

Going Beyond Linear Models: Takeaways

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Syntax

- Create polynomial features via the `PolynomialFeatures` class

```
from sklearn.preprocessing import PolynomialFeatures
poly = PolynomialFeatures(degree=3)
poly_X = poly.fit_transform(X)
```

- Create basis function features for a spline via the `SplineTransformer` class

```
from sklearn.preprocessing import SplineTransformer
spline = SplineTransformer(degree=1, n_knots=2, knots="uniform")
spline.fit_transform(X)
```

Concepts

- **Polynomial models** add powers of features to help explain non-linear trends.
- **Piecewise functions** can use different functions for different regions of the predictor.
- **Knots** are points where the predictor function changes in a spline model.
- **Spline models** are piecewise polynomials that incorporate constraints to be continuous and smooth at the knot points.
- Spline models can be represented as a linear combination of **basis functions**. These basis functions are functions of the original predictor.
- To fully characterize a spline, we only need to create and calculate $d + k - 1$ basis functions. Thanks to the `SplineTransformer` class, we don't need to know the explicit form of the basis functions.

Resources

- [scikit-learn official documentation](#)
- [scikit-learn vignette on polynomials and splines](#)

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