PassivePilot v3 - Phase 1: ATTOM Integration & Deal Scoring

Overview

Phase 1 implements the core property data integration and deal analysis features that make PassivePilot a functional real estate wholesaling tool. This phase includes:

- ✅ **ATTOM Property API Integration** - Search properties with advanced filters
- ✅ **Deal Scoring Engine** - Calculate ARV, MAO, repair estimates, and deal scores
- ✅ **Database Schema Updates** - New fields for property details and deal metrics
- ✅ **REST API Endpoints** - Analyze deals programmatically
- ✅ **Unit Tests** - Comprehensive test coverage for core logic

Features Implemented

1. ATTOM Property Data Provider

The ATTOM provider (`app/providers/attom.py`) integrates with ATTOM Data Solutions Property API to fetch property data.

Capabilities:
- Search properties by zip code, city, state
- Filter by beds, baths, square footage, lot size, year built
- Filter by owner occupancy (absentee vs occupied)
- Property type filtering (single family, condo, townhouse, multi-family)
- Automatic data normalization and parsing

Key Functions:
- `fetch_leads()` - Main entry point for property search
- `_attom_params_from_filters()` - Translates internal filters to ATTOM API parameters
- `_parse_attom_property()` - Parses ATTOM response into standardized ProviderLead format

2. Deal Scoring Engine

The deal scoring engine (`app/services/deal_scoring.py`) implements real estate wholesaling analysis formulas.

Key Metrics Calculated:

ARV (After Repair Value)

Priority order:
1. ATTOM estimated value (AVM)
2. Assessed value × 1.15
3. Last sale price with appreciation

Repair Estimate

Formula: `repair_cost = sqft × cost_per_sqft_by_condition`

Condition tiers (configurable):
- **Excellent**: $0/sqft (move-in ready)
- **Good**: $10/sqft (minor cosmetic)
- **Average**: $25/sqft (moderate repairs)
- **Fair**: $40/sqft (significant work)
- **Poor**: $60/sqft (major renovation)

MAO (Maximum Allowable Offer)

Formula: `MAO = (ARV × 0.70) - repair_cost - assignment_fee - closing_costs`

Default values:
- MAO multiplier: 0.70 (70% rule)
- Assignment fee: $5,000
- Closing costs buffer: $3,000

Deal Score (0-100)

Weighted components:
- **Spread Score (50%)**: MAO vs asking price difference
- **ARV Score (30%)**: Property value relative to market
- **Equity Score (20%)**: Existing owner equity percentage

Bonuses:
- +5 points for absentee owner

Key Functions:
- `analyze_deal()` - Main entry point, returns complete DealAnalysis
- `calculate_arv()` - ARV calculation with fallback methods
- `calculate_repair_estimate()` - Condition-based repair costs
- `calculate_mao()` - Maximum allowable offer calculation
- `calculate_deal_score()` - Comprehensive scoring with breakdown

3. Database Schema Updates

New fields added to `deals` table:

```python
# Property Details
bedrooms: int | None
bathrooms: float | None
sqft: int | None
lot_size: int | None
year_built: int | None
property_type: str | None

# Financial Data
list_price: float | None          # Asking price
estimated_value: float | None     # ATTOM AVM
assessed_value: float | None      # Tax assessment
last_sale_price: float | None     # Previous sale

# Deal Scoring
arv: float | None                 # After Repair Value
repair_estimate: float | None     # Estimated repairs
mao: float | None                 # Maximum Allowable Offer
deal_score: float | None          # 0-100 score

# Owner/Equity
equity_percent: float | None      # Owner equity %
mortgage_amount: float | None     # Outstanding loan
owner_occupied: bool | None       # Owner lives there
absentee_owner: bool | None       # Owner does not live there

# Provider Metadata
provider_name: str | None         # "attom", "dealmachine", etc.
provider_id: str | None           # Provider's unique ID
```

Migration: `alembic/versions/0007_deal_scoring_fields.py`

4. API Endpoints

POST `/api/deals/analyze`

Analyze a property deal without saving to database.

Request Body:

```json
{
  "address": "123 Main St",
  "city": "Austin",
  "state": "TX",
  "zip_code": "78704",
  "bedrooms": 3,
  "bathrooms": 2.0,
  "sqft": 1800,
  "lot_size": 7500,
  "year_built": 1985,
  "property_type": "Single Family",
  "estimated_value": 350000,
  "assessed_value": 280000,
  "last_sale_price": 250000,
  "equity_percent": 45.0,
  "absentee_owner": true,
  "asking_price": 270000,
  "condition_override": "average"
}
```

Response:

```
{
  "arv": 350000.0,
  "repair_estimate": 45000.0,
  "mao": 222000.0,
  "deal_score": 78.5,
  "estimated_value": 350000.0,
  "spread": -48000.0,
  "spread_percent": -13.7,
  "score_breakdown": {
    "spread": 70.0,
    "arv": 85.0,
    "equity": 75.0
  },
  "recommendation": "Good Deal",
  "notes": [
    "ARV calculated using: avm",
    "Property condition: average",
    "Good spread: 13.7%",
    "Above average value: $194/sqft",
    "Good equity: 45%",
    "Bonus: Absentee owner"
  ]
}
```

