README – API de Prédiction des Prix Immobiliers
Projet FastAPI + Docker + Google Cloud Run

1. Exécuter l'API localement
1) Créer un environnement virtuel :
python -m venv .venv

2) Activer l'environnement (Windows) :
.venv\Scripts\activate

3) Installer les dépendances :
pip install -r requirements.txt

4) Lancer l'API :
uvicorn app:app --reload --host 127.0.0.1 --port 8000
Documentation Swagger : http://127.0.0.1:8000/docs

2. Docker Local
Construire l'image Docker :
docker build -t housing-api .

Exécuter le conteneur :
docker run -p 8000:8000 housing-api
API disponible : http://localhost:8000

3. Rôle des fichiers
Dockerfile : Définit l'environnement et lance Uvicorn.
requirements.txt : Contient toutes les dépendances Python.
best_model.pkl : Pipeline ML complet avec preprocessing + modèle.
app.py : Le code FastAPI (endpoints /health, /predict, /docs).
utils.py : Chargement du modèle.
.dockerignore : Ignore les fichiers inutiles dans le build Docker.

4. Structure du projet
app.py – API FastAPI
utils.py – Fonction load_model
best_model.pkl – Pipeline complet
Dockerfile – Image Docker
requirements.txt – Dépendances
index.html – Interface utilisateur (test API)

5. Déploiement Google Cloud Run
1) Build Cloud Build :
gcloud builds submit --tag gcr.io/api-housing/housing-api

2) Déploiement Cloud Run :
gcloud run deploy housing-api --image gcr.io/api-housing/housing-api --platform managed --region us-central1 --allow-unauthenticated

URL publique :
https://housing-api-275363795836.us-central1.run.app

6. Tests de l'API
GET /health – Vérification du modèle
POST /predict – Faire une prédiction
/docs – Swagger UI

Exemple JSON :

```
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  {"MSSubClass": 60,"LotFrontage": 65.0,"LotArea": 8450,"OverallQual": 7,"OverallCond": 5,"YearBuilt": 2003,"YearRemodAdd":
2003,"MasVnrArea": 0.0,"BsmtFinSF1": 706,"BsmtFinSF2": 0,"BsmtUnfSF": 150,"TotalBsmtSF": 856,"1stFlrSF": 856,"2ndFlrSF":
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  }
]
```