0230

Epoch 621/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0190 - val_loss: 0.0230

Epoch 622/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0191 - val_loss: 0.0229

Epoch 623/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0188 - val_loss: 0.0230

Epoch 624/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0196 - val_loss: 0.0228

Epoch 625/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0202 - val_loss: 0.0229

Epoch 626/2500

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100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0229

Epoch 627/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0227

Epoch 628/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0229

Epoch 629/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0229

Epoch 630/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0230

Epoch 631/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0230

Epoch 632/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0228

Epoch 633/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0199 -
val_loss: 0.0227

Epoch 634/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0228

Epoch 635/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0228

Epoch 636/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 - val_loss: 0.0229

Epoch 637/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 - val_loss: 0.0228

Epoch 638/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0203 - val_loss: 0.0226

Epoch 639/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0196 - val_loss: 0.0226

Epoch 640/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0228

Epoch 641/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 - val_loss: 0.0227

Epoch 642/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 - val_loss: 0.0228

Epoch 643/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 - val_loss: 0.0227

Epoch 644/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 - val_loss: 0.0229

Epoch 645/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 - val_loss: 0.0229

Epoch 646/2500

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100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0196 -
val_loss: 0.0228

Epoch 647/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0227

Epoch 648/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0227

Epoch 649/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0226

Epoch 650/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0227

Epoch 651/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0227

Epoch 652/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0227

Epoch 653/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0226

Epoch 654/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0196 -
val_loss: 0.0227

Epoch 655/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0226

Epoch 656/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0229

Epoch 657/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0194 - val_loss: 0.0226

Epoch 658/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0227

Epoch 659/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0195 - val_loss: 0.0226

Epoch 660/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0228

Epoch 661/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 - val_loss: 0.0231

Epoch 662/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0184 - val_loss: 0.0229

Epoch 663/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0190 - val_loss: 0.0226

Epoch 664/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 0.0191 - val_loss: 0.0226

Epoch 665/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0185 - val_loss: 0.0228

Epoch 666/2500

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100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0228

Epoch 667/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0227

Epoch 668/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0228

Epoch 669/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0230

Epoch 670/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0196 -
val_loss: 0.0227

Epoch 671/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0199 -
val_loss: 0.0228

Epoch 672/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0227

Epoch 673/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0225

Epoch 674/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0198 -
val_loss: 0.0228

Epoch 675/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0199 -
val_loss: 0.0229

Epoch 676/2500
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100/100 ───────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0226

Epoch 677/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0225

Epoch 678/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0227

Epoch 679/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0194 -
val_loss: 0.0226

Epoch 680/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0226

Epoch 681/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0227

Epoch 682/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0227

Epoch 683/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0227

Epoch 684/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0226

Epoch 685/2500

100/100 ───────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0226

Epoch 686/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0201 - val_loss: 0.0228

Epoch 687/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 - val_loss: 0.0225

Epoch 688/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 - val_loss: 0.0225

Epoch 689/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 - val_loss: 0.0229

Epoch 690/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 - val_loss: 0.0224

Epoch 691/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 - val_loss: 0.0225

Epoch 692/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 - val_loss: 0.0227

Epoch 693/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 - val_loss: 0.0226

Epoch 694/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 - val_loss: 0.0228

Epoch 695/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0227

Epoch 696/2500

```
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0226

Epoch 697/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0226

Epoch 698/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0227

Epoch 699/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0226

Epoch 700/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0229

Epoch 701/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0224

Epoch 702/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0228

Epoch 703/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0227

Epoch 704/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0226

Epoch 705/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0226

Epoch 706/2500
```

```
100/100 ──────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0225

Epoch 707/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0225

Epoch 708/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0226

Epoch 709/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0194 -
val_loss: 0.0224

Epoch 710/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0200 -
val_loss: 0.0224

Epoch 711/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0224

Epoch 712/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0228

Epoch 713/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0225

Epoch 714/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0225

Epoch 715/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0225

Epoch 716/2500
```

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100/100 ──────────────────────── 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0223