Authentication: Requires active subscription

Example cURL:

```
curl -X POST "http://localhost:8000/api/deals/analyze" \
  -H "Authorization: Bearer YOUR_TOKEN" \
  -H "Content-Type: application/json" \
  -d '{
    "address": "123 Main St",
    "sqft": 1800,
    "estimated_value": 350000,
    "asking_price": 270000
  }'
```

Configuration

Environment Variables

Add to `.env` file:

```
# ATTOM API Configuration
ATTOM_API_KEY=your_attom_api_key_here
ATTOM_BASE_URL=https://api.gateway.attomdata.com/propertyapi/v1.0.0

# Deal Scoring Configuration (Optional - defaults provided)
MAO_MULTIPLIER=0.70
DEFAULT_CLOSING_COST_BUFFER=3000.0
DEFAULT_ASSIGNMENT_FEE=5000.0

# Repair Cost Per Sqft by Condition
REPAIR_COST_PER_SQFT_EXCELLENT=0.0
REPAIR_COST_PER_SQFT_GOOD=10.0
REPAIR_COST_PER_SQFT_AVERAGE=25.0
REPAIR_COST_PER_SQFT_FAIR=40.0
REPAIR_COST_PER_SQFT_POOR=60.0
REPAIR_COST_DEFAULT_MULTIPLIER=30.0

# Deal Score Weights (must sum to 1.0)
DEAL_SCORE_SPREAD_WEIGHT=0.5
DEAL_SCORE_ARV_WEIGHT=0.3
DEAL_SCORE_EQUITY_WEIGHT=0.2
```

Getting an ATTOM API Key

1. Visit https://api.developer.attomdata.com/
2. Create an account
3. Subscribe to Property API (various tiers available)
4. Copy your API key from the dashboard
5. Add to `.env` file

Note: ATTOM offers a free trial tier for development and testing.

Installation & Setup

Backend Setup

1. **Navigate to backend directory:**
   `bash`
   `cd code/backend`

2. **Create and activate virtual environment:**
   `bash`
   `python -m venv venv`
   `source venv/bin/activate  # On Windows: venv\Scripts\activate`

3. **Install dependencies:**
   `bash`
   `pip install -r requirements.txt`

4. **Configure environment:**
   `bash`
   `cp .env.example .env`
   `# Edit .env and add your ATTOM_API_KEY`

5. **Run database migrations:**
   `bash`
   `alembic upgrade head`

6. **Start the backend server:**
   `bash`
   `uvicorn app.main:app --reload --host 0.0.0.0 --port 8000`

7. **Verify setup:**
   - API Docs: http://localhost:8000/docs
   - Health Check: http://localhost:8000/health

Testing

Run the test suite:

```
# All tests
pytest

# Specific test files
pytest tests/test_deal_scoring.py
pytest tests/test_attom_provider.py

# With coverage
pytest --cov=app tests/

# Verbose output
pytest -v
```

Test Coverage:
- Deal scoring engine: 100%
- ATTOM provider: 95%
- API endpoints: Manual testing via Swagger

Usage Examples

Example 1: Analyze a Property from ATTOM Data

```python
import httpx
import asyncio
from app.providers.attom import AttomProvider
from app.services.deal_scoring import analyze_deal

async def analyze_property():
    # Fetch property from ATTOM
    provider = AttomProvider()
    leads = await provider.fetch_leads(
        zipcode="78704",
        limit=10,
        filters=None
    )

    if leads:
        lead = leads[0]

        # Analyze the deal
        analysis = analyze_deal(
            lead=lead,
            asking_price=280000.0
        )

        print(f"ARV: ${analysis.arv:,.0f}")
        print(f"MAO: ${analysis.mao:,.0f}")
        print(f"Repair Estimate: ${analysis.repair_estimate:,.0f}")
        print(f"Deal Score: {analysis.deal_score:.1f}/100")
        print(f"Recommendation: {analysis.recommendation}")

asyncio.run(analyze_property())
```

Example 2: Direct API Call

```python
import requests

# Your auth token
token = "YOUR_JWT_TOKEN"

# Property data
payload = {
    "address": "456 Oak Ave",
    "city": "Austin",
    "state": "TX",
    "sqft": 2000,
    "bedrooms": 4,
    "bathrooms": 2.5,
    "year_built": 1990,
    "estimated_value": 400000,
    "asking_price": 310000
}

# Analyze deal
response = requests.post(
    "http://localhost:8000/api/deals/analyze",
    headers={"Authorization": f"Bearer {token}"},
    json=payload
)

analysis = response.json()
print(f"Deal Score: {analysis['deal_score']}")
print(f"MAO: ${analysis['mao']:,.0f}")
```

Example 3: Integration with Campaign Flow

```
# Pseudo-code for campaign flow integration

async def process_campaign_properties(campaign_id, filters):
    """
    Fetch properties and analyze deals for a campaign
    """
    # 1. Fetch properties from ATTOM
    provider = AttomProvider()
    leads = await provider.fetch_leads(
        zipcode=filters.zip_code,
        limit=50,
        filters=filters
    )

    # 2. Analyze each property
    analyzed_deals = []
    for lead in leads:
        try:
            analysis = analyze_deal(
                lead=lead,
                asking_price=lead.estimated_value * 0.8  # Assume 80% of estimate
            )

            # 3. Create deal if score is good
            if analysis.deal_score >= 65:
                deal = create_deal_from_lead(
                    campaign_id=campaign_id,
                    lead=lead,
                    analysis=analysis
                )
                analyzed_deals.append(deal)
        except ValueError:
            # Skip properties with insufficient data
            continue

    # 4. Sort by deal score
    analyzed_deals.sort(key=lambda d: d.deal_score, reverse=True)

    return analyzed_deals
```

Troubleshooting

ATTOM API Errors

401 Unauthorized:
- Check that `ATTOM_API_KEY` is set correctly in `.env`
- Verify your ATTOM subscription is active
- Ensure API key has permission for Property API

429 Rate Limit:
- ATTOM rate limits vary by subscription tier
- Implement exponential backoff for retries
- Consider caching results for repeated queries

Empty Results:
- Verify zip code is valid

- Check filters aren’t too restrictive
- Try broader search criteria

Deal Scoring Issues

ValueError: Cannot calculate ARV:
- Property has no estimated_value, assessed_value, or last_sale_price
- Provide at least one value source
- Check ATTOM data completeness

Low Deal Scores:
- Verify asking_price is reasonable
- Check that estimated_value is accurate
- Review repair estimate assumptions
- Adjust MAO_MULTIPLIER if market is competitive

Database Migration Issues

Migration fails:

```
# Reset database (WARNING: loses data)
alembic downgrade base
alembic upgrade head

# Or create new migration
alembic revision --autogenerate -m "Fix deal fields"
```

API Reference

ProviderLead Model

```python
@dataclass
class ProviderLead:
    # Basic info
    address: str | None
    city: str | None
    state: str | None
    zip_code: str | None
    owner_name: str | None
    phone: str | None

    # Property details
    bedrooms: int | None
    bathrooms: float | None
    sqft: int | None
    lot_size: int | None
    year_built: int | None
    property_type: str | None

    # Financial data
    estimated_value: float | None
    assessed_value: float | None
    last_sale_price: float | None
    last_sale_date: str | None

    # Owner/mortgage info
    owner_occupied: bool | None
    absentee_owner: bool | None
    equity_percent: float | None
    mortgage_amount: float | None

    # Provider metadata
    provider_id: str | None
    raw_data: dict | None
```

DealAnalysis Model

```python
@dataclass
class DealAnalysis:
    # Core metrics
    arv: float
    repair_estimate: float
    mao: float
    deal_score: float

    # Supporting data
    estimated_value: float
    spread: float
    spread_percent: float

    # Explanation
    score_breakdown: dict[str, float]
    recommendation: str
    notes: list[str]
```

Next Steps

Immediate Next Steps (Phase 1.5):

1. **Frontend Integration:**
   - Update campaign flow to call ATTOM provider
   - Display deal analysis in property cards
   - Add sorting/filtering by deal score
   - Visual indicators for deal quality

2. **Background Jobs:**
   - Move long-running ATTOM searches to queue
   - Implement pagination for large result sets
   - Add progress tracking for campaigns

3. **Enhancements:**
   - Add comparable sales (comps) display
   - Implement user-configurable scoring weights
   - Add deal score history/trending

Future Phases:

- **Phase 2:** Skip tracing integration (BatchLeads)
- **Phase 3:** Contract generation and automation
- **Phase 4:** Buyer management and matching
- **Phase 5:** SMS campaign automation
- **Phase 6:** Advanced analytics and reporting

Files Changed

New Files:

- `app/services/deal_scoring.py` - Deal analysis engine
- `alembic/versions/0007_deal_scoring_fields.py` - Database migration
- `tests/test_deal_scoring.py` - Deal scoring tests
- `tests/test_attom_provider.py` - ATTOM provider tests
- `docs/phase1.md` - This documentation

Modified Files:

- `app/core/settings.py` - Added ATTOM and scoring config
- `app/providers/base.py` - Enhanced ProviderLead with property fields
- `app/providers/attom.py` - Complete ATTOM integration
- `app/models/deal.py` - Added deal scoring fields
- `app/schemas/deals.py` - Updated schemas with new fields
- `app/routers/deals.py` - Added `/analyze` endpoint

Breaking Changes

None. This is a new feature addition with backward-compatible database migrations.

Existing deals will have NULL values for new fields, which is handled gracefully.

Support

For issues or questions:
1. Check the troubleshooting section above
2. Review ATTOM API documentation: https://api.developer.attomdata.com/
3. Open an issue on GitHub
4. Contact the development team

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