Epoch 717/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0225

Epoch 718/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0225

Epoch 719/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0225

Epoch 720/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0225

Epoch 721/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0227

Epoch 722/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0227

Epoch 723/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0226

Epoch 724/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0225

Epoch 725/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0225

Epoch 726/2500
```

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100/100 ──────────────────────── 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0224

Epoch 727/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0226

Epoch 728/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0225

Epoch 729/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0228

Epoch 730/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0224

Epoch 731/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0226

Epoch 732/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0228

Epoch 733/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0225

Epoch 734/2500
100/100 ──────────────────────── 0s 3ms/step - loss: 0.0192 -
val_loss: 0.0224

Epoch 735/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0225

Epoch 736/2500
```

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100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0223

Epoch 737/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0224

Epoch 738/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0222

Epoch 739/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0226

Epoch 740/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0225

Epoch 741/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0225

Epoch 742/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0226

Epoch 743/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0225

Epoch 744/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0224

Epoch 745/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0227

Epoch 746/2500
```

```
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0226

Epoch 747/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0226

Epoch 748/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0226

Epoch 749/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0225

Epoch 750/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0200 -
val_loss: 0.0227

Epoch 751/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0226

Epoch 752/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0226

Epoch 753/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0226

Epoch 754/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0225

Epoch 755/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0225

Epoch 756/2500
```

```
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0225

Epoch 757/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0197 -
val_loss: 0.0224

Epoch 758/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0224

Epoch 759/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0223

Epoch 760/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0226

Epoch 761/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0226

Epoch 762/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0222

Epoch 763/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0225

Epoch 764/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0194 -
val_loss: 0.0223

Epoch 765/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0224

Epoch 766/2500
```

```
100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0226

Epoch 767/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0225

Epoch 768/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0224

Epoch 769/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0223

Epoch 770/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0223

Epoch 771/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0223

Epoch 772/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0224

Epoch 773/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0224

Epoch 774/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0194 -
val_loss: 0.0225

Epoch 775/2500

100/100 ─────────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0226

Epoch 776/2500
```

```
100/100 ───────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0224

Epoch 777/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0224

Epoch 778/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0199 -
val_loss: 0.0221

Epoch 779/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0224

Epoch 780/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0225

Epoch 781/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0224

Epoch 782/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0223

Epoch 783/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0224

Epoch 784/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0225

Epoch 785/2500
100/100 ───────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0226

Epoch 786/2500
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```
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0192 -
val_loss: 0.0223

Epoch 787/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0194 -
val_loss: 0.0224

Epoch 788/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0223

Epoch 789/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0222

Epoch 790/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0223

Epoch 791/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0190 -
val_loss: 0.0224

Epoch 792/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0222

Epoch 793/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0224

Epoch 794/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0223

Epoch 795/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0222

Epoch 796/2500
```

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100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0221

Epoch 797/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0221

Epoch 798/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0223

Epoch 799/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0222

Epoch 800/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0221

Epoch 801/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0223

Epoch 802/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0223

Epoch 803/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0223

Epoch 804/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0223

Epoch 805/2500

100/100 ──────────────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0223

Epoch 806/2500
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100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0222

Epoch 807/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0224

Epoch 808/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0224

Epoch 809/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0224

Epoch 810/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0224

Epoch 811/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0224

Epoch 812/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0223

Epoch 813/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0222

Epoch 814/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0223

Epoch 815/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0224

Epoch 816/2500
```

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0221

Epoch 817/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0194 - val_loss: 0.0222

Epoch 818/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0221

Epoch 819/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0178 - val_loss: 0.0223

Epoch 820/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0224

Epoch 821/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0222

Epoch 822/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0223

Epoch 823/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0186 - val_loss: 0.0223

Epoch 824/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0223

Epoch 825/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0191 - val_loss: 0.0223

Epoch 826/2500

```
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0223

Epoch 827/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0223

Epoch 828/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0222

Epoch 829/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0221

Epoch 830/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0224

Epoch 831/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0224

Epoch 832/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0225

Epoch 833/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0223

Epoch 834/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0222

Epoch 835/2500

100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0223

Epoch 836/2500
```

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0221

Epoch 837/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0222

Epoch 838/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0221

Epoch 839/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0183 - val_loss: 0.0223

Epoch 840/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0223

Epoch 841/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0188 - val_loss: 0.0223

Epoch 842/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0199 - val_loss: 0.0222

Epoch 843/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0188 - val_loss: 0.0221

Epoch 844/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0222

Epoch 845/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0187 - val_loss: 0.0221

Epoch 846/2500

```
100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0221

Epoch 847/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0222

Epoch 848/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0222

Epoch 849/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0224

Epoch 850/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0223

Epoch 851/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0220

Epoch 852/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0221

Epoch 853/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0222

Epoch 854/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0224

Epoch 855/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0224

Epoch 856/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 - val_loss: 0.0222

Epoch 857/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0184 - val_loss: 0.0223

Epoch 858/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 - val_loss: 0.0224

Epoch 859/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 - val_loss: 0.0224

Epoch 860/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0185 - val_loss: 0.0221

Epoch 861/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 - val_loss: 0.0220

Epoch 862/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 - val_loss: 0.0223

Epoch 863/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 - val_loss: 0.0221

Epoch 864/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0191 - val_loss: 0.0220

Epoch 865/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0173 - val_loss: 0.0221

Epoch 866/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0221

Epoch 867/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0221

Epoch 868/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0223

Epoch 869/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0221

Epoch 870/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0220

Epoch 871/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0220

Epoch 872/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0224

Epoch 873/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0221

Epoch 874/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0221

Epoch 875/2500

100/100 —————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0222

Epoch 876/2500

```
100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0223

Epoch 877/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0191 -
val_loss: 0.0222

Epoch 878/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0224

Epoch 879/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0219

Epoch 880/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0223

Epoch 881/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0219

Epoch 882/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0223

Epoch 883/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0223

Epoch 884/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0220

Epoch 885/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0223

Epoch 886/2500
```

100/100 ———————————————————— 0s 2ms/step - loss: 0.0177 - val_loss: 0.0220

Epoch 887/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0220

Epoch 888/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0183 - val_loss: 0.0223

Epoch 889/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0186 - val_loss: 0.0222

Epoch 890/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0224

Epoch 891/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0191 - val_loss: 0.0220

Epoch 892/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0219

Epoch 893/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0188 - val_loss: 0.0222

Epoch 894/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0221

Epoch 895/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0220

Epoch 896/2500

```
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0224

Epoch 897/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0220

Epoch 898/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0223

Epoch 899/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0219

Epoch 900/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0221

Epoch 901/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0221

Epoch 902/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0220

Epoch 903/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0195 -
val_loss: 0.0219

Epoch 904/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0221

Epoch 905/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 0.0187 -
val_loss: 0.0221

Epoch 906/2500
```

```
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0221

Epoch 907/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0189 -
val_loss: 0.0219

Epoch 908/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0223

Epoch 909/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0221

Epoch 910/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0219

Epoch 911/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0222

Epoch 912/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0221

Epoch 913/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0221

Epoch 914/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0221

Epoch 915/2500
100/100 ──────────────────────── 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0222

Epoch 916/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 - val_loss: 0.0219

Epoch 917/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 - val_loss: 0.0221

Epoch 918/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0179 - val_loss: 0.0221

Epoch 919/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0189 - val_loss: 0.0220

Epoch 920/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0186 - val_loss: 0.0220

Epoch 921/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0177 - val_loss: 0.0220

Epoch 922/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0175 - val_loss: 0.0219

Epoch 923/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 - val_loss: 0.0221

Epoch 924/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 - val_loss: 0.0218

Epoch 925/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 - val_loss: 0.0220

Epoch 926/2500

```
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0221
Epoch 927/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0220
Epoch 928/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0220
Epoch 929/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0222
Epoch 930/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0220
Epoch 931/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0193 -
val_loss: 0.0219
Epoch 932/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0222
Epoch 933/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0221
Epoch 934/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0173 -
val_loss: 0.0221
Epoch 935/2500
100/100 ———————————————————————— 0s 2ms/step - loss: 0.0174 -
val_loss: 0.0219
Epoch 936/2500
```

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0220

Epoch 937/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0183 - val_loss: 0.0220

Epoch 938/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0188 - val_loss: 0.0219

Epoch 939/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0186 - val_loss: 0.0220

Epoch 940/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0177 - val_loss: 0.0220

Epoch 941/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0220

Epoch 942/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0219

Epoch 943/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0218

Epoch 944/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0220

Epoch 945/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0219

Epoch 946/2500

```
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0222

Epoch 947/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0221

Epoch 948/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0220

Epoch 949/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0219

Epoch 950/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0220

Epoch 951/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0221

Epoch 952/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0219

Epoch 953/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0221

Epoch 954/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0219

Epoch 955/2500
100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0222

Epoch 956/2500
```

100/100 ——————————————————— 0s 2ms/step - loss: 0.0173 - val_loss: 0.0219

Epoch 957/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0187 - val_loss: 0.0221

Epoch 958/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0220

Epoch 959/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0176 - val_loss: 0.0221

Epoch 960/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0183 - val_loss: 0.0219

Epoch 961/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0219

Epoch 962/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0178 - val_loss: 0.0221

Epoch 963/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0221

Epoch 964/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0219

Epoch 965/2500

100/100 ——————————————————— 0s 2ms/step - loss: 0.0187 - val_loss: 0.0217

Epoch 966/2500

```
100/100 ———————————————————— 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0218

Epoch 967/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0221

Epoch 968/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0219

Epoch 969/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0217

Epoch 970/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0220

Epoch 971/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0218

Epoch 972/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0219

Epoch 973/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0217

Epoch 974/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0219

Epoch 975/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0218

Epoch 976/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0174 - val_loss: 0.0222

Epoch 977/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 - val_loss: 0.0216

Epoch 978/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0176 - val_loss: 0.0219

Epoch 979/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0177 - val_loss: 0.0218

Epoch 980/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0174 - val_loss: 0.0217

Epoch 981/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0192 - val_loss: 0.0218

Epoch 982/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0179 - val_loss: 0.0218

Epoch 983/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0176 - val_loss: 0.0219

Epoch 984/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step - loss: 0.0173 - val_loss: 0.0218

Epoch 985/2500

100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0182 - val_loss: 0.0219

Epoch 986/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0172 - val_loss: 0.0223

Epoch 987/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0220

Epoch 988/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0218

Epoch 989/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0219

Epoch 990/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0174 - val_loss: 0.0221

Epoch 991/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0220

Epoch 992/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0219

Epoch 993/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0185 - val_loss: 0.0220

Epoch 994/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0177 - val_loss: 0.0219

Epoch 995/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0220

Epoch 996/2500

```
100/100 ──────────────────── 0s 2ms/step - loss: 0.0188 -
val_loss: 0.0218

Epoch 997/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0174 -
val_loss: 0.0217

Epoch 998/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0217

Epoch 999/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0220

Epoch 1000/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0220

Epoch 1001/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0219

Epoch 1002/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0217

Epoch 1003/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0222

Epoch 1004/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0219

Epoch 1005/2500

100/100 ──────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0217

Epoch 1006/2500
```

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0218

Epoch 1007/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0220

Epoch 1008/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0217

Epoch 1009/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0176 - val_loss: 0.0220

Epoch 1010/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0175 - val_loss: 0.0217

Epoch 1011/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0221

Epoch 1012/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0222

Epoch 1013/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0185 - val_loss: 0.0219

Epoch 1014/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0220

Epoch 1015/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0174 - val_loss: 0.0218

Epoch 1016/2500

```
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0187 -
val_loss: 0.0217

Epoch 1017/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0218

Epoch 1018/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0218

Epoch 1019/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0219

Epoch 1020/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0174 -
val_loss: 0.0218

Epoch 1021/2500
100/100 ──────────────────────────── 0s 1ms/step - loss: 0.0174 -
val_loss: 0.0220

Epoch 1022/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0219

Epoch 1023/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0170 -
val_loss: 0.0220

Epoch 1024/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0171 -
val_loss: 0.0221

Epoch 1025/2500
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0182 -
val_loss: 0.0219

Epoch 1026/2500
```

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0178 - val_loss: 0.0219

Epoch 1027/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 - val_loss: 0.0216

Epoch 1028/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 - val_loss: 0.0219

Epoch 1029/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 - val_loss: 0.0220

Epoch 1030/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0173 - val_loss: 0.0222

Epoch 1031/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0187 - val_loss: 0.0217

Epoch 1032/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0177 - val_loss: 0.0218

Epoch 1033/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0183 - val_loss: 0.0217

Epoch 1034/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0180 - val_loss: 0.0219

Epoch 1035/2500

100/100 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0179 - val_loss: 0.0219

Epoch 1036/2500

```
100/100 ———————————————————— 0s 2ms/step - loss: 0.0174 -
val_loss: 0.0218
Epoch 1037/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0217
Epoch 1038/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0220
Epoch 1039/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0219
Epoch 1040/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0186 -
val_loss: 0.0217
Epoch 1041/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0219
Epoch 1042/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0220
Epoch 1043/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0220
Epoch 1044/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0219
Epoch 1045/2500
100/100 ———————————————————— 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0218
Epoch 1046/2500
```

```
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0216

Epoch 1047/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0178 -
val_loss: 0.0217

Epoch 1048/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0217

Epoch 1049/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0219

Epoch 1050/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0176 -
val_loss: 0.0218

Epoch 1051/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0221

Epoch 1052/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0217

Epoch 1053/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0172 -
val_loss: 0.0219

Epoch 1054/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0219

Epoch 1055/2500
100/100 ━━━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0215

Epoch 1056/2500
```

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0219

Epoch 1057/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0219

Epoch 1058/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0191 - val_loss: 0.0218

Epoch 1059/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0170 - val_loss: 0.0217

Epoch 1060/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0218

Epoch 1061/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0188 - val_loss: 0.0217

Epoch 1062/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0174 - val_loss: 0.0217

Epoch 1063/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0187 - val_loss: 0.0218

Epoch 1064/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0178 - val_loss: 0.0216

Epoch 1065/2500

100/100 ———————————————— 0s 2ms/step - loss: 0.0173 - val_loss: 0.0220

Epoch 1066/2500

```
100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0183 -
val_loss: 0.0219

Epoch 1067/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0221

Epoch 1068/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0222

Epoch 1069/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0217

Epoch 1070/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0177 -
val_loss: 0.0220

Epoch 1071/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0184 -
val_loss: 0.0218

Epoch 1072/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0173 -
val_loss: 0.0216

Epoch 1073/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0218

Epoch 1074/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0217

Epoch 1075/2500

100/100 ──────────────────────────── 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0218

Epoch 1076/2500
```

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100/100 ———————————————— 0s 2ms/step - loss: 0.0173 -
val_loss: 0.0216

Epoch 1077/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0179 -
val_loss: 0.0217

Epoch 1078/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0175 -
val_loss: 0.0217

Epoch 1079/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0174 -
val_loss: 0.0219

Epoch 1080/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0172 -
val_loss: 0.0220

Epoch 1081/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0174 -
val_loss: 0.0218

Epoch 1082/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0172 -
val_loss: 0.0218

Epoch 1083/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0180 -
val_loss: 0.0217

Epoch 1084/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0181 -
val_loss: 0.0218

Epoch 1085/2500
100/100 ———————————————— 0s 2ms/step - loss: 0.0185 -
val_loss: 0.0216

Epoch 1086/2500
```

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0217

Epoch 1087/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0216

Epoch 1088/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0178 - val_loss: 0.0218

Epoch 1089/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0218

Epoch 1090/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0178 - val_loss: 0.0217

Epoch 1091/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0217

Epoch 1092/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0176 - val_loss: 0.0216

Epoch 1093/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0170 - val_loss: 0.0216

Epoch 1094/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0218

Epoch 1095/2500

100/100 ———————————————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0216

Epoch 1096/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0216

Epoch 1097/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0179 - val_loss: 0.0217

Epoch 1098/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0216

Epoch 1099/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0184 - val_loss: 0.0217

Epoch 1100/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0216

Epoch 1101/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0173 - val_loss: 0.0217

Epoch 1102/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0181 - val_loss: 0.0219

Epoch 1103/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0177 - val_loss: 0.0216

Epoch 1104/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0182 - val_loss: 0.0216

Epoch 1105/2500

100/100 ———————————— 0s 2ms/step - loss: 0.0180 - val_loss: 0.0216

12/12 ———————————— 0s 4ms/step

Comparison of Model Performance (Matching Paper Table 4):

Model	Your RMSE (W/m^2)	Paper RMSE (W/m^2)	Difference
Persistence	220.987	209.25	5.6%
Linear Regression	231.137	230.99	0.1%
BPNN	88.3444	133.53	-33.8%
LSTM	82.2341	76.25	7.8%

Improvement Over Baselines:

Comparison	Your Improvement	Paper Improvement
LSTM vs BPNN	6.9%	42.9%
LSTM vs LR	64.4%	61.1%
LSTM vs Persistence	62.8%	63.6%

LSTM Training History

BPNN Training